



Sierra Ecosystem
Associates

June 11, 2009

County of El Dorado
Procurement & Contracts
330 Fair Lane
Placerville, CA 95667
Attn.: Bonnie H. Rich, Sr. Dept. Analyst

RE: Response to May 8, 2009 Request for Proposals to Prepare an Integrated Natural
Resources Management Plan and Environmental Document Preparation
(RFP #09-918-116)

Dear Ms. Rich:

Sierra Ecosystem Associates (SEA) is pleased to submit herewith one (1) original and six (6) copies of our team's proposal to assist El Dorado County (County) in preparing the first phase of planning studies for the County's Integrated Natural Resources Management Plan (INRMP). We are particularly excited about this project because it is within our areas of expertise as well as in our community. Joining our team as an extension of the SEA Staff are Mr. Jordan Postlewait, a local registered landscape architect, Dr. Fraser Shilling, a corridor ecologist from the U.C. Davis Road Ecology Center, and Mr. Robert Smart, a local registered professional forester.

SEA's headquarters are located in Placerville, which is the business office of the team's Principal-in-Charge and Program Manager, Rick Lind. The majority of work will be performed at SEA's offices in Placerville.

Our team members have a long history and are active in biological, planning, landscape architecture, ecological evaluations and other assignments in El Dorado County. The team member qualifications, work styles, and quality of services are well known to the County and other anticipated participants of the INRMP process. Our working relationships with County stakeholders will allow us to quickly initiate and cost-effectively complete the INRMP process.

SEA's successful work for the El Dorado County Planning Department in 2006 and 2007 on the Oak Woodland Management Plan – the first component of the INRMP - represents the most recent collaborative habitat conservation planning effort in the County. Members of the consultant team have worked together on large planning and biological consulting assignments previously, including special-status species permitting and habitat restoration in El Dorado County.

Ms. Bonnie H. Rich
RFP #09-918-116
June 11, 2009

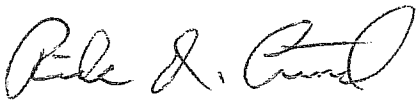
Rick Lind, President and owner of SEA, operates the business and he is solely authorized to bind the company. This proposal is a firm offer that will be effective for a period of 90 days from the date of this letter. Mr. Lind's contact information is as follows:

Rick A. Lind, Principal
Sierra Ecosystem Associates
P.O. Box 2260/1024 Simon Drive, Suite H
Placerville, CA 95667
(530) 622-8740 office
(530) 622-2820 fax
rick@sierraecos.com

We greatly appreciate your consideration and the opportunity to continue supporting the County on the INRMP process. This effort will be important to further shaping the community's environmental and economic future. Developing workable solutions to this complex challenge will be our primary focus.

Please contact Mr. Jordan Postlewait, SEA's Project Manager, or me directly at the number listed above, if we can provide additional information to help you with your evaluation process. Should our team be selected to serve you, you will find our desire and enthusiasm to be among our strongest assets.

Sincerely,

A handwritten signature in black ink, appearing to read "Rick A. Lind". The signature is fluid and cursive, with the first name "Rick" being more prominent.

Rick A. Lind
President

Enclosure

El Dorado County Integrated Natural Resources Management Plan and Environmental Document Preparation



Request for Proposal
#09-918-116



Prepared for
El Dorado County
Development Services Department
2850 Fairlane Court, Building C
Placerville, CA 95667



Submitted by
Sierra Ecosystem Associates
1024 Simon Drive, Suite H
Placerville, CA 95667


Sierra Ecosystem
Associates

June 11, 2009



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C. PROPOSER'S CAPABILITIES

1. EXECUTIVE SUMMARY

In response to the El Dorado County's (County's) May 8, 2009 Request for Proposals #09-918-116 for the Integrated Natural Resources Management Plan (INRMP), Sierra Ecosystem Associates (SEA) has assembled a team of consultants and community leaders that will assist the County in identifying a range of INRMP alternatives, any of which could be successfully implemented.

Preparation of the INRMP requires an organized, experienced team of environmental technical experts, planners and community involvement specialists. Understanding and awareness of past and present issues within the County is also extremely important to those preparing this plan. SEA, along with Dr. Fraser Shilling of the UC Davis Road Ecology Center, represents the most technically qualified and knowledgeable consultant team to prepare this work. Because of our success on past assignments supporting the County, the El Dorado Irrigation District (EID), as well as local land development projects and programs, the Project Team understands the processes, stakeholders, information sources, technical issues, and approaches that will help the County succeed with developing and approving the INRMP.

Major features of our proposal include utilization of state-of-the-art GIS software and modeling systems as well as a team that consists solely of local professionals. The documents that we create will not only address General Plan Policy regarding the INRMP, but other General Plan implementation issues as well.

The purpose of our proposed scope of work is to assist the County's Development Services Department in the preliminary stages of developing an INRMP for the west slope of the County at 4,000 feet elevation and lower. Ultimately, the INRMP will complement existing efforts by planners and developers to avoid or compensate for environmental impacts under the California Environmental Quality Act (CEQA) by identifying areas for investment in offsite mitigation. At this stage, the County has identified the need for mapping important habitat and connectivity, identifying indicator species, and developing alternative approaches for preparation of the INRMP, which is what our proposal addresses. In general, our approach to the project will be to assist the County in developing a workable document and database that can be utilized to complete the INRMP. Existing data will be utilized wherever possible. This proposal does not include extensive field research.

The INRMP must identify important habitat in the County and establish a program for effective habitat preservation and management. The data and findings obtained as a result of the effort described in this proposal, however, are not intended to substitute for site-specific biological surveys or analysis on land proposed for future development or conservation. In addition to the County General Plan, support information for this effort will come from a wide variety of sources, including the 2007 Oak Woodland Management Plan (prepared by SEA), the EIP Rare Plant Study (1991), and communications with County staff and members of the Board of Supervisors' appointed Plant and Wildlife Technical Advisory Committee (PAWTAC) and INRMP Stakeholders Advisory Committee (ISAC).

The following list identifies the various documents that have been identified as background material:

- Oak Woodland Management Plan (2007)
- EIP Rare Plant Study (1991)
- Saving & Greenwood Report (2002)
- El Dorado County General Plan & EIR (2004)
- County's GIS Database (including INRMP Initial Inventory mapping layers)
- Other materials provided by PAWTAC and ISAC
- Other jurisdictions' conservation plans
- Pine Hill Rare Plant Study (ongoing)

2. DETAILED DISCUSSION

The SEA Project Team assembled for this undertaking has a complete understanding of the requirements for this project. We have been following the project since 2006 when we were one of the firms originally shortlisted to prepare the INRMP. Since that time, we completed the OWMP (as the first component of the INRMP) and have continued to monitor the project through contact with County staff, voluntary attendance at ISAC and PAWTAC meetings, and County Board of Supervisors' meetings.

We believe that our team of local professionals is uniquely qualified to serve the needs of the County for this important project. We understand the necessity of adhering to the project schedule, so that the INRMP can be adopted without further delays to the implementation of the County General Plan, and also the importance of adhering to the project budget in these challenging economic times.

This section provides an overview of the detailed Scope of Work described in Section E of this document. Our understanding of the project requirements on a task-by-task basis can best be described by our proposed deliverables for each task. Those deliverables are described below:

Task 1.a – 1.b: Map Important Habitat and Connectivity

In order to fulfill the requirements of the County's General Plan, agreement must first be reached among the oversight groups of the PAWTAC, ISAC and Board of Supervisors (BOS) on specific terms pertinent to the development of the INRMP. Defining these relevant terms - "Important Habitat", "Large Expanses", and "Native Vegetation" - is crucial to making forward progress. The Team will actively assist the County staff in directing these oversight parties toward consensus or majority agreement on these terms.

The SEA Team will utilize existing available data to create a GIS-based map depicting important habitats in the County as identified by General Plan Policy 7.4.2.8. The map will be accompanied by a detailed report identifying the procedures and criteria used to create it. The PAWTAC and ISAC will be consulted regularly throughout the process of preparing this document. The document shall be formally submitted to the County as a Draft, Public Review Draft and Final.

Task 1.c: Develop List of Indicator Species

Developing a list of Indicator Species used to identify potential core habitat areas, corridors and linkages will necessarily occur concurrently with updating the Initial Inventory and building consensus on the relevant terms described above. Terms such as “important” and “large” are relevant to the needs of species which occur within those expanses. For this task, we will develop a detailed report that will include the following:

- List of recommended ‘best’ indicator species and justification for each recommendation;
- List of available indicator species based on data availability;
- Descriptions of the habitat relationships for each indicator species;
- Ranked habitat preferences for each indicator species;
- Map of the highest quality habitat areas;
- Map showing likely distribution within the County for each indicator species;
- Description of legal and biological status for each indicator species (as feasible);
- Description of dispersal needs for each indicator species;
- Description of local and regional barriers to dispersal for each indicator species;
- Description of actual and potential dispersal pathways for each indicator species; and
- Description of home ranges and threats to home ranges for each indicator species.

The Indicator Species Report shall be submitted to the County in Draft, Public Review Draft, and Final format.

Task 1.d: Wildlife Movement Corridors

The SEA Team will prepare a report evaluating the need for north-south wildlife movement corridors and linkages, including identification of species with north-south migration patterns. The report will analyze the barrier effect of Highway 50 and identify existing locations for safe passage of terrestrial mammals. The report will also address traffic management, structure retrofits, and other alternative Highway 50 crossing options. The Wildlife Corridor Report shall be submitted in Draft, Public Review Draft and Final format.

Task 2 is listed as Identifying Alternative Approaches for Preparation of the INRMP. Within this task are two subtasks, which are described below:

Task 2.a: Identify Range of Alternatives for INRMP

In this task, the Project Team will identify a range of alternatives available to the County for completing the INRMP. To assist the County in identifying these alternative approaches, the Team will provide information on various modeling techniques with which we have experience, including Ecosystem Management Decision Support, FunnConn and PATCH. Additionally, we will compare progress made in neighboring jurisdictions on conservation plans to give the County a full sense of the range of options available to finalize an INRMP. Once the alternatives

have been identified, the Project Team will work with County staff, ISAC, PAWTAC and the County Board of Supervisors to develop a preferred alternative.

Task 2.b: Assist County with Preparing INRMP Scope of Work

The Team will then work with the County to prepare a revised scope of work that can be used to complete the INRMP. The report identified in this task shall be submitted to the County in Draft, Public Review Draft and Final format.

D. BACKGROUND & EXPERIENCE

SEA is headquartered in Placerville (since 2000), which is the business office of the Team's Principal-in-Charge and Program Manager, Rick Lind. Our team members have a long history and are active in biological, planning, infrastructure, development, and other assignments in El Dorado County. Team member qualifications, work styles, and our product-oriented quality of services are well known to the County and other anticipated participants of the INRMP process.

Mr. Rick Lind, founder and president of SEA, was the director of Environmental Regulatory Management and also the Director of Natural Resources Management with responsibility for more than 20 employees at Resource Management International, Inc. (RMI). During his 11-year term at RMI, he participated in the firm's growth from 24 to over 450 employees. From 1996 to 2000, he subsequently helped initiate and establish the successful water resources consulting practice of Surface Water Resources, Inc., which employed over 30 consultants and was recently acquired by a large engineering firm. In charge of his own business since March 2000, Mr. Lind and his senior staff and associates have the foundation, experience, and resources to make realistic commitments and mobilize additional resources when needed to accomplish the County's objectives.

SEA has been performing a wide range of tasks throughout El Dorado County for over eight years. Our location (Placerville), our employees (who reside in El Dorado County) and our ongoing work (for both private and public agency clients) make us readily available and familiar with the issues, stakeholders, and challenges that may be encountered in the County. SEA is committed to being responsive, cost-effective and solution-oriented so that we can support the County in meeting its objectives. The SEA team has a proven track record of meeting time constraints on projects. For example, as lead consultant for the El Dorado County's Oak Woodland Management Plan, SEA met County Staff, Technical Advisory Committee and Board of Supervisors' deadlines on numerous steps in the preparation of the Plan. SEA continually meets time constraints on our projects for which we are engaged. We commit ourselves to defer or decline other new client work that may interfere with or impede our ability to perform timely and quality services for our existing clients.

The SEA technical team will be led by Mr. Jordan Postlewait, a California registered landscape architect with over 22 years of experience in landscape architecture and planning in El Dorado County. Most recently, Mr. Postlewait served as the Manager of Airports, Parks and Grounds for El Dorado County's General Services Department. Mr. Postlewait will serve as the Project Manager on the INRMP.

Ms. Shelly Hatleberg, a senior biologist with over 15 years of experience, will serve as the Assistant Project Manager to Mr. Postlewait. Ms. Hatleberg assisted EID with investigating the feasibility of preparing a Habitat Conservation Plan/Natural Communities Conservation Plan (HCP/NCCP) for EID projects within the west slope of the County. As part of that process, Ms. Hatleberg was instrumental in assisting EID with coordinating and facilitating meetings with County and Water Agency staff as well as resource agencies. Ms. Hatleberg has worked on several biological projects throughout El Dorado County and is quite familiar with environmental issues in the County.

The SEA team also includes Dr. Fraser Shilling, Co-Director of the UC Davis Road Ecology Center. Dr. Shilling's road ecology related research includes the development of a habitat fragmentation and connectivity analysis of the Sierra Nevada foothills, road systems analysis on public lands, and GIS analysis to determine habitat suitability for a variety of native species. He has also been involved with the application of ecological information in decision-support for agencies involved with transportation system design, construction, and removal. Dr. Shilling's team includes post-doctoral researcher Marcelo Tognelli and graduate student Maria Santos. Dr. Tognelli has conducted field and GIS analyses of habitat conditions, connectivity, and individual species' needs in various Mediterranean climates. With Dr. Shilling, he recently completed a project for Caltrans examining GIS modeling approaches to understand combined habitat analysis, wildlife and traffic movement. Maria Santos is an expert in Sierra Nevada mammals and has trapped, radio-collared, and tracked movement of several species in the range. She is experienced in the statistical and GIS modeling approaches that help bring wildlife movement information into ecological analysis and planning.

The project team assembled for this project also includes Mr. Robert Smart, a local registered Forester and District Three Parks Commissioner, and Mr. Tom Wegge, a principal economist at TCW Economics, an economic consulting firm that specializes in economic analysis for natural resource management and land use planning. Mr. Smart will serve as our liaison with the U.S. Forest Service and Mr. Wegge will assist in developing a cost estimate for implementing the alternative approaches to the INRMP.

SEA's work for EID in 2004 and 2005 on state and federal Endangered Species Act planning for its Capital Improvement Program also represents a successful, collaborative habitat conservation planning effort in the County. Members of our consultant team have worked together on large planning and biological consulting assignments previously, including special-status species permitting and habitat restoration in El Dorado County and on HCP/NCCP processes.

Members of the SEA Project Team have a proven performance record on past assignments with the County Development Services Department, the County Department of Transportation, the County Water Agency, EID, and other potential INRMP participants such as the City of Placerville. We have successfully worked together previously on comparably large assignments and our team resources are organized and ready to mobilize.

As residents and working members of the community, the Project Team has a vested interest in supporting the County with successfully designing and implementing the INRMP. Our working knowledge and existing relationships with the anticipated INRMP participants, the resource and land management agencies, the community stakeholders, and our neighbors will help us to be as cost-effective as possible, and also help us to effectively communicate with all segments of the community during the preparation of the INRMP.

We are prepared to assist our community with moving forward, economically and environmentally, to help maintain and enhance the quality of our community and the sustainability of El Dorado County's valuable natural and human resources as envisioned by our County leaders.

A Project Team Organization Chart (Figure 1) is included below followed by a matrix (Table 1) showing our Team's Qualifications. Detailed resumes for our individual team members are also included as an appendix to this document (Appendix A). Table 2 lists relevant County project development experience.

Figure 1: Project Team Organization Chart

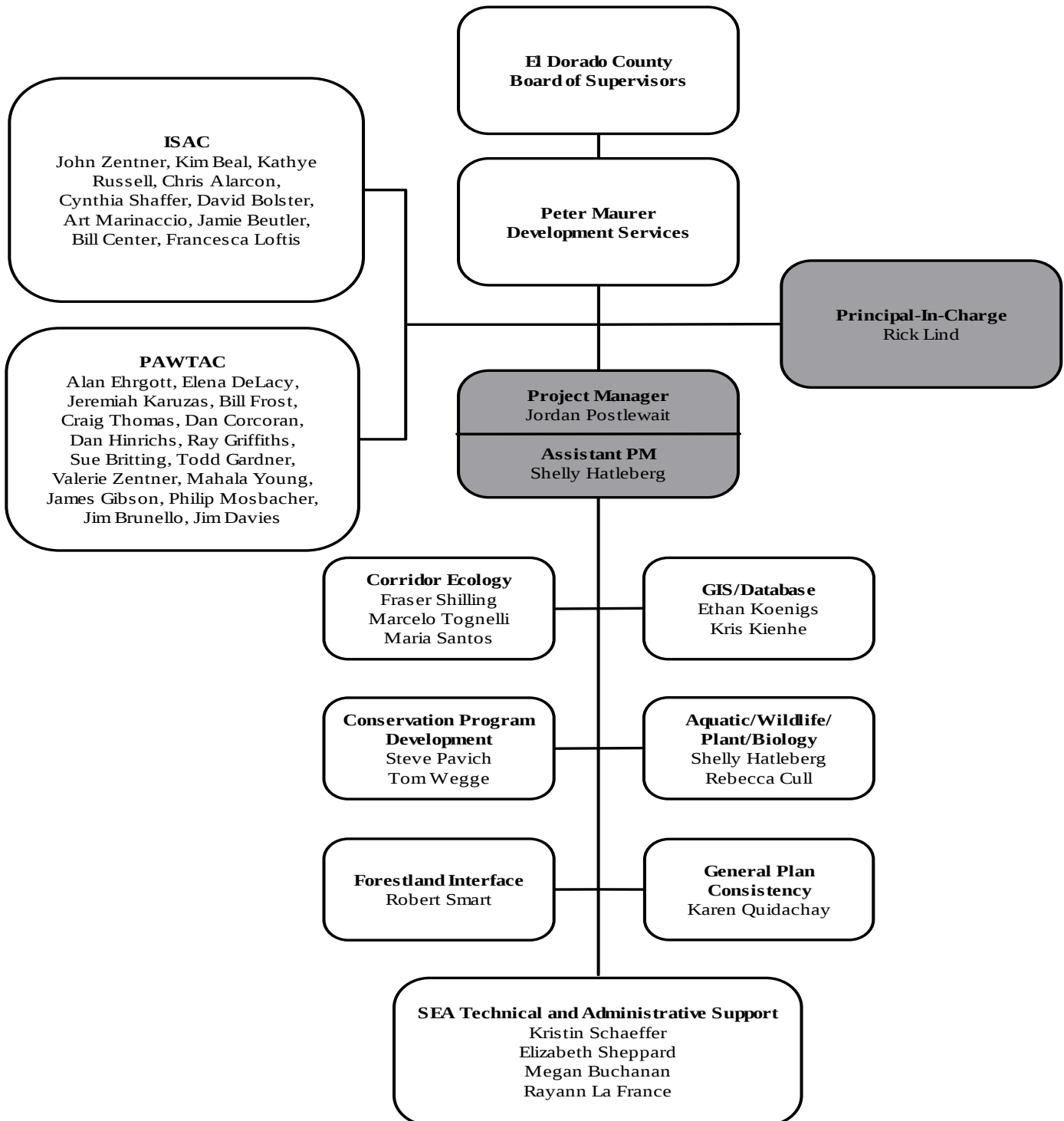


Table 1: Team Qualifications

TEAM MEMBER	College/ University Degree	Years of Experience	Certifications	Training/Specialization
R. Lind	MA, Geography (Water Resources) BA, Geography (Natural Resources)	30+	CSU Sacramento Planning Certificate (1979)	AMA Project Management, CEQA/NEPA, Public Involvement, Public Communications, Water Resources and Energy Infrastructure Development
J. Postlewait	MLA, Landscape Architecture BA, Biological Science	20+	Member of American Society of Landscape Architects	Landscape Architect, CA #3603
S. Hatleberg	MA, Biology BS, Environmental Studies/Biology	15+	State of California Scientific Collectors Permit	40-hour Wetland Delineation Training, AMA Project Management, Endangered Species Act training, AMA Project Manager Training
F. Shilling	PhD, Biology BS, Biology	20+	--	Corridor Ecology, wildlife movement, indicators of ecosystem performance, GIS modeling (habitat, wildlife, transportation, land-use), and policy issues associated with transportation impacts
R. Smart	Master of Forestry BS, Forest Management	39+		El Dorado County Trails Advisory Committee, Public Lands Management/Administration Commission, El Dorado County Recreation Commission
M. Tognelli	PhD, Ecology	15+	--	Conservation Ecology, GIS modeling, botanical and wildlife studies, habitat classifications
M. Santos	PhD (candidate), Ecology MS, Env Science/Policy	10+	--	Ecology, Landscape Ecology, field-tracking and modeling wildlife movement, characterizing wildlife habitat needs
E. Koenigs	MS, Horticulture and Agronomy MS, Entomology BS, Biology	5+	ISA Arborist License CA-DPR PCA License;; CDFG Scientific Collector's License	GIS mapping and analysis using ESRI suite of software, Wetland Delineation, Habitat Assessment, Environmental Permitting and Compliance, Integrated Pest Management, Vineyard Management

Table 1: Team Qualifications Continued

TEAM MEMBER	College/ University Degree	Years of Experience	Certifications	Training/Specialization
R. Cull	MS, Environmental Studies BA Biology	25+	EPA Watershed Management Training Certification, State of California Scientific Collector's Permit	
S. Pavich	MS, Agricultural and Resource Economics B.A., Economics	10+	--	Natural Resource Economics, Agricultural Economics, Recreation Planning, Environmental Compliance, Quantitative Analysis
T. Wegge	MS, Environmental Economics BA, Urban Studies	30+	--	Socioeconomic impact assessments, recreation demand modeling, and fish and wildlife economic valuations for CEQA/NEPA compliance documents
K. Kiehne	BA, Biology	20+	ISA Certified Arborist	CEQA: A Step-by-Step Approach; Developing and Writing Effective CEQA Documents
K. Quidachay	MA, Environmental Policy (Water Resources) BA, Sociology (Environmental Problems/Anthropology)	15+	Au Sable Institute of Environmental Studies Naturalist Certificate	Successful CEQA/NEPA Compliance (CSU, Sacramento 1997)

Table 2: Representative County Development Experience

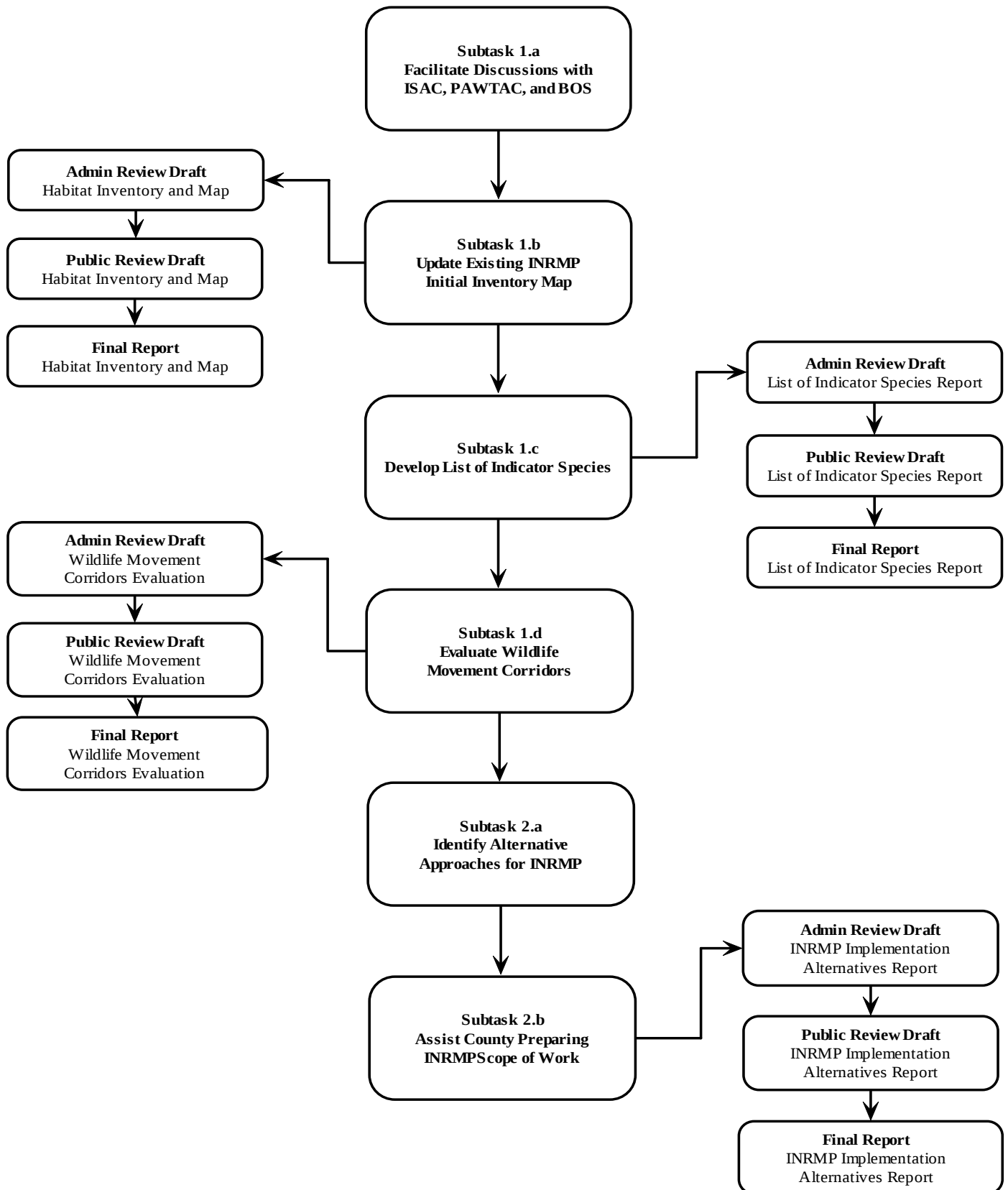
APN	Client	Project Name	Biological Resources Study/Important Habitat Mitigation Program	Wetland Evaluation/Delineation	Tree Survey, Preservation, and Replacement Plan	Rare Plant Evaluation/ Mitigation Plan
088-050-27	Malone	Hancock Road Proposed Subdivision	X	X		
079-230-18-100	Melanson	Stipulated Judgment for Injunction, Civil Penalties, and Other Relief Compliance	X			
331-400-02	Private Island Homes/ Richard Jongordon	Diamond Dorado Planned Development	X	X	X	X
102-070-44	Young	Proposed Building and Driveway				X
101-390-42	Perkins	Perkins Proposed Subdivision	X			
060-330-21	Calvert	Whispering Oaks Proposed Subdivision	X		X	
089-010-08	Case	Diveway Access Project	X	X	X	X
069-090-05	Smith Flat Development	Casper - Mineral Way Proposed Subdivision			X	
109-340-68	Deangelis	Deangelis Parcel Subdivision	X	X		X
048-121-11	Jones	Jones Proposed Subdivision	X			
089-202-34	Hiroshima	Emmerson Road Parcel Subdivision			X	
096-040-54	Mace	Mace Outbuilding Construction	X		X	
099-020-02	Smith Flat Development	Mackay - Mineral Way Proposed Subdivision			X	
319-190-26	Meyer	Meyer Proposed Subdivision	X	X	X	
325-100-14	Short	Oak Knoll Road Proposed Development	X			X
319-190-08	Williams	Davidson Road/Greathouse Lane Proposed Subdivision	X	X	X	X
078-200-71	Wirtanen	Blackhawk Estates Proposed Subdivision	X			
109-470-23	Wise	Steeple Chase Drive	X			
102-231-55	Yi	Mercy Way Proposed Development	X			X
078-278-12	Francis	Beau Val Lane Proposed Subdivision			X	
069-150-14	Pacific Rim Construction	Buddhist Meditation Facility	X		X	X
4-07-13/ELD-7	CW Park, Inc.	Cottonwood Timber Harvet				X
multiple	Rawson, Blum, and Leon	El Dorado Crossing Shopping Center	X			

E. WORK PLAN

In 2004, the County adopted its General Plan. Mitigation measures included in the General Plan Environmental Impact Report (EIR) include Policy 7.4.2.8 and Implementation Measure CO-M, which are intended to protect natural resources and are the focus of this proposal. Other policies from the General Plan which are relevant to the effort to protect natural resources include 7.4.2.9 and Measure CO-U. The County is directed to identify important habitat and to establish a program for habitat preservation, effective management, monitoring and mitigation (i.e., an INRMP) within five years of the General Plan approval. This includes developing land conservation strategies that conserve and restore habitat connectivity to offset the effects of increased habitat loss and fragmentation elsewhere in the County. It also includes identifying habitat preservation areas, with preference for large continuous blocks of habitat and where possible, corridors to facilitate species movement among these blocks. These areas will then form a network of priority preservation lands in the County to provide proactive preservation planning at a landscape level so as to reduce future endangered species listings, human-wildlife conflicts, and make the County better equipped to deal with expected land-use and global climate change.

The tasks identified as being necessary to develop the INRMP in the May 8, 2009 Request for Proposals are listed below and Figure 2 identifies SEA's proposed work plan in flowchart form.

Figure 2: Proposed Work Plan



TASK 1 MAP IMPORTANT HABITAT AND CONNECTIVITY

According to General Plan Policy 7.4.2.8 (A), this part of the INRMP shall inventory and map the following important habitats in the County:

- a. Habitats that support special-status species;
- b. Aquatic environments including streams, rivers, and lakes;
- c. Wetland and riparian habitat;
- d. Important habitat for migratory deer herds; and
- e. Large expanses of native vegetation.

In addition, the Policy states that the County should update the inventory every three years to identify the amount of important habitat protected, by habitat type, through County programs and the amount of important habitat removed because of new development during that period. The inventory and mapping effort shall be developed with the assistance of two County oversight groups, the PAWTAC and ISAC. Additional help will be sought from the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS). The inventory shall be maintained and updated by the County Planning Department and shall be publicly accessible.

Subtask 1.a Facilitate Discussions with PAWTAC, ISAC & Board of Supervisors

Project Team members will attend and facilitate discussions at monthly meetings with the PAWTAC and ISAC. These discussions will include efforts to define “Important Habitat”, “Large Expanses”, and “Native Vegetation” as used in General Plan Policy 7.4.2.8. Team members will also attend public meetings, as necessary, with the County Board of Supervisors, the Agricultural Commission, the Planning Commission and the Parks and Recreation Commission, to include them in the discussions and update them in the project findings and schedule. For budgetary purposes, a total of 36 meetings have been included as a part of this proposal. Any additional meetings will be charged on a Time and Materials basis.

Subtask 1.b Update Existing INRMP Initial Inventory Map

The existing INRMP Initial Inventory map for El Dorado County displays information on existing important wildlife habitats for the entire County (March 26, 2008). The study area for the INRMP is now defined as the west side of the County below the 4,000-foot elevation contour. The map will be updated to reflect the study area as it is now defined.

The existing map displays the following data:

1. Special-status species point locations (California Natural Diversity Database)
2. Aquatic environments (El Dorado County)
3. Wetland and riparian habitat (U.S. Fish and Wildlife Service [USFWS] – National Wetlands Inventory)
4. Important deer habitat (CDFG)
5. California Red-legged frog critical habitat (USFWS)
6. Pine Hill Preserve areas (Bureau of Land Management)
7. Priority Conservation Areas from the Oak Woodland Management Plan (OWMP, EN2 Resources, Inc.)
8. Important Biological Corridors identified in the 2004 General Plan
9. Valley Oak Woodland (FRAP 2002)
10. Lands that are publicly owned, subject to conservation easements and designated Open Space or Natural Resource in the 2004 General Plan

General Plan Policy 7.4.2.8 specifically calls for the mapping of five types of habitats and environments for the Habitat Inventory (7.4.2.8). SEA will update the initial inventory map from the 2004 General Plan using the most current data available. For example, the existing map has data from 2000 and the CNDDDB is updated monthly, therefore, SEA will use the most current month's data to overlay on the map. In addition, we will modify the map to display the data in the most effective way to convey the extent of habitats in the study area. As an example, the current map uses point data to display the location of special-status species from the CNDDDB; however, the CNDDDB data also includes polygon data, which better approximates location of special-status species occurrences.

Several additional data-sets may be used to more accurately display the range of habitat types in the study area. The latest vegetation data from the California Land Cover Mapping and Monitoring Program (LCMMP) provides vegetation data obtained from remotely sensed data, which is classified according to the California Wildlife Habitat Relationship (CWHR). This information is useful in determining where there are large expanses of native vegetation as required by the 2004 General Plan. We also are aware of recently-developed maps of historic vegetation types, possible future vegetation distributions (with climate change), and historic wildlife occurrences. In addition, to more accurately map where special-status plant species are likely to occur, Natural Resources Conservation Service (NRCS) soil data can be used to show the location of gabbro- and serpentine-derived soil types. Many rare plants are associated with these soil types. SEA would research and evaluate additional existing data, including the 1991 EIP Rare Plant Study, the OWMP, and County GIS data, to include on the map as necessary.

Subtask 1.c Develop List of Indicator Species

The Project Team will develop a recommended list of Indicator Species to be utilized in identification of potential core habitat areas, corridors and linkages. For each Indicator Species, the Team will identify habitat relationships and discuss relevant characteristics such as distribution, status, dispersal and home range requirements.

Indicator species can represent particular structural and functional values of habitat, they can be species of particular management or regulatory concern (e.g., endangered species), or they can exert substantial influence on an ecosystem (e.g., mule deer). The presence of indicator species can provide information about habitat quality and extent in an area. The combination of information about a suite of indicator species and structural information about habitat (quality and threats) is often sufficient for conservation planning. We will describe a combination of indicator species suitable for analyzing habitat quality, extent of usable habitat, connectivity, and habitat conservation. Because there can be a reciprocal relationship between choosing indicator species and finding sufficient data to evaluate their distribution and status, we will develop both a list of "best indicator species" and a list of "available indicator species".

Team member Dr. Fraser Shilling has developed the only connectivity analysis for the Sierra Nevada, which was based in part on actual occurrences, or GIS models of habitat, for indicator species. These species were chosen for their rarity (e.g., wolverine), keystone role (mule deer), or management status (e.g., California Spotted Owl). We also have extensive field research experience with the species most likely to play a key role as indicator species.

Habitat Relationships

Wildlife occupy specific habitat types, often indicated by particular assemblages of plant types. Planning for conservation of wildlife species often depends on knowing two critical pieces of information: 1) the use of different habitat types by each of these species (some species can use more than one habitat type) and 2) the distribution and quality of the habitat types. These relationships are often modeled, although the modeling is not a perfect science, with both known and unknown limitations. For each indicator species, we will describe the essential habitat relationships, including the ranked habitat preferences and the caveats and accuracy of these relationships. We will use the California Wildlife Habitat Relations (CWHR) model, which was developed by CDFG and other biologists. This model provides habitat associations for each vertebrate species in California, ranks habitats for their utility for species, and includes accuracy for the model's predictions. The primary output will be a map of the highest quality habitat areas for each species.

Dr. Shilling has used the CWHR modeling approach for the last decade as part of road system analyses, habitat reserve design, and connectivity analysis in El Dorado County and other parts of the Sierra Nevada.

Distribution

El Dorado County is home to varied habitat types, from oak savannahs and woodlands in the West, to Alpine forests and barren areas to the East. All major vegetation types in the County have been mapped and for many, qualities of these habitats are known (e.g., crown cover). We will use this information to describe the likely distribution of indicator species in the County. In addition, there have been wildlife records collected during the implementation of infrastructure, restoration, and other projects. Although these don't indicate numbers of individual wildlife, this information can be used to indicate presence/absence of certain species.

Dr. Shilling has prior experience in the Sierra Nevada and other places in the world in digital mapping of actual occurrences and distributions, as well as likely distributions, for many of the likely indicator species.

Status

The actual presence and numbers of wildlife species is one of the most challenging pieces of information to collect for indicator species. It is also one of the most important, as species status correlates with habitat quality and threats and trends in status can act as a surrogate for improving or declining ecosystem status. One indicator of species status is their regulatory status. However, there is not always as much information about the status and changing status of species to equate legal status with biological status. We will collect as much information as is available for the indicator species regarding their biological, legal, and local status.

Dispersal

The ability of different species to disperse within and among habitat areas is often critical for their survival and well-being. Dispersal can be affected by both natural and artificial barriers and opportunities. For example, for small species, a large river may represent as effective a barrier as a freeway. In addition, some species may take advantage of highway structures (e.g., culverts) to opportunistically cross highways. For each indicator species, we will describe their basic

dispersal needs, local and regional barriers to dispersal, and information about their actual dispersal and potential dispersal pathways.

Home Range Requirements

Habitat type and quality can determine the actual use of individuals and pairs of wildlife species of the landscape. The size of the home range depends on a combination of the species, individual's reproductive stage, habitat quality, habitat type, and disturbances. The most probable home range size is known for many species occurring in El Dorado County, allowing for modeling the likely extent on the landscape of potential home range areas. Actual home range areas can be determined by tracking the movements of individual animals. We will describe the home range sizes, potential distributions in the County, and threats to home ranges for all major mammal species and certain birds of legal concern (e.g., spotted owl). For other taxonomic groups, there may not be enough known to discuss home range size.

Subtask 1.d Evaluate Wildlife Movement Corridors

The SEA Team will evaluate the need for north-south wildlife movement corridors and linkages, including identification of species with north-south migration patterns. The Team will analyze the barrier effect of Highway 50 and other major roadways in the project area (i.e., Motherlode Road). The Team will identify existing locations along Highway 50 that allow safe passage for terrestrial mammals. The Team will examine and discuss issues involved with retrofitting existing drainage structures and undercrossings to provide for discrete wildlife crossings, including an approximation of the cost, to allow the County to assess the feasibility of such an approach. Prior research studies, such as the 2002 Saving & Greenwood report and initial oak-corridor mapping conducted for the OWMP by EN2 Resources, Inc., will also be analyzed. Alternative locations for wildlife movement across Highway 50 (such as Weber Creek and areas east of Placerville), will be identified and examined as to the relative feasibility of those locations. General Plan Policy 7.4.2.8 (A) and the Oak Woodland Management Plan will be considered as part of this task.

Wildlife movement often follows natural corridors, such as riparian forests, from one important to another. Wildlife also move within zones of habitat types that they require for survival. In El Dorado County, this equates to north-south movement within belts of woodland habitat, or mixed conifer forest habitat, or other vegetation and climatic zones. Road and other development in the County has proceeded in both north-south and east-west orientations (as well as others) and can thus pose barriers to wildlife movement. One critical issue that mammals moving through El Dorado County face is traffic on Highway 50. This highway has sufficient traffic that only the fastest animals at certain times of the day will be able to successfully cross the surface of the right-of-way. Other major roads also have enough traffic (e.g., Latrobe Rd) that wildlife are at risk of collisions with vehicles if they try to cross.

Caltrans has collected wildlife-vehicle collision data for Highway 50 and provided those data to Dr. Shilling as part of a collaborative study. These data reveal that deer are commonly killed on Highway 50 and primarily where traffic levels are moderate (10,000 to 20,000 vehicles per day), within a zone that stretches west of Placerville to Echo Summit. In addition, these collisions tend to occur in the foothill zone more commonly in the winter and summer and at higher elevations in the spring and fall. Similarly, SACOG has collected data on wildlife-vehicle collisions

resulting in death, injury, and property damage and provided these data to Dr. Shilling. In the last 10 years, there have been 180 accidents caused by collisions with wildlife on Highway 50 in western El Dorado County, 32 of which resulted in death or injury. Interestingly, 126 of the collisions were between dusk and dawn and 54 were during daylight hours.

The Team will investigate the likelihood that wildlife can cross Highway 50 from the western County line to the 4,000 foot elevation on the eastern project area boundary. We will do this in two ways: 1) use existing maps and knowledge of habitat areas near or adjacent to the highway to map areas of likely concern and 2) field a small crew of UC Davis student-scientists to map (GPS) and describe (dimensions) all potential pathways for wildlife to opportunistically cross the Highway 50 right-of-way. We will also describe the factors that may constrain or enable wildlife crossing of major roads and Highway 50, in order to allow for a more general understanding of barriers and opportunities for crossing. Existing structures can sometimes provide opportunities to expand the range of possibilities for wildlife to more safely (for them and people) cross highways.

Dr. Shilling is a co-author of the California Wildlife Crossing Manual (developed under contract with Caltrans), which describes in detail how to determine wildlife crossing potential of highways, as well as approaches to reduce conflict at that crossing.

Structure Retrofit

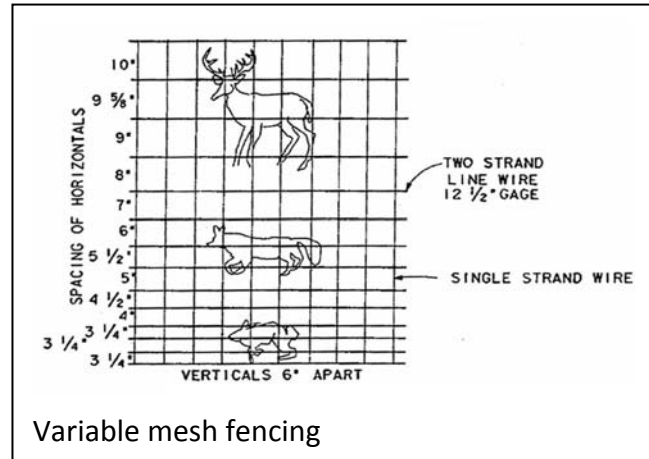
One of the cheapest and sometimes most effective ways to improve wildlife movement through areas with busy roads and highways is to improve existing right-of-way crossing opportunities. There are several general concepts that can guide the placement and choice of type of enhanced crossing structure. These include: adjacent land-ownership status, adjacent habitat quality, type and dimensions of existing crossing structure, other uses of existing crossing structure. There are also aspects of the right-of-way that can be enhanced to reduce crossing in certain areas (through fencing) and increase it in others (access paths through median barriers). Finally, driver education and traffic management can reduce the likelihood that wildlife crossing results in collision. The following section describes possible retrofit recommendations that we will make to improve wildlife crossing on County highways and major roads.

1) Bridges over major roads may function as a crossing pathway for wildlife capable of perceiving and using these structures. Three issues associated with retrofit would be access to the bridge, traffic management on the bridge, and creation of a wildlife friendly walkway adjacent to the roadway.

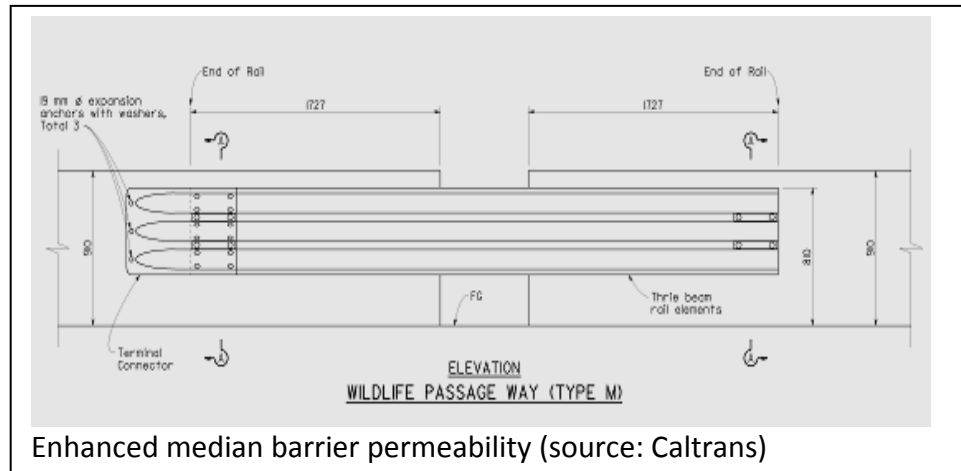
2) Culverts provide one of the best crossing pathways for small and medium-sized wildlife species. They sometimes have a natural bottom, but if not can be retrofitted with a naturalized bottom or with a wildlife ledge that can be attached to the side of the tunnel.



3) Fencing is a useful and cost-effective way to stop wildlife crossing in certain areas and channel them toward better places to cross. In one study (Aresco, 2005), a wildlife biologist used a vinyl erosion control fence as a drift fence to encourage turtles, and other herpetofauna to use a culvert to move between water-bodies on either side of 1 km of a busy highway. The fence was >99% effective for diverting turtles, resulting in thousands fewer deaths on the surface of the road. Variable mesh-size fencing can be used to divert wildlife of a wide range of sizes to appropriate crossing opportunities.



4) Median barriers are usually very effective crossing barriers. When wildlife attempt to cross highways and busy roads despite the presence of traffic, it is important to get them off the road surface as quickly as possible. Most



animals cannot jump over a typical concrete median barrier and even those that can may not because of the unfamiliarity of the obstacle. Recognizing this, two main solutions have been developed. One is to offset barrier segments from each other at the ends, so as to create a space. Another approach is to use scuppers to allow small animals to penetrate through the barrier.



5) Traffic management has been effectively used to reduce vehicle speed and increase awareness of the likelihood of collision with wildlife in specific areas. One way this is accomplished is using wildlife detection systems to alert drivers to the presence of large wildlife on or near the roadway. There is a UC Berkeley study that is looking at how these systems could be cost-effectively used in California. Other ways are to alert people to likely presence of wildlife on or near the road, for specific roads

and to reduce permitted speeds on roadways that have frequent collisions.

We will describe how and where these types of crossing enhancement strategies could be used for major roads and highways in the County. We will include cost-ranges for the strategies, based upon costs elsewhere in California or the US.

Alternative Highway 50 Crossings

There are very few places where Highway 50 is completely permeable to wildlife movement. One critical lower-elevation area includes the two un-named tributary streams to Deer Creek that cross Highway 50 adjacent to Silva Valley Parkway. These vegetated crossings are probably important to species that can tolerate the El Dorado Hills residential neighborhoods in the vicinity to the north. A paved under-crossing that may be important is Bass Lake Road at Highway 50. Because of habitat to the north and south of the highway, this may be an important crossing. There are other possible opportunistic crossings between the western County line and Placerville, but Weber Creek is likely to be the most important one. The forested and scrub areas it connects provide the best lower/mid-elevation connection between the Cosumnes and American River watersheds.

We will evaluate the various Highway 50 crossing alternatives, starting at the western County line and extending to elevation 4,000 feet to the east. We will characterize each potential crossing's relative importance and feasibility for enhancement and maintenance.

Subtask 1.e Deliverables

- *Administrative Draft Important Habitat Inventory Report and Map*
- *Public Review Draft Important Habitat Inventory Report and Map*
- *Final Important Habitat Inventory Report and Map*

- *Administrative Draft Indicator Species Report*
- *Public Review Draft Indicator Species Report*
- *Final Indicator Species Report*

- *Administrative Draft Analysis of North-South Wildlife Movement Corridors Report*
- *Public Review Draft Analysis of North-South Wildlife Movement Corridors Report*
- *Final Analysis of North-South Wildlife Movement Corridors Report*

TASK 2 IDENTIFY ALTERNATIVE APPROACHES FOR PREPARATION OF THE INRMP

The purpose of the INRMP is to identify important habitat in the County and establish a program for effective habitat preservation and management. The policy goes on to state that the INRMP shall include the following components:

1. Habitat Inventory
2. Habitat Protection Strategy
3. Mitigation Assistance
4. Habitat Acquisition
5. Habitat Management
6. Habitat Monitoring
7. Public Participation
8. Funding

Subtask 2.a Identify Range of Alternatives for INRMP

The Project Team will identify a range of alternative approaches available to the County to complete the INRMP. Advantages and disadvantages of each alternative will be discussed along with their probable cost of implementation. This shall include accounts for the implementation cost of mitigation, including acquisition, monitoring, and management. This task shall also include a discussion on the methodology employed in other jurisdictions for similar conservation plans. By way of example, some of the methods to be discussed might include GIS-based computer modeling, a criteria-based program, and a Conceptual Conservation Plan approach.

There are a wide array of possible computer-based spatial modeling approaches that can be used to estimate connectivity, habitat quality, conservation priorities, and wildlife species needs. There are also conceptual conservation strategies commonly used in habitat conservation planning that may require less computer-intensive analysis (e.g., Bay-Delta Conservation Plan), but have clear links to conservation goals.

Dr. Shilling has prior experience developing GIS-based models of important habitats for wildlife needs, structural and functional connectivity, and potential impacts of roads for private organizations and local, state, and federal agency clients. These models include: Ecosystem Management Decision Support, Least Cost Path & Corridor Analysis, PATCH, Patch Analyst (ESRI), FRAGSTATS, the Hawth's Tool Set, SITES/MARXAN, FunnConn, Criterium Decision Plus, and others. All of these approaches provide maps of provable accuracy that are also easy to understand, unlike some of the more esoteric, academic approaches (e.g., graph theory and circuit theory). These tools vary in their ease of use and the accuracy and utility of their outputs. In all cases, a moderate level of GIS expertise is required to ensure that the outputs are meaningful. In all cases, the modeler must have a clear question in mind. Finally, in all cases, the models have been successfully tested for accuracy and use in real-life planning.

The Project Team will coordinate with the consultants and staff working on the Pine Hill plant issues to ensure that the Pine Hill plant work will fit into the INRMP, but will not do extensive work on this issue. We will also be prepared to assist the County with evaluating potential

policy changes and in preparing a General Plan Amendment, should that become necessary during this process.

Subtask 2.b Assist County Preparing INRMP Scope of Work

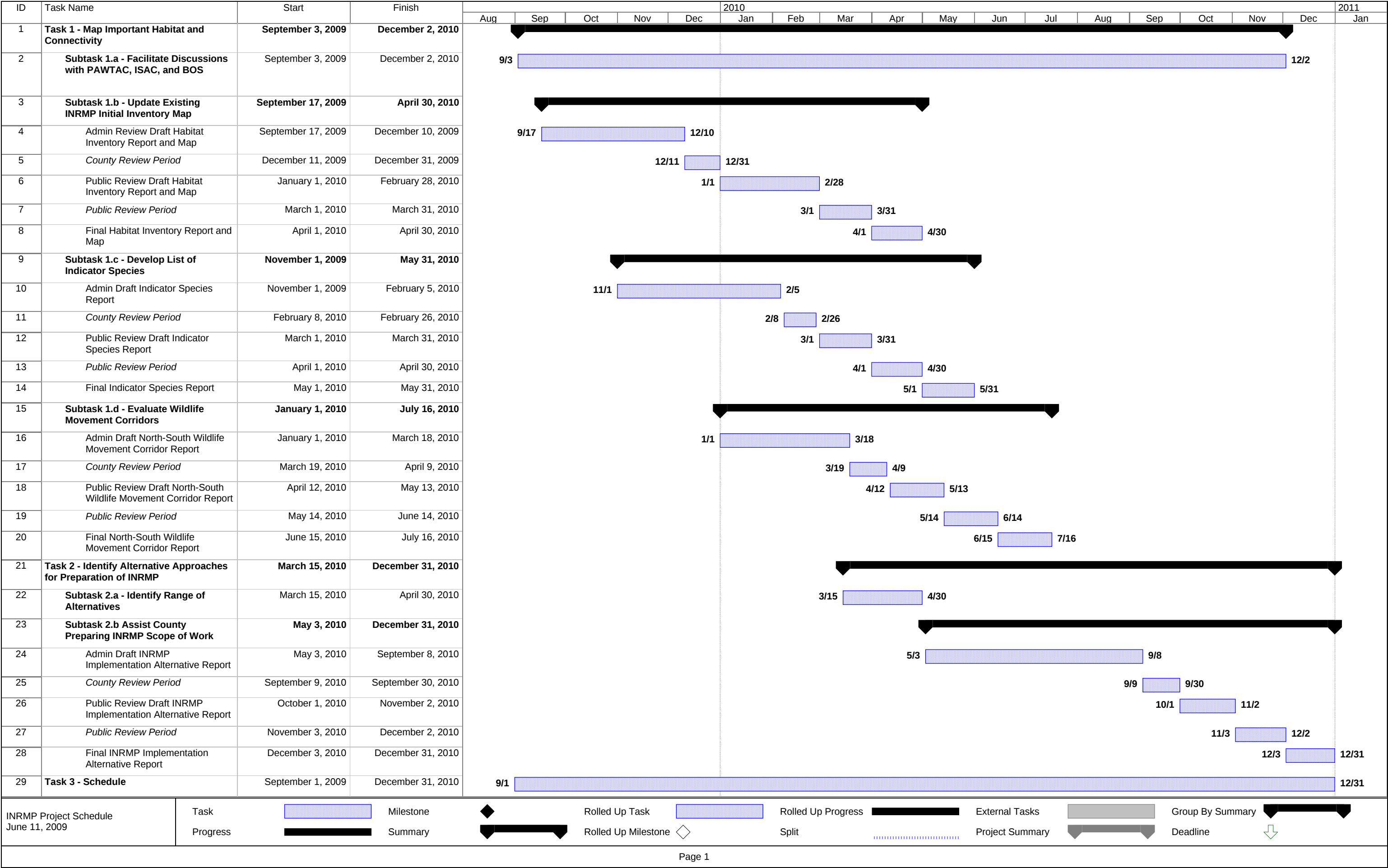
The Team will also assist the County in preparation of a revised Scope of Work in compliance with General Plan Policies 7.4.2.8. The revised Scope of Work will be based on the findings from the studies prepared as a result of this proposal and will identify all remaining tasks necessary to complete the INRMP. The INRMP will evaluate the extent to which resources are or can be protected on public lands as a first priority. Costs associated with preparing the Final INRMP shall also be provided.

Subtask 2.c Deliverables

- *Administrative Draft INRMP Implementation Alternatives Report*
- *Public Review Draft INRMP Implementation Alternatives Report*
- *Final INRMP Implementation Alternatives Report*

TASK 3 PROJECT SCHEDULE

A copy of the Project Schedule is included herein. As work progresses, this schedule will be updated on a monthly basis and shared with County staff and PAWTAC and ISAC members.



F. INSURANCE REQUIREMENTS

We have reviewed the County's May 8, 2009 Request for Proposals including the sample agreement identified as Exhibit "A". Based on our team's experience with entering into past agreements with the County, we foresee no difficulty in negotiating an agreement should we be the selected bidder.

G. FEE PROPOSAL

The following is SEA's detailed fee proposal for completing this project.

INRMP Fee Proposal

TASK	STAFF	PROJECTED HOURS	COST PER HOUR/ITEM	PROJECTED TOTAL COSTS
TASK 1: MAP IMPORTANT HABITAT & CONNECTIVITY				
Subtask 1.a Facilitate Discussions with PAWTAC, ISAC & BOS	R. Lind	8	164	\$ 1,312.00
	J. Postlewait	72	140	\$ 10,080.00
	S. Hatleberg	72	125	\$ 9,000.00
	F. Shilling	8	100	\$ 800.00
	R. LaFrance	2	65	\$ 130.00
	Subtotal	162		\$ 21,322.00
Subtask 1.b Update Existing INRMP Initial Inventory Maps	R. Lind	8	164	\$ 1,312.00
	J. Postlewait	24	140	\$ 3,360.00
	S. Hatleberg	24	125	\$ 3,000.00
	E. Koenigs	80	105	\$ 8,400.00
	R. Smart	12	125	\$ 1,500.00
	K. Kienhe	16	65	\$ 1,040.00
	R. LaFrance	16	65	\$ 1,040.00
	Subtotal	180		\$ 19,652.00
Subtask 1.c Develop Recommended List of Indicator Species	R. Lind	8	164	\$ 1,312.00
	J. Postlewait	24	140	\$ 3,360.00
	S. Hatleberg	40	125	\$ 5,000.00
	F. Shilling	140	100	\$ 14,000.00
	M. Tognelli	50	63	\$ 3,150.00
	M. Santos	75	38	\$ 2,850.00
	E. Koenigs	8	105	\$ 840.00
	R. Cull	2	125	\$ 250.00
	R. Smart	1	125	\$ 125.00
	K. Kienhe	2	65	\$ 130.00
	R. LaFrance	16	65	\$ 1,040.00
	Subtotal	366		\$ 32,057.00
Subtask 1.d Evaluate Need for Wildlife Corridors	R. Lind	8	164	\$ 1,312.00
	J. Postlewait	24	140	\$ 3,360.00
	S. Hatleberg	24	125	\$ 3,000.00
	F. Shilling	290	100	\$ 29,000.00
	M. Tognelli	50	63	\$ 3,150.00
	M. Santos	200	38	\$ 7,600.00
	E. Koenigs	8	105	\$ 840.00
	R. Cull	6	125	\$ 750.00
	R. Smart	6	125	\$ 750.00
	S. Pavich	2	135	\$ 270.00
	T. Wegge	4	125	\$ 500.00
	K. Kienhe	4	65	\$ 260.00
	R. LaFrance	16	65	\$ 1,040.00
	Subtotal	642		\$ 51,832.00
TASK 2: ASSIST COUNTY IDENTIFYING ALTERNATIVE APPROACHES FOR PREPARATION OF INRMP				
Subtask 2.a Identify Range of Alternative Approaches for INRMP	R. Lind	6	164	\$ 984.00
	J. Postlewait	80	140	\$ 11,200.00
	S. Hatleberg	40	125	\$ 5,000.00
	K. Quidachay	18	125	\$ 2,250.00
	F. Shilling	190	100	\$ 19,000.00
	M. Tognelli	100	63	\$ 6,300.00
	M. Santos	50	38	\$ 1,900.00
	E. Koenigs	24	105	\$ 2,520.00
	R. Cull	6	125	\$ 750.00
	R. Smart	8	125	\$ 1,000.00
	S. Pavich	6	135	\$ 810.00
	T. Wegge	4	125	\$ 500.00
	K. Kienhe	6	65	\$ 390.00
	K. Schaeffer	2	112	\$ 224.00
	M. Buchanan	2	78	\$ 156.00
	R. LaFrance	8	65	\$ 520.00
	Subtotal	550		\$ 53,504.00
Subtask 2.b Assist County Preparing Revised Scope of Work	R. Lind	8	164	\$ 1,312.00
	J. Postlewait	40	140	\$ 5,600.00
	S. Hatleberg	32	125	\$ 4,000.00
	K. Quidachay	16	125	\$ 2,000.00
	F. Shilling	8	100	\$ 800.00
	E. Koenigs	8	105	\$ 840.00
	R. Cull	2	125	\$ 250.00
	R. Smart	8	125	\$ 1,000.00
	S. Pavich	4	135	\$ 540.00
	E. Sheppard	4	98	\$ 392.00
	K. Kienhe	4	65	\$ 260.00
	M. Buchanan	4	78	\$ 312.00
	R. LaFrance	8	65	\$ 520.00
	Subtotal	146		\$ 17,826.00
TASK 3: SCHEDULE	R. Lind	2	164	\$ 328.00
	J. Postlewait	4	140	\$ 560.00
	S. Hatleberg	6	125	\$ 750.00
	R. LaFrance	16	65	\$ 1,040.00
	Subtotal	28		\$ 2,678.00
Direct Expenses (mileage, postage)				\$ 1,000.00
	TOTAL HOURS	2074	TOTAL NOT TO EXCEED	\$ 199,871.00

- Hours may vary by individual and by task, but total budget will not be exceeded.
- Cost estimate based on Proposal to Assist County with Preparation of INRMP dated June 11, 2009.
- It is assumed that SEA will provide one original for all maps and reports but the County shall be responsible for reproduction costs.

H. REFERENCES

Company/Organization Name: El Dorado County Development Services Department
Contact: Peter Maurer, Principal Planner
Telephone Number: (530) 621-5355
Length of Business Relationship: 3 years
Summary of Services: Lead consultant for the County and the County Technical Advisory Committee with preparing the Oak Woodland Management Plan for implementing Measure CO-P and Policy 7.4.4.4 Option B of the 2004 General Plan. The OWMP establishes a basis for the County to receive State and Federal cost-sharing for oak woodland conservation initiatives. The OWMP was prepared and approved by the County Board of Supervisors as the initial component of the County's Integrated Natural Resources Management Plan.

Company/Organization Name: El Dorado Irrigation District
Contact: Ms. Elizabeth Betancourt, Watershed Coordinator
Telephone Number: (530) 642-4082
Length of Business Relationship: 1 year
Summary of Services: Authored and produced the draft *South Fork American River Watershed Plan* (Watershed Plan) for review and approval by a diverse group of watershed stakeholders known as the South Fork American River Watershed Group. The Watershed Plan is part of a coordinated resource management planning process and is designed to work in conjunction with the Cosumnes, American, Bear and Yuba (CABY) *Integrated Regional Water Management Plan*. The Watershed Plan describes the goals, objectives and priorities for stewardship of watershed resources and is designed to facilitate further financial support and grant funding opportunities.

Company/Organization Name: El Dorado County Water Agency
Contact: Ms. Tracey Eden-Bishop, Water Resources Engineer
Telephone Number: (530) 621-7668
Length of Business Relationship: 4 years
Summary of Services: Assisted the El Dorado County Water Agency, El Dorado Irrigation District, and Georgetown Divide Public Utilities District in identifying hydroelectric generation opportunities with potential to generate energy revenues for existing and new water supply infrastructure and operations. Led a team of technical consultants to inventory, screen, rank, and analyze the most feasible hydroelectric development options in El Dorado County (both west slope and Lake Tahoe Basin). The plan will allow County purveyor staff and financial resources to be focused on the projects that have the greatest potential for successful implementation.

Company/Organization Name: El Dorado County & Georgetown Divide RCDs
Contact: Mr. Mark Egbert, District Manager
Telephone Number: (530) 295-5633
Length of Business Relationship: 8 years
Summary of Services: Rick Lind (SEA) and Karen Quidachay assisted with preparing the South Fork American River Watershed Stewardship Strategy, which involved the preparation of natural resource watershed assessments and community resource watershed evaluations for the 81 sub-basins of the South Fork American River Basin. Technical studies focused on two resource priorities identified by the South Fork American River Watershed Group, i.e., water quality and fuels (fire risk) management. SEA developed the approach and performed the technical studies and reports upon which watershed restoration and CALFED funding requests were prioritized.

Company/Organization Name: Jong and Renee Yi
Contact: Jong and Renee Yi
Telephone Number: (530) 676-8554
Length of Business Relationship: 2 years
Summary of Services: Prepared a biological resource analysis of the property which identified oak woodland and Pine Hill rare plant resources. Surveyed the site for rare plants. Prepared a rare plant mitigation plan to address impacts to Pine Hill Rare Plants as required by the by the County for CEQA compliance. The plan was prepared and agreed to after significant discussions and negotiations with the landowner, County, CDFG, USFWS, and BLM.

Company/Organization Name: Bruce Wirtanen
Contact: Bruce Wirtanen
Telephone Number: (530) 417-3264
Length of Business Relationship: 2 years
Summary of Services: Prepared a biological resources analysis consistent with CEQA and El Dorado County policies for the Blackhawk Estates project. The biological report included: Descriptions/classifications of the biological setting including natural communities, an impacts analysis, and recommendations on mitigation measures and/or Best Management Practices to avoid or minimize impacts for the proposed development.

Company/Organization Name: El Dorado Irrigation District
Contact: David Witter, Natural Resources Manager
Telephone Number: (530) 642-4103
Length of Business Relationship: 8 years
Summary of Services: Assisted El Dorado Irrigation District with investigating the feasibility of preparing an HCP/NCCP for EID projects within the west slope of the County. Assisted EID with coordinating and facilitating meetings with EID, the County and Water Agency staff as well as resource agencies. Identified grant opportunities to fund project. The primary contact (Dave Powell then director of Facilities Management), has left EID and is now working for a private engineering firm.

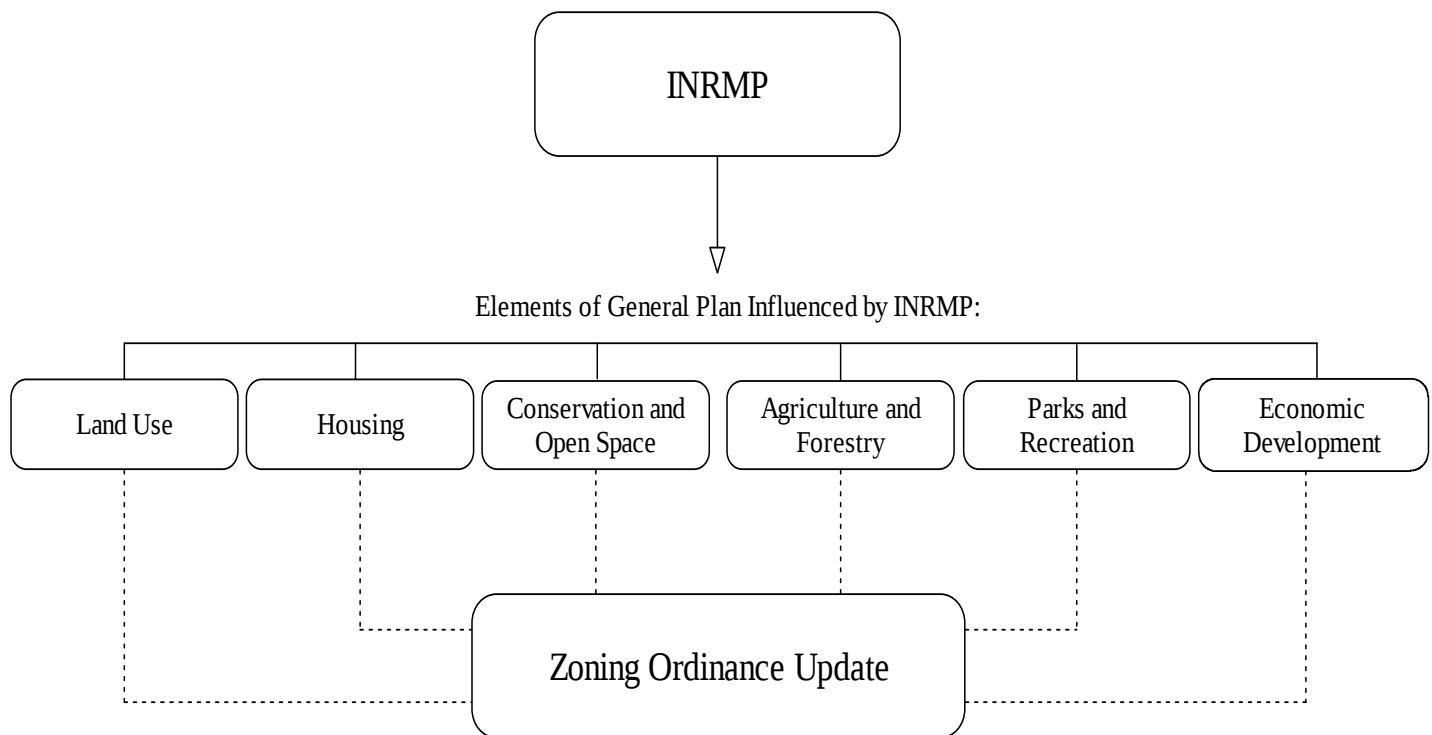
I. ADDITIONAL DATA

The SEA team is very familiar with the current social and economic conditions facing El Dorado County. We understand that while preparing and implementing the INRMP is required by the General Plan, the cost and direction of this effort must be carefully managed. SEA will take great effort in ensuring that the costs associated with this work and those associated with implementing and managing the policies set forth in the INRMP will be clearly defined and approved by County staff and the Board of Supervisors.

SEA also recognizes that the INRMP can also be used to assist the County in implementing other General Plan requirements. As the mapping and analysis proceed, selected areas of the west slope of the County will be identified as important habitat. However, habitat needs do not necessarily conflict with other land uses. A crucial first step is to accurately identify lands that best support the suite of Indicator Species. This proposal addresses this need, which in turn helps the County move forward to resolve any conflicts in land use. As the County resolves these conflicts, it can then proceed with updating the Zoning Ordinance to accurately reflect the goals of the General Plan.

Figure 3 below defines some of the General Plan policies that will be addressed in the INRMP if the SEA team is selected to perform this work.

Figure 3: El Dorado County INRMP and Relationship to Other General Plan Elements



In addition to the need to fulfill General Plan requirements, the SEA team also recognizes the County's need to obtain additional funding sources. Therefore as a part of Task 2.2 we have included an optional task to assist the county in obtaining grant monies. We believe that the County could successfully compete for grant funding in areas such as land acquisition, planning, natural resource management, environmental education and parks and recreation.

Potential grant providers applicable to this project include both Federal and State agencies. All of these agencies have offered grant opportunities in the past and if our team is selected and authorized by the County, we will contact each of them to determine which opportunities currently exist. The following is a partial list:

Federal

- U.S. Army Corps of Engineers
- Bureau of Land Management
- Bureau of Reclamation
- Environmental Protection Agency
- Federal Highway Administration
- Farm Service Agency
- Fish and Wildlife Service
- Forest Service
- National Center for Recreation and Conservation
- National Resources Conservation Service

State

- California Conservation Corps
- California Department of Conservation
- California Department of Education
- California Department of Fish and Game
- California Department of Forestry and Fire Protection
- California Department of Parks and Recreation.
- California Department of Transportation
- California Resources Agency
- California Wildlife Conservation Board

APPENDIX A

PROJECT TEAM MEMBER RESUMES

Management Staff

Rick Lind
Jordan Postlewait
Shelly Hatleberg

Technical Support Staff

Megan Buchanan
Rebecca Cull
Kris Kiehne
Ethan Koenigs
Steve Pavich
Karen Quidachay
Maria Santos
Kristin Schaeffer
Elizabeth Sheppard
Fraser Shilling
Robert Smart
Marcelo Tognelli
Tom Wegge

Rick A. Lind – Principal in Charge

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Extensive knowledge with El Dorado County and policy, scientific and other issues affecting the County
- Previous experience working with El Dorado County staff, Board of Supervisors and other interested parties
- Served as Project Manager for Oak Woodland Management Plan

Education

Master of Arts, Geography
(Water Resources), 1984
University of California, Davis

Bachelor of Arts, Geography
(Natural Resources), 1979
California State University, Sacramento

Professional History

President, EN2 Resources, Inc.,
established March 2000

Senior Project Manager, Surface
Water Resources, Inc., 1996-2000

Senior Project Manager,
Beak Consultants, Inc., 1995-1996

Director, Natural Resources and
Environmental Regulatory
Management, Resource Management
International, Inc., 1984-1995

*Associate Land and Water Use
Analyst*, California Department
of Conservation, 1981-1984

*Energy Resources Specialist –
Geothermal and Hydroelectric
Projects*, California Department
of Water Resources, 1979-1981

Assistant to State Climatologist,
California Department of
Water Resources, 1978

Mr. Lind specializes in California, federal and local environmental regulatory compliance, feasibility evaluations, and agency/public consultations, and has specific expertise in utility infrastructure project and program-related planning, development, and operations. He designs and performs environmental regulatory programs for complex, sometimes multiple-party projects, often serves as an extension of staff and lead agency representative, and works constructively with regulatory agencies to identify, address, and resolve critical issues. In addition to California, Mr. Lind's experience extends to several of the western United States (Utah, Arizona, Nevada, and Oregon), and portions of the Midwest and East Coast. Mr. Lind has a reputation for technically and procedurally defensible environmental regulatory processes, and practical construction and operation mitigation compliance and monitoring programs.

Regulatory programs in which Mr. Lind has extensive experience include the California Environmental Quality Act, National Environmental Policy Act, Endangered Species Act(s), Clean Water Act, Clean Air Act, National Historic Preservation Act, Central Valley Project Improvement Act, and CALFED Ecosystem Restoration Program Plan. Mr. Lind also has participated in administrative hearings, including California Energy Commission energy project certification proceedings, and has provided litigation support and served as an expert witness on environmental regulatory compliance cases related to energy development projects.

Mr. Lind has over 30 years experience in project development management, environmental regulatory planning and permitting, ecosystem restoration, and water and energy-related project construction and program development and implementation. Presented below are summary descriptions of representative experience.

Project Experience

El Dorado County Oak Woodland Management Plan – County of El Dorado Planning Services Department
– Project Manager of a multi-disciplinary consultant team charged with preparing the Oak Woodland Management Plan (OWMP) for the County. The OWMP was successfully completed and approved by the County Board of Supervisors in 2007 in compliance with the County's 2004 General Plan under the direction of a Technical Advisory Committee comprised of County staff from multiple departments. As the first component of the County's Integrated Natural Resources Management Plan (INRMP), the OWMP addressed issues that will be critical to the completion of the County's INRMP, including alternative approaches for defining large expanses of habitat, the County's Important Biological Corridors (IBCs) as delineated in the General Plan, and funding and managing the INRMP to be implemented by the County.

Habitat Conservation Planning for Capital Improvement Plan – El Dorado Irrigation District – Performed initial planning, agency liaison, and stakeholder consultations to evaluate the potential approach, design, scope and implementation of a Habitat Conservation Plan to address El Dorado Irrigation District’s state and federal endangered species act (ESA) requirements associated with its Capital Improvement Plan and operations within its service area Sphere of Influence. Identified other ESA planning activities, both within and outside of El Dorado County, which could contribute to developing a cost-effective and efficient program for meeting the combined ESA requirements of several stakeholders including the County, City of Placerville, agriculture, other water purveyors, electric utilities, federal and state land management agencies, and developers.

Hydroelectric Development Options Study – El Dorado County Water Agency and El Dorado Irrigation District – Project Manager of a multi-disciplinary consultant team and Hydro Advisory Panel charged with identifying, evaluating, and recommending the most feasible hydroelectric development options throughout El Dorado County. The Hydroelectric Development Options Study was completed and presented to the El Dorado Water and Power Authority in June 2009. The study recommends immediate implementation of six economically viable options at existing water facilities, development of a hydrokinetic demonstration project, and detailed feasibility studies of seven other hydro options that could assist with reaching a recommended goal of Energy Independence for the County. The study was completed within the original budgeted amount, and identifies several hydroelectric projects that will yield substantial net revenues for the purveyors’ customers.

Bryte Bend Water Treatment Plant Expansion Project - City of West Sacramento - Served as the Environmental Program Manager responsible for a multi-disciplinary team charged with environmental planning, CEQA compliance, Endangered Species Act consultations, and Fish and Game, Corps of Engineers, and levee district permits for expanding the City’s surface water intake facility on the Sacramento River from 24 mgd to 60 mgd. The project also included construction of a 2.3-mile, 36-inch water transmission main extension into the Southport area. An Initial Study/Mitigated Negative Declaration was successfully completed on schedule in accordance with CEQA requirements, construction of the project began in June 2002, and construction was completed in 2004. The expansion project now meets increased demands for M & I water supplies associated with the City’s recently approved General Plan that provides for the development of the City’s Southport and East Central Yolo planning areas.

Hamilton City Pumping Plant Fish Screen Improvement Project EIR/EIS - Glenn-Colusa Irrigation District - Project manager for the preparation and certification of an EIR/EIS on behalf of the Glenn-Colusa Irrigation District (GCID), California Department of Fish and Game, U.S. Army Corps of Engineers and U.S. Bureau of Reclamation for constructing fish screen improvements at GCID’s 3,000 cfs Hamilton City Pumping Plant on the upper Sacramento River. Final design and construction included an approximately 1,100-foot long 3/32 inch flat plate fish screen, an internal fish bypass system, and a gradient facility across the Sacramento River. Served as secretary to and coordinated a multi-agency work group charged with ensuring CEQA, NEPA, state and federal Endangered Species Acts, water quality, and other regulatory compliance. Prepared CEQA findings and statements of overriding consideration on behalf of the lead agencies. Designed and prepared a mitigation monitoring and reporting program for a wide range of riparian, fisheries protection, and recreation/public safety measures. Key issues included analyses of alternative means of simultaneously protecting fish (including the federally threatened/state endangered winter-run chinook salmon) while re-establishing reliability in GCID’s diversions from the Sacramento River.

Litigation Support – Wild Goose Gas Storage, Inc. vs. Roseville Land Development Association – Testified as expert witness in support of Roseville Land Development Association on environmental regulatory and environmental technical aspects of routing an approximately 4-mile, 18-inch natural gas pipeline and siting of an approximately 5-acre compressor station associated with the Wild Goose Gas Storage Project in Butte County, California.

Yuba City Water Treatment Plant Expansion Project - City of Yuba City - Lead CEQA and permitting consultant for the expansion of the City's water treatment plant, pipelines and intake facility on the Feather River from an existing reliable capacity of 21 mgd to a future reliable capacity of 30 mgd. Performed environmental feasibility evaluations of alternative facility locations and pipeline routes, developed cost estimates for environmental mitigation requirements, and implemented a resources agency consultation program to expedite CEQA, Endangered Species Act, State Water Resources Control Board, Regional Water Quality Control Board, and other land/resource agency review and approval processes.

Litigation Support – Golden State Water Company (GSWC) v. Southern California Edison Company - Provided environmental technical, environmental regulatory, and project management evaluation services regarding the delayed development of a 115 kV high voltage transmission line that was needed for meeting increased service area demands of GSWC's electric utility subsidiary, Bear Valley Electric Service. Performed audit of over 10 years of correspondence, work products, and invoices for reasonableness and due diligence. Assisted client and legal team with developing position statements for pre-hearing depositions and for negotiations on possible settlements.

South Fork American River Hydroelectric Project 184 Reconstruction - El Dorado Irrigation District - Environmental Compliance Manager responsible for permitting, agency considerations, and permit compliance on EID's Federal Energy Regulatory Commission hydroelectric license amendment, U. S. Forest Service special use permit, State Water Resources Control Board Clean Water Act Section 401 certification, and related requirements for the reconstruction of EID's Project 184. Project reconstruction included a new 165 cfs capacity diversion dam on the South Fork of the American River (completed November 2000), a new 2-mile long, 8-foot diameter tunnel (completed October 2002), and environmental restoration of 2.3 miles of canal bench that are now bypassed by the new tunnel (completed October 2003).

California-Oregon Transmission Project EIS/EIR - Transmission Agency of Northern California - As CEQA lead agency representative and EIS/EIR coordinator, directed and participated in a wide range of analyses for routing and constructing the 340-mile long California-Oregon 500-kV Transmission Project from southern Oregon to central California. Served as secretary to a multi-utility (public and private) environmental committee overseeing environmental studies and EIS/EIR preparation. Negotiated mitigation with U.S. Fish and Wildlife Service for the first incidental take permit that was issued for the northern spotted owl. Prepared and processed NEPA and CEQA public notices, and conducted over 50 public and agency workshops and hearings throughout California and Oregon.

Decker Island Tidal Wetland Enhancement Pilot Project - Port of Sacramento – Secured funding and then managed technical studies for a CALFED Category III project involving a 70-acre tidal wetland ecosystem enhancement project on Decker Island in the Sacramento-San Joaquin Delta. Designed habitat conversions from grazing lands to targeted fisheries, waterfowl, upland, and riparian habitats. Presented design plans to and coordinated with Interagency Ecological Program Resident Fish Species Work Group to maximize habitat benefits for federal and California endangered species act-listed fish, including spring-run and winter-run salmon, delta smelt, and splittail.

Upper Hangtown Creek Watershed Restoration Plan – Smith Flat Limited Partnership – Directed the investigation, evaluation of options, and development of a preliminary plan for re-establishing stream connectivity and riparian zone ecosystem values for the Smith Flat area near Placerville. Historical mining, lumber mill operations, railway, recreation, and urban development have substantially modified pre-existing drainage patterns, and have diminished high rainfall-runoff conveyance capacity, resulting in recurring flood events and impacts to current development. The preliminary plan elements are designed to integrate human and riparian ecosystem values.

Ballona Freshwater Wetlands System Operations and Maintenance Manual – Playa Capital Company, LLC

- Developed the approach and design for a detailed operations and maintenance guidebook for a 25-acre riparian corridor and 26-acre freshwater marsh near Playa Vista. The freshwater wetland system integrates three interdependent wetland functions (treatment of urban runoff, freshwater for fish and wildlife, and enhancement of flood storage and carrying capacity) that provide mitigation for commercial and urban development on the central coast of Los Angeles County between Playa del Rey and Marina del Rey. The manual provides integrated, week-by-week instructions and reporting procedures to wetland managers for operation, maintenance, and monitoring of the wetland system.

South Fork American River Watershed Stewardship Strategy – Georgetown Divide Resource Conservation District

– Provided oversight and guidance on watershed assessments and evaluations that were focused on South Fork American River watershed resources, especially with respect to water quality and fire management. Also participated as member of technical team charged with identifying priority sub-basins and restoration activities for future stewardship strategies and funding.

Jordan Postlewait – Project Manager

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Experience in all aspects of project management, scheduling and cost control
- Experience in consensus building and public workshop facilitation
- Familiarity with El Dorado County
- Biologist and landscape architect
- Experience with grant applications and administration

Education

MLA, 1986 Landscape
Architecture University of
Colorado, Denver

BA, 1991 Biological Science University of
California, Santa Barbara

Landscape Architect, CA #3603

Mr. Postlewait has over 20 years of experience in landscape architecture and planning and specializes in the design of park and open space facilities. In addition, he has a strong background in environmental restoration and community workshop facilitation. He has served as Project Manager and prepared conceptual designs and construction documents for a wide variety of projects including parks, streetscapes, subdivisions and commercial developments. He is also an award-winning photographer.

Work Experience

Clover Creek Flood Protection and Environmental Restoration Project, Redding, California - Project Landscape Architect providing design for planting, irrigation, restoration and environmental education opportunities for a 300-acre-foot detention basin located on a 125-acre site surrounded by residential development along Clover Creek. Upon completion, the facility will serve as a joint-use flood control and recreation project. Project amenities include a permanent water feature, habitat areas including seasonal wetlands, grassland savannahs, oak woodlands seasonal marshes, and a network of trails and bird watching areas. The completed project is envisioned to be a significant community amenity and will be called the Clover Creek Preserve.

DeBenedetti Park, Lodi, California - Served as Project Manager and Landscape Architect for the design of a new 49-acre park site that will serve as a regional sports complex and detention basin. The project includes lighted football, baseball, and soccer fields, a tot lot, and passive recreation areas, as well as the incorporation of restroom, concession and maintenance buildings. The design also allows the site to be used as a primary detention basin for the surrounding watershed through the application of a complex tiered approach to grading that minimizes flood risk to the primary recreation features.

Design Standards Manual for Dual Use Flood Control/Recreation Facilities, Modesto, CA. - Served as Project Manager and Landscape Architect for the preparation of a Design Standards Manual that is used by the City to establish appropriate design guidelines and criteria pertinent to the development of dual-use recreation/flood control facilities. The dual use park/detention basin concept provides a means to reduce the amount of land devoted to the exclusive use of storm water detention while augmenting the size and quality of City park lands where possible.

Lagoon Valley Lake Regional Park, Vacaville, California - Provided design assistance in developing a Lake Management Plan to provide guidelines for future development in the park. Scope of work included developing water balance models, evaluating erosion and sedimentation problems, and suggesting mitigation measures for appropriate watershed management

Coffee Claratina Park, Modesto, California - Project Manager and Landscape Architect in the preparation of construction documents for an 8-acre dual use detention basin and Neighborhood Park. This park site contains two tot lots, a pedestrian bridge, lighting, passive recreation areas, a basketball court, extensive planting and irrigation, and a water play area. During the rainy season this recreational area also serves as a storm water detention basin.

Gateway Park, Sacramento, California - Landscape Architect responsible for conceptual design of 40-acre park located along the American River Parkway. Park plans included design of interpretive trail systems, bicycle, equestrian and pedestrian trails, native plant restoration, a car top boat launching area, entrance kiosks, and picnic areas and parking facilities.

Humbug-Willow Creek Trail / Folsom Parkway Rail Trail, Folsom, California - Served as Project Manager/Landscape Architect and was responsible for the design of 4.5 miles of bicycle/pedestrian trails for the City of Folsom. The project served to provide "missing links" to the city's existing trail system. The project also involved several unique features including seven bicycle/pedestrian bridges, a bicycle/pedestrian undercrossing at East Bidwell Street, and a wildlife observation deck. The Humbug-Willow Creek portion of the project totals 2.5 miles and consists of a 10-foot wide asphalt trail that meanders adjacent to the creeks. The scope of work also included preparation of an oak tree mitigation plan. The Folsom Parkway Rail Trail portion of the project is approximately 2 miles and runs parallel to the new light rail facility being constructed along the east side of Folsom Blvd.

Ulatis Creekwalk/Andrews Park Improvements, Vacaville, California - Served as Project Manager and Landscape Architect and was responsible for the design of a creek side linear park located in downtown Vacaville. The project included preparation of construction documents, specifications, cost estimates, environmental review and permitting. Project features included a bike path/pedestrian trail system, pedestrian bridges, retaining walls, concrete walkways and stairways, pedestrian plazas, fountains, kiosks, picnic areas, parking facilities, erosion control, and extensive planting and irrigation.

Mather Air Force Base Conversion to Regional Park, Mather, California - Served as Landscape Architect for County and was responsible for preparing construction documents used by the Sacramento Local Conservation Corps (SLCC) in converting the base to a regional park facility. Documentation included planting plans, cost estimates, design details, habitat improvement plans and project schedules for various aspects of the project.

Rio Vista Streetscape, Rio Vista, California - Served as Principal-in-Charge and was responsible for the preparation of a streetscape construction document package for the City of Rio Vista. The design focused on improving on a five-block section of Main Street and included streetscape improvements as well as a hardscape gateway plaza feature adjacent to the Sacramento River. The design also included the placement of street trees and planters, corner accent treatments, decorative pavement and street lighting. In addition, a series of public workshops were conducted to refine the design concepts.

Paradise Community Park, Paradise, California - Served as Principal-in-Charge and was responsible for master planning and design of a five acre community park located on Black Olive Drive and Pearson Road. The park is intended to reflect a "town square" image and incorporates the existing historic train depot building into the design. Other amenities include a paved parking area, picnic areas, a lawn amphitheatre, a gazebo, signage, a tot lot, pedestrian and bicycle paths, a restroom and an observation deck. An existing channel runs through the site and will be preserved.

Shelly Hatleberg – Assistant Project Manager/Biologist

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Familiarity with El Dorado County
- Experience with complex biological issues

Education

MA, Biology, University of Nebraska at Omaha, 1997

BS, Environmental Science/Biology, University of Nebraska, 1993

Specialized Training

Two-day Intensive Workshop on Habitat Restoration, UC Davis Extension

40-Hour Wetland Delineation Training, Wetland Training Institute, San Diego, California

HDR Desert Tortoise Monitoring Training

National Highway Institute course in Project Development and Environmental Documentation

Professional History

EN2 Resources, Inc./Sierra Ecosystem Assoc
2004 - present

HDR Engineering, Inc.
1995 - 1998, 1999 to 2004

Dames & Moore, 1999

Sonoma County Water Agency, 1998 – 1999

U.S. Army Corps of Engineers
1993 - 1995

Professional Affiliations

- American Fisheries Society
- American Institute of Fishery Research Biologists
- Salmonid Restoration Federation
- Society for Ecological Restoration
- Dry Creek Conservancy Board of Directors

Ms. Hatleberg is a biologist with more than fifteen years of experience in preparing biological assessments and NEPA and CEQA documents, performing vegetation studies and wetland delineations, and coordinating with various state, federal, and local agencies for environmental permitting.

Publications

Hatleberg, S., and Stasiak, R., “The Effects of Dredging and Flooding on the Fish Community in a Missouri River Floodplain Wetland,” Master’s Thesis, University of Nebraska at Omaha (December 1997). (Also presented to the Corps of Engineers in accordance with a contract with them to perform the monitoring of their restoration site.).

Presentations

Hatleberg, S., Sigler, B., and Morton, J., “Institutional and Environmental Constraints to Wetland Mitigation Design in Semi-arid Western Nebraska,” presented at the American Wetlands Month Conference in Alexandria, VA (May 1997).

Hatleberg, S., Sigler, B., and Oltmanns, S., “Papio-Missouri River Natural Resources District Wetland Mitigation Bank Study” presented at the 1997 American Wetlands Month Conference in Alexandria, VA (1997).

Morton, J., Hatleberg, S., and Remus, J. “Aquatic Habitat Restoration and Preservation at Blackbird Tieville Decatur Bends Along the Missouri River in Nebraska and Iowa,” presented at the 1996 Annual Meeting of the Society of Wetland Scientists, Kansas City, MO (1996).

Hatleberg, S., Sigler, B., and Morton, J., “Institutional and Environmental Constraints to Wetland Mitigation Design in Semi-arid Western Nebraska,” presented at the American Society of Civil Engineers 1996 conference, Anaheim, CA (1996).

Hatleberg, S., Sigler, B., and Oltmanns, S., “Papio-Missouri River Natural Resources District Wetland Mitigation Bank Study” presented at the 1996 Washington State Department of Transportation Connections Conference, Tacoma, WA (1996).

Fish Studies

Kimball Island Aquatic Monitoring Project - Wildlands, Inc. Monitoring fish use of newly created aquatic habitat within the restored tidal wetlands on Kimball Island. Fish sampling was conducted using seines, trawls, and fyke nets to capture larval, juvenile, and adult fishes, as well as macroinvertebrates. Fish species include delta smelt, splittail, chinook salmon, and other fishes. Habitat conditions that were monitored included depth, velocity, substrate, cover, temperature, turbidity, salinity, and channel configuration.

Lake Aloha Trout Survey and Removal Project – El Dorado Irrigation District, Desolation Wilderness. Conducted initial trout survey and removal efforts in ponds below Lake Aloha in Desolation Wilderness. Methods used for sampling/removal included gill nets and seines. Purpose of project is to determine presence of trout and remove any trout if found to assist in the recovery of mountain yellow-legged frog populations in high elevation lakes. Removal efforts will continue over the next five years, in accordance with El Dorado Irrigation District's Relicensing Settlement Agreement with FERC and the U.S. Forest Service.

Salmon Surveys and Aquatic Sampling – Dry Creek Conservancy, Roseville, California. For the last two years, have performed fall/winter salmon surveys along Secret Ravine, and assisted with sampling benthic macroinvertebrates and water quality parameters with the Dry Creek Watershed. Salmonid surveys and water quality sampling occurs on an annual basis.

Fish Study for China Bend/Stone Lakes, Wildlands, Inc. - Prepared report detailing the existing fish use in the Sacramento River at China Bend and Stone Lakes.

Fish Sampling Studies - U.S. Army Corps of Engineers, Omaha District, Game and Parks Commission, Audubon Society, Nebraska. Organized and conducted several larval, juvenile, and adult fish sampling projects. These studies were funded by the U.S. Army Corps of Engineers, Nebraska Game and Parks Commission and Audubon Society, and involved the comparison of fish communities along the Missouri River and in a small urban wetland prior to and following restoration. Thesis studied fish species composition, diversity, and relative abundance within a recently restored marsh along the Missouri River.

Bioassay Chlorine Residual Study - Delta Diablo Sanitation District, California. Researched publications discussing gas bubble disease in fish, as part of a study that evaluate residual chlorine phenomenon at the plant.

BMI Sampling for Skaggs Bridge Replacement - California Department of Transportation (Caltrans), Central Region District, Fresno and Madera Counties, California. Assisted with sampling for benthic macroinvertebrates (BMI) upstream and downstream of Skaggs Bridge to determine pre- and post-construction impacts to water quality. Sampling was conducted in accordance with the California Department of Fish and Game's protocol for sampling BMIs.

CEQA/NEPA – Transportation

CEQA and Biological Studies for Northgate Boulevard Elevation - City of Sacramento, California. Performed biological studies for the proposed elevation of this major arterial roadway through Sacramento. Issues include threatened and endangered species (valley elderberry longhorn beetle, Sacramento splittail, Delta smelt, salmonids, and northwestern pond turtle), heritage trees (oaks and cottonwoods), wetlands, floodplain, and recreational trails.

EA and Biological Assessment for Kelso to Cima Track Upgrade – Union Pacific Railroad (UPRR), Mojave Desert, California. Prepared an environmental assessment (EA) and biological assessment for construction of a 20-mile double track along the UPRR mainline through Mojave National Preserve. The project accommodates joint operation of freight trains and Amtrak high-speed passenger trains. Environmental documents were prepared for approval by National Park Service, which included NEPA analysis, ESA Section 7 consultation for desert tortoise, and NHPA Section 106 consultation (prehistoric and historic sites).

CEQA/NEPA – Wastewater

North Stockton Pipelines Environmental Impact Report (EIR) - City of Stockton, California. Assisted with preparation of an EIR and provided permitting support for new pipelines (includes 24- to 48-inch-diameter sewer interceptor, and 30-inch potable water transmission main) running parallel along a five-mile alignment in North Stockton. Environmental issues evaluated included the preservation of heritage oak trees, threatened and endangered species, crossing of waterways and railroad tracks, coordination with planned development, agricultural land impacts, and growth inducement.

Initial Study for Yuba City Wastewater Treatment Plant Improvements - City of Yuba City, California. Prepared an Initial Study suitable to meet CEQA requirements for the City's wastewater treatment plant expansion from 7 to 12 mgd.

CEQA – Wastewater

CEQA for Bryte Bend Water Treatment Plant Expansion - City of West Sacramento, California. Prepared CEQA Initial Study/Mitigated Negative Declaration and provided environmental permitting services associated with expanding the Bryte Bend Water Treatment Plant from 24 mgd to 60 mgd. Also prepared a biological assessment, biological evaluation, and Mitigation Monitoring and Reporting Program (MMRP). Permits and agreements were completed for the California Department of Fish and Game, California Department of Transportation, National Marine Fisheries Service, Regional Water Quality Control Board, State Reclamation Board, U.S. Army Corps of Engineers, and U.S. Fish and Wildlife Service. Served as liaison with resource agencies to obtain permits required prior to construction.

Spillway 20 Reconstruction Project – El Dorado Irrigation District, Whitehall, California. Prepared CEQA Initial Study/Mitigated Negative Declaration for reconstruction of Spillway 20 as part of El Dorado Irrigation District's Mill Creek to Bull Creek Tunnel Project. Assisting as Environmental Compliance Inspector responsible for ensuring contractor compliance with environmental regulations during construction activities.

NEPA – Water Resources

Blackbird Tieville Decatur Bend EA and Biological Assessment - U.S. Army Corps of Engineers, Omaha District, Nebraska. Prepared an environmental assessment (EA), Section 404(b)(1) evaluation, and biological assessment for a Missouri River mitigation project. Provided input to project engineers for design of fish passageways, and ground-truthed land use from satellite imagery photographs. Coordinated with state, federal, and local agencies in the two states involved.

EIS and EA for Mining Projects - U.S. Army Corps of Engineers, Omaha District, Nebraska. Participated in the development of environmental impact studies (EISs) and environmental assessments (EAs) for various mining projects, prepared biological assessments, assisted branch biologists, and provided technical support to other branches within the Corps' Omaha District, other resource agencies, and the general public.

Wetlands

Wetland Delineations for West Davis Highway EIS - Utah Department of Transportation, Utah. Performed wetland delineations of both freshwater and saline wetlands near the Great Salt Lake for a highway environmental impact statement (EIS). Conducted functional analyses of delineated wetlands according to the Hydrogeomorphic Method (HGM).

Biological Resource and Wetlands Assessment for Sonoma Marin Area Rail Transit (SMART) Commuter Service Systems Planning and On-Call Engineering Contract – Sonoma Marin Area Transit Commission, Sonoma County, California. Performed the biological resources and wetlands assessment for the San Quentin alignment and the biological constraints analysis for the SMART maintenance facility site selection report.

Environmental Permitting and Wetlands Monitoring for Lake Francis Dam Rehabilitation - Yuba County Water Agency, California. Assisted with environmental permitting and coordinating during rehabilitation of Lake Francis Dam. Also performed Year 2 and Year 3 wetlands and vegetation monitoring.

Wetland Mitigation Bank Study – Papio-Missouri River Natural Resources District, Omaha, Nebraska. Conducted a feasibility study for the development of a wetland mitigation bank. Study included the investigation of permits issued by the Corps of Engineers and subsequent mitigation requirements, current and future land use, and GIS mapping. Prepared final banking prospectus and banking instrument for approval by the Corps of Engineers and Mitigation Bank Review Team.

Chevron Wetland Mitigation Monitoring, Point Richmond, California. Assisted with second-year monitoring of saline wetlands for Chevron Refinery wetland mitigation. Monitoring included identification of plant species, notation of hydrology, and other general observations, including wildlife and maintenance issues.

Wetland Delineations and Field Surveys for State Route 101-San Juan Road Interchange Safety Improvements - California Department of Transportation (Caltrans), Central Region District, Monterey County, California. Project manager of field studies to assist Caltrans in documenting potential occurrences of listed, candidate, and species of concern as well as other natural resources for this project, which involves safety improvements for the San Juan Road and Dunbarton Road intersections of State Route (SR) 101. Surveys performed included wetland delineations, and habitat assessments and field surveys for the California red-legged frog and California tiger salamander. Also prepared technical reports for the assessment and delineation for submittal to resource agencies.

Wetland Delineations and Field Surveys for State Route 1-Salinas Road Interchange Safety Improvements - California Department of Transportation (Caltrans), Central Region District, Monterey County, California. Project manager of field studies to assist Caltrans in documenting potential occurrences of listed, candidate, and species of concern as well as other natural resources for this project, which involves safety improvements for the Salinas Road intersection of State Route (SR) 1. Surveys performed included wetland delineations, and habitat assessments and field surveys for the California red-legged frog. Also prepared technical reports for the assessment and delineation for submittal to resource agencies.

Environmental Permitting Assistance

Track Capacity Upgrades, Sacramento to Stockton Permitting – Union Pacific Railroad, Sacramento Valley, California. Coordinated with U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game on permitting (Clean Water Act, Endangered Species Act, and California Fish and Game Code) for three track capacity upgrade projects in California's Central Valley. Conducted biological monitoring during construction for giant garter snake, valley elderberry longhorn beetle, wetlands, and other sensitive habitats.

Stormwater Pollution Prevention Plan – Musco Olive Products, Tracy, California. Assisted with the preparation of an operations stormwater pollution prevention plan (SWPPP) for Musco olive processing plant. SWPPP was prepared per Regional Water Quality Control Board (RWQCB) General Permit specification. Also helped develop best management practice (BMP) implementation plan and assisted in agency approval process.

Permitting - U.S. Army Corps of Engineers, Regulatory Branch, Omaha District, Nebraska. As a biologist for the Regulatory Branch, assisted with issuance of general permits, nationwide permit authorizations, and individual permits in accordance with Section 404. Assisted project managers, field office supervisors, and the enforcement program manager with compliance inspections.

Biological Monitoring/Surveys/Assessments

Dam Investigation and Biological Assessment for Henry W. Coe State Park Reservoirs/Ponds - California Department of Parks and Recreation (California State Parks), Four Rivers District, Santa Clara and Stanislaus Counties, California. Reviewing approximately 50 stock pond reservoirs for biological value, recreational potential, and maintenance considerations. Reconnaissance-level inventories of biological resources are being conducted at each reservoir/pond, including performing habitat assessments for potential sensitive species; sampling aquatic and amphibian species by seining or dip netting; listing and providing estimates of the number of species observed, including birds, mammals, reptiles, amphibians, and plants; and developing a habitat map of the park.

El Dorado Canal Bench Intermittent Streams Riparian Restoration – El Dorado Irrigation District, Whitehall, California. Prepared revegetation plan for five drainages along Canal Bench Restoration Project. Included identifying plants best suited for the area (habitat and elevation) and developing plan and cross section drawings of revegetation plans at each drainage.

Lake Aloha Dam Maintenance and Telemetry Station Installation – El Dorado Irrigation District, Desolation Wilderness, El Dorado County, California. Prepared Biological Evaluation and Biological Resources section of CEQA Initial Study/Mitigated Negative Declaration addressing potential impacts to threatened and endangered species, US Forest Service species of special concern, and Management Indicator Species. Conducted pre-construction and construction surveys for mountain yellow-legged frog and Mount Lyell salamander for dam maintenance and telemetry station installation efforts.

Wildlife Road Mortality Survey for State Route 41/33 Rehabilitation - California Department of Transportation (Caltrans), Central Region District, Kern and San Luis Obispo Counties, California. Assisted with a six-month-long wildlife road mortality survey focusing on state- and federally listed threatened, endangered, proposed threatened or endangered, candidate, and species of concern found deceased on or adjacent to State Route (SR) 41 and SR 33 within the project boundaries. All deceased wildlife identified during these surveys were documented and described in a final Road Mortality Survey Report.

San Joaquin Kit Fox Surveys for State Route 142 Vernalis Expressway - California Department of Transportation (Caltrans), Central Region District, San Joaquin and Stanislaus Counties, California. Assisted with San Joaquin kit fox surveys for this project, which will provide a four-lane divided expressway from State Route (SR) 132/33 separation and overhead in San Joaquin County to west of the San Joaquin River in Stanislaus County (approximately 3.3 miles).

Water Resources

Mormon Channel 1135 Restoration Alternatives Report - U.S. Army Corps of Engineers, Stockton, California. Prepared biological section of an alternatives report that included cost, benefit, and feasibility analysis of restoration improvements for Mormon Channel in the city of Stockton.

Biological Data Report for American River Site No. 5- U.S. Army Corps of Engineers, Sacramento District, Sacramento, California. Prepared biological data report that identifies alternatives for providing additional bank and channel stabilization for a 1,500-foot reach along the north bank of the American River (between Howe Avenue and Watt Avenue bridges), while protecting habitat for several special status species, including Chinook salmon, Central Valley steelhead, and valley elderberry longhorn beetle. The report includes a biological data report, mitigation incremental analysis, and conceptual design of the preferred alternative for bank stabilization.

Megan Buchanan – Assistant Resource Analyst

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Document coordination
- Quality assurance/control
- Served as Document Editor for the Oak Woodland Management Plan

Education

Associate of Arts, Human Services, Folsom Lake College, 2008

Associate of Arts, General Education, Folsom Lake College, 2008

Professional History

Administrative Services Manager, EN2 Resources, Inc., 2004 to present

ROP Intern, El Dorado Union High School District, 2003-2004

Health Information Services Department Assistant, Marshall Hospital, 2002

Family Law Clerk, Placer County Superior Court, 2000-2001

Assistant Manager, The Rental Connection, 1999-2000

Ms. Buchanan specializes in office and project administration and has considerable experience in report editing and production, budget tracking, spreadsheet and contract preparation, subconsultant and vendor coordination, and administrative support of technical staff. She is skilled in quality assurance/quality control (QA/QC) review for consistency, organization, and clarity. Ms. Buchanan is proficient in computer programs such as National Geographic Topo! topographic mapping program, AirPhotoUSA, PhotoMapper 4.0, The Print Shop, SmartDraw, Adobe Acrobat 5.0, Adobe Reader 8.1, and Microsoft programs including Word, Excel, Access, PowerPoint and Publisher.

Specialized Training

Central Sierra Regional Occupational Program (ROP) training in Microsoft programs including Excel and PowerPoint

Academic Honors

Folsom Lake College Valedictorian, 2008

Named on The National Dean's List 2004-05, 2005-06, 2006-07, 2007-08

Phi Theta Kappa International Honor Society Member

Project Experience and Responsibilities

Silver Lake Remediation Project – El Dorado Irrigation District – Assisted with review and editing of the Project Description for the Initial Study/Proposed Mitigated Negative Declaration (IS/Proposed MND) that was prepared per CEQA requirements. Prepared Aesthetics, Utilities and Service Systems, Mineral Resources, Population and Housing, and Public Services sections of IS/Proposed MND. Also prepared Notice of Intent and Notice of Completion for the project.

Oak Woodland Management Plan – El Dorado County – Responsible for project administration and contract management. Coordinated with County staff and subconsultants on contracts, budgets, and activities. Prepared Plan Components, Plan Administration and Implementation, Cultural Resources, Hazards and Hazardous Materials, Transportation and Traffic, and Public Services sections of Oak Woodland Management Plan Initial Study/Negative Declaration that was prepared per CEQA requirements. Prepared PowerPoint presentations for Planning Commission meetings. Provided QA/QC review for the Administrative Draft, Draft, and Public Review Draft Oak Woodland Management Plan. Responsible for document editing and production. Oversaw organization and indexing of numerous project documents and reference materials.

Transportation and Trails System Management Plans – El Dorado Irrigation District – Responsible for project administration. Provided editorial assistance for the Draft Transportation System Management Plan and the Draft Trails System Management Plan and worked with Project Manager to prepare reports. Created tables, organizational charts, and Excel spreadsheets and assisted with graphics design. Coordinated with printing company on production of reports. Created maps using National Geographic Topo! mapping program and assisted with the preparation of aerial photos using AirPhotoUSA 2003 and PhotoMapper 4.0 programs. Responsible for budget tracking, QA/QC review of documents, and file management.

Butte Creek Benthic Macroinvertebrate (BMI) Survey – El Dorado Irrigation District – Assisted with editorial review and document production and distribution. Coordinated with project team on ‘chain-of-custody’ delivery of BMI samples to the lab for assessment. Created Excel spreadsheets. Responsible for vendor coordination and scheduling, budget tracking, and file management.

Project 184 Reconstruction Environmental Compliance, Mill to Bull Tunnel and Canal Bench Restoration Support – El Dorado Irrigation District – Assisted with editorial review, production, and distribution of Spillway 20 Public Information and Public Contact Reports, Water Quality Monitoring Reports, and Erosion/Sediment Control/Spill Prevention/Containment Plan and Storm Water Pollution Prevention Plan Inspections. Assisted with preparation of subconsultant agreement for Canal Bench Intermittent Drainage Crossings Revegetation Plan. Responsible for budget tracking, QA/QC review of documents, file management, and subconsultant and vendor coordination and scheduling.

Fausel Professional Building Project – Murray and Downs – Assisted with QA/QC review and document production and distribution. Responsible for vendor and subconsultant coordination, editorial review assistance, file management, and budget tracking.

Oak Tree Inventory, Preservation, and Replacement Plans and Biological Resources Reports for Various Subdivision and Development Projects – Responsible for QA/QC review and production and assisted in preparation of aerial photos and mapping for numerous oak tree plans and biological reports required by the County of El Dorado for housing, commercial, and subdivision projects falling under the requirements of Policy 7.4.4.4 (oak woodlands) and Policy 7.3.3.4 (riparian habitat and wetlands).

Surface Mining and Reclamation Plan – Smith Flat Recycling, Inc. – Assisted with editing and production of surface mining and reclamation plan for the clean up and restoration of the historic mining and lumber mill operations at Smith Flat near Placerville, CA. Key elements of the plan include management of reclamation activities to avoid nearby riparian resources while allowing demolition and recovery of extensive concrete, bark, and sand and gravel materials leftover from prior site uses. Key planning issues included the need to address the County’s Policy 7.4.4.4 related to conservation and mitigation of oak woodlands, and riparian/wetland setback requirements of Policy 7.3.3.4, as well as the revegetation requirements of the State Mining and Geology Board’s reclamation regulations.

Diamond Dorado Biological Resources Study and Important Habitat Mitigation Program – Private Island Homes – Responsible for contract and subconsultant agreement preparation. Coordinated with clients on contract and schedule. Prepared aerial photos using AirPhotoUSA 2003 and maps using Topo! mapping.

Yuba City Water Treatment Plant Expansion Project – City of Yuba City – Created Project Vicinity, Site Grading and Paving Plan, Site Piping Plan, Project Location, and Project APE and Survey Coverage maps using National Geographic Topo! mapping program. Assisted with graphics design for Initial Study/Mitigated Negative Declaration and editorial review, production, and distribution of Biological Assessment and Cultural Resources Inventory Report. Assisted with preparation of Notice of Intent and preparation and filing of Notice of Determination. Coordinated with subconsultants on activities and budgets. Responsible for budget tracking, meeting coordination, QA/QC review of documents, and file management.

Rebecca Cull – Biologist

Reasons for Assignment to the Integrated Natural Resources Management Plan

- 25+ years experience with complex biological issues in northern California
- Experience with acting as liaison with multiple interested parties on complicated projects

Education

MSc Environmental Studies CSU San Jose

BA Biology/Environmental Studies UC
Santa Cruz, 1979

Professional History

Sustain Environmental Inc., 2004–present

HDR Inc. Senior Biologist, 2002-2004

California Department of Parks and
Recreation, Senior Resource Ecologist,
2000-2002

Independent Consultant, Wildlife Biologist,
1998-2000

KEA Environmental Inc., Senior Wildlife
Ecologist, 1996-1998

BioSystems Analysis Inc., Wildlife Biologist
1991-1996

Various Private Industries Accounting and
Management, 1980-1991

UC Santa Cruz, Prescribed Fire Crew and
Research Assistant, 1977-78

US Forest Service YCC Crew Leader
1977, 1978

Permits

CDFG Scientific Collecting Permit
#801100-05. 1991-present

Certifications

EPA Watershed Management Training
Certification. 2004

Southwest Willow Flycatcher
Training/Certification. 1998

Marbled Murrelet Survey
Training/Certification. 1991

Ms. Rebecca Cull is a founding principal of Sustain Environmental Inc. Rebecca has worked for small private firms, multimillion-dollar companies, universities and state agencies during her 25-year career in business management and ecological studies. Her attention to detail, awareness of systems, and understanding of animal behavior (humans included) make her an excellent manager, field biologist, and educator.

Rebecca's specialty is designing, supervising and conducting ecological studies to meet the needs of environmental reviews under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). She works on Habitat Conservation Plans (HCPs) and provides Endangered Species (ESA) consults. Well-versed in federal and state survey protocols for listed and special-status wildlife species in the western U.S., Rebecca has extensive field experience with raptors, terrestrial birds, small mammals, reptiles, amphibians, and vernal pool invertebrates.

Rebecca has managed several environmental studies for multi-year linear projects that crossed state lines as well as federal and private properties. Her years of supervising and working with field crews in remote and often adverse conditions have honed her ability to elicit cooperation and understanding while maintaining respect for the matters at hand. This ability is further evidenced in the training manuals and field identification guides she has developed for crews on large-scale construction projects, and in compliance manuals developed for environmental monitoring teams.

Rebecca has in-depth expertise with burrowing owls and Swainson's hawks, having conducted surveys, assisted with banding efforts, and participated in long-term monitoring of both species throughout northeastern and central California. An active member of the Burrowing Owl Consortium since 1992, Ms. Cull was a key participant in the development of the *Burrowing Owl Survey Protocol and Mitigation Guidelines*, informally adopted by the California Department of Fish and Game in 1995. She is the primary author of the *Status of Burrowing Owls in Northeastern California* (in press).

Travel to remote locations piqued Rebecca's interest in sustainable systems. An experienced coastal and "blue water" sailor, she was one of a four-person crew on the *Unlikely VII* during an eight-week oceanic passage from India to Israel that included ports of call in Oman, South Yemen and Sudan. More recent adventures include several trips to Kenya, and to French Polynesia. Wherever her journeys take her, she brings a keen interest in the natural world along with a deep respect and sensitivity to local cultures.

Project Management

Land Management Plan Update and CEQA Initial Study/Negative Declaration, Hallelujah Junction Wildlife Area California Wildlife: Foundation/California Department of Fish and Game, North Central Region - PROJECT MANAGER Responsible for overseeing the preparation of an updated Land Management Plan (LMP) for the 13,300-acre Hallelujah Junction Wildlife Area. The LMP, which incorporates a CEQA Initial Study/Negative Declaration (IS/ND), uses an adaptive management approach to address a variety of management concerns ranging from recent property acquisitions, special-status species protection, habitat enhancement and restoration, grazing and fire management, noxious weed management, easements and boundaries, vegetation community mapping, and appropriate public use. The LMP incorporates the use of indicator species for monitoring management activities, and tools to foster community support and stewardship of the wildlife area. Duties include serving as the primary point of contact between the California Department of Fish and Game (CDFG) and the SEI team, managing schedules and scoping issues, supervising development of the LMP, researching and preparing the biological resources and monitoring sections of the document, GIS mapping, and providing QA/QC. The SEI team includes allied environmental and engineering firms, the Geographic Information Center at CSU Chico, and the Sacramento City College Field Ecology Certificate Program. 2006-present

Draft Land Management Plan and CEQA Initial Study/Negative Declaration Mouth of Cottonwood Creek Wildlife Area: California Wildlife foundation/California Department of Fish and Game, North Coast Region - PROJECT MANAGER Responsible for overseeing the preparation of the Draft Land Management Plan (LMP) for the Mouth of Cottonwood Creek Wildlife Area. The LMP, which incorporates a CEQA Initial Study/Negative Declaration (IS/ND), addresses a variety of management concerns ranging from recent property acquisitions, special-status species protection and habitat enhancement, noxious weed management, easements and boundaries, vegetation community mapping, public use, and educational opportunities. The LMP includes the use of indicator species for monitoring management activities, and development of an environmental resource and education center for the wildlife area. Duties include serving as the primary point of contact between the California Department of Fish and Game (CDFG) and the SEI team, managing schedules and scoping issues, supervising development of the LMP, preparing GIS layers and maps, and providing QA/QC. The SEI team includes allied environmental and engineering firms, the Geographic Information Center at CSU Chico, and the Sacramento City College Field Ecology Certificate Program. 2005-present

Biological On-Call Services Caltrans Central Region - SENIOR WILDLIFE BIOLOGIST Responsible for preparation of cost estimates and scopes of work, biological survey plans, and quality control review of technical reports. Conducted biological surveys for special-status wildlife including raptors, riparian obligate passerines, California red-legged frog and valley elderberry longhorn beetle. Prepared NES and Biological Assessments (BA) according to Caltrans specifications. Provided technical oversight for all projects and quality assurance/quality control (QA/QC) for all documents. 2002-2004

State Park General Plans, Northern and Central Service Centers California Department of Parks and Recreation - SENIOR RESOURCE ECOLOGIST Responsible for supervision and training of staff ecologists and archaeologists, oversight and assistance with park general plan updates (including public meetings, project scoping, and development of long-term strategies), field surveys for special-status wildlife, and preparation and review of CEQA environmental documents. **PROJECT MANAGER** Responsible for the development and implementation of a restoration plan for the severely eroded slopes at Carnegie State Vehicle Recreation Area. Plan development included consultations with restoration specialists, native plant suppliers, ecologists, and equipment operators. Created a restoration team of park staff whose primary task was assisting in the implementation of the restoration work, including fencing the proposed restoration sites and working with volunteers and California Department of Forestry (CDF) crews installing erosion control throughout the park. Located, hired and supervised heavy equipment operator with restoration experience to repair and contour hill slopes ranging from 26 to 37 degrees to match surrounding topography. Supervised the installation of silt fencing and sediment basins at foot of slopes to protect Corral Hollow Creek. Negotiated with CDF for off-season crew assistance to install erosion control and reseed slopes. Erosion control techniques included installation of straw wattles, strategically placed hay bales, straw mulching, and fiber coir mats. Slopes were seeded with a mix of sterile non-native grasses and locally collected native grasses and forbs. Tracked time and materials to assist in budget planning for future projects. 2000-2002

Alturas Intertie Transmission Project Sierra Pacific Power Company - WILDLIFE PROJECT MANAGER Responsible for all aspects of biological resource issues associated with the construction of a 167-mile, 356 Kv transmission line from Alturas to Reno. Prepared cost estimates and managed budgets, supervised remote field crews and data management, assisted with overall project administration, and prepared monthly and final reports. Acted as primary point of contact for all project wildlife resource issues. Reviewed and corrected impact assessments for wildlife habitat. Reviewed, prepared and/or edited the following project mitigation plans: Preconstruction Survey Plan for Special-Status Wildlife, Off-site Habitat Compensation, Greater Sage-Grouse Habitat Enhancement, and Wildlife Protection Plans. Assisted with preparing environmental training manuals, compliance manuals and presentations. Conducted environmental training for crews involved with project (surveyors, engineers, construction, etc.). Coordinated environmental compliance monitoring team during construction.

Field work included coordinating and conducting preconstruction special-status wildlife surveys within a 500-foot to 3-mile corridor along the length of the alignment. Species included greater sage-grouse, greater sandhill crane, bank swallow, yellow warbler, willow flycatcher, desert kit fox, pygmy rabbit, burrowing owl, raptors (Swainson's hawk, golden eagle, bald eagle, prairie falcon, peregrine falcon, etc.) and special-status amphibians. 1996-1998

Tuscarora Gas Transmission Project *Tuscarora Natural Gas Company* - DEPUTY PROJECT MANAGER Responsible for all aspects of biological resource issues associated with construction of a 229-mile natural gas pipeline from Malin, Ore., to Tracy, Nev. Duties included preparation of scopes of work and task orders, tracking and managing budgets and schedules, coordination of staff and subconsultants, project administration, data management, agency consultations, background research and report preparation. Supervised field crews and conducted special-status wildlife surveys, recorded data, coordinated fieldwork, and co-authored final reports. Assisted with preparation of environmental training manuals and materials (synthesizing environmental mitigation requirements from all permits as well as environmental documents, preparation of lay-person friendly special-status species accounts, and editing of presentation materials and environmental compliance manual). Authored the Preconstruction Survey Plan for Special-Status Wildlife, Wildlife Protection Plan, and co-authored and edited the draft and final Preconstruction Survey Reports.

Field work included two years of focused special-status species surveys within a 500-foot to 8-mile corridor along the length of the preferred alignment. Species included raptors (bald eagle, osprey, Swainson's hawk, peregrine falcon, and burrowing owl), greater sandhill crane, greater sage-grouse, desert kit fox, pygmy rabbit, American badger, tricolored blackbird, bank swallow, yellow warbler, willow flycatcher and special-status amphibians. Documented the first nesting occurrence of peregrine falcons east of the Sierra Nevada in Lassen County, and monitored nesting success. Coordinated Swainson's hawk nest monitoring efforts. Researched, surveyed, and reported on potential mitigation sites for special-status species habitat and/or presence on an on-call basis after project was completed. 1994–1996

PGT-PG&E Natural Gas Pipeline Expansion Project *Bechtel Corporation* - SPREAD COORDINATOR Responsible for two sections of a pipeline expansion project in California (Shingletown to Brentwood, Brentwood to Firebaugh). Coordinated and worked with field crews conducting preconstruction surveys and biological monitoring, acted as client liaison, and managed data collection and submission. Prepared annual reports and assisted with project administration. Edited special-status species information for environmental compliance worker education program. Surveyed more than 250 miles of pipeline alignment for special-status wildlife, including bank swallows, prairie falcons, burrowing owls, Swainson's hawks, California tiger salamander, California red-legged frog, San Joaquin kit fox, and vernal pool invertebrates. Monitored a burrowing owl colony through two breeding seasons, monitored active Swainson's hawk nests, assisted with invertebrate and amphibian surveys. 1992–1994

Special-Status Species Surveying and Monitoring

Biological On-Call Services *PG&E/ TRC Environmental Consulting* - PROJECT MANAGER, SENIOR ECOLOGIST. Responsible for planning, conducting, and supervising biological resource assessments on an on-call, as needed basis throughout northern California. Prepared scopes of work, cost estimates, progress reports, biological reports and assisted with resource agency negotiations on behalf of PG&E. Conducted surveys for special-status wildlife, coordinated botanical resource surveys, and prepared preconstruction survey reports. Supervised 12 months of biological resource environmental compliance monitoring. 2007-2008.

Burrowing Owl Habitat Monitoring City of Davis - PROJECT MANAGER, SENIOR ECOLOGIST. Responsible for conducting biannual habitat monitoring survey of burrowing owl mitigation site in Yolo County. Surveys follow a prescribed protocol and include preparation of an annual report. 2006-2009.

Burrowing Owl Mitigation Monitoring South Sacramento/Albion Environmental Consulting - SENIOR BIOLOGIST. Subcontractor to Albion Environmental to assist with follow-up burrowing owl monitoring at a site slated for infill development. Conducted evening monitoring three times/week, surveyed all suitable burrowing owl habitat within a mile of the site to relocate owls. Coordinated efforts with Ester Burkett of CDFG.

Special-Status Wildlife Preconstruction Survey, Stonebridge Outfall Project William Lyon Homes/Ibis environmental Consulting - SENIOR BIOLOGIST. Conducted surveys for Swainson's hawk, white-tailed kite, burrowing owl, giant garter snake, and other special-status wildlife in accordance with permitting requirements. Monitored Swainson's hawk nests to determine reproductive status. Prepared survey report and mitigation recommendations. 2004

Biological Monitoring, Washoe Lake Wetlands Mitigation Bank Nevada Department of Transportation - SENIOR BIOLOGIST, trained field staff in bird identification and monitoring techniques, assisted with monthly bird surveys, assisted with preparation of annual report, and provided QA/QC for final report. 2003

Wetlands Mitigation Monitoring and Burrowing Owl Surveys, Wild Goose Gas Storage Facility Alberta Energy Company/ Essex Environmental Consulting - SENIOR BIOLOGIST Conducted post-construction mitigation monitoring of created wetland sites. Monitoring included winter and breeding bird surveys. Conducted preliminary surveys for Swainson's hawks and other nesting raptors along proposed project expansion. Prepared winter and breeding bird survey reports for 1999-2000. Conducted burrowing owl habitat assessment and surveys according to CDFG protocols, prepared report for submittal to CDFG. 2002-3

Burrowing Owl Monitoring, Sharpe Army Depot U.S. Department of Defense, San Joaquin County, California - Conducted annual breeding census for burrowing owls, mapped active burrows, monitored reproductive status, and assisted with banding juveniles. 2000

Burrowing Owl Surveys City of Morgan Hill, California - Conducted burrowing owl surveys of all vacant lots within city general plan in support of a burrowing owl management plan. Mapped all burrowing owl nest locations and prepared preliminary report. 1999

Biological Resource Assessments, Hungry Valley Lateral Tuscarora Natural Gas Company, Reno, Nevada - SENIOR WILDLIFE ECOLOGIST responsible for planning and conducting reconnaissance-level surveys for special-status wildlife and plants, habitat characterization, impact assessment and mitigation recommendations. Prepared Biological Resources section of Federal Energy Regulatory Commission (FERC) permit for a natural gas pipeline. Conducted focused surveys for rare plants, assisted with preparation of the Environmental Assessment (EA). 1998

Special-Status Species Surveys and Assessments, Multiple Projects Santa Cruz County Planning Department, California - Conducted special-status species surveys and habitat assessments throughout Santa Cruz County, including Felton Water Treatment Facility (surveys for special-status amphibians and reptiles), Graham Hill Showground (Cooper's hawk surveys), Wilder Ranch State Park (California red-legged frog habitat assessment and surveys), Shoreline Middle School (surveys and impact assessment for special-status wildlife), and Lexington Reservoir (special-status species surveys and impact assessment for seismic retrofit). Also provided third-party review of environmental documents. 1991-1996

Burrowing Owl and Raptor Monitoring San Jose International Airport, California - Conducted biweekly surveys to monitor raptors, burrowing owls and other wildlife species in the infields and conducted biannual burrowing owl population censuses. Prepared annual reports. Installed artificial burrows for owls, and performed burrowing owl mitigation for airport construction, assisted with burrowing owl banding efforts and raptor trapping and relocation. Co-authored San Jose Airport Burrowing Owl Management Plan. 1991-1996

Biological Assessment, Monterey Bay Environment, Science and Technology Center and Fort Ord Natural Reserve University of California, Santa Cruz - Served as principal investigator for a three-phase biological assessment of an undeveloped 1150-acre portion of Fort Ord, Monterey, Calif. Conducted surveys for all special-status species including burrowing owl, black legless lizard, California horned lizard, Smith's blue butterfly, various birds, Monterey ornate shrew, Monterey dusky-footed woodrat, and American badger. Mapped potential habitat for each species, analyzed potential impacts, and presented general recommendations. Wrote and organized production of final report. 1994-1995

Special-Status Species Surveys, Coastal Branch Phase II California Department of Water Resources, Kern and San Luis Obispo Counties - Conducted surveys for special-status species, including San Joaquin kit fox, short-eared owl, burrowing owl, blunt-nosed leopard lizard, California tiger salamander, and California red-legged frog, according to state and federal protocols. Co-authored Environmental Compliance Monitoring Manual and edited worker education materials for project. 1994-1995

Special-Status Wildlife Surveys, Highway 68 Caltrans, Monterey County - Conducted breeding bird and special-status wildlife surveys on two proposed realignments of Highway 68. Surveys included extensive searches for yellow warblers, yellow-breasted chats, Coopers' hawk and black legless lizard. Coordinated fieldwork, data collection, and curated data. Assisted with preparation of technical reports in support of the Natural Environment Study and Wetlands Assessment. 1994

Biological Assessment, Rancho San Carlos Pacific Union, Monterey County, California - Conducted breeding bird surveys, spring and fall Columbian black-tail deer population census, marbled murrelet habitat assessment and surveys, and raptor surveys on a 20,000 acre ranch. Assisted with special-status amphibian and bat surveys. 1991-1993

Spotted Owl Survey, Greenhorn District U.S. Forest Service, Sequoia National Forest, California - Conducted spotted owl surveys according to USFS 1991 protocol, coordinated spotted owl survey crew, acted as liaison with lead agency, and processed weekly reports. Assisted project manager with project administration. 1992

Marbled Murrelet Surveys, Butano Unit Big Creek Lumber, San Mateo County, California - Conducted intensive surveys for marbled murrelets, included nest searches in occupied habitats, according to established protocol. Assisted with collection of data for habitat analysis within random vegetation plots. 1991

CEQA/NEPA Projects and Environmental Permitting

San Pablo Dam Seismic Retrofit Project, Section 7 Consultation, Biological Assessment East Bay Municipal Utility District/Environmental Science Associates - Senior Ecologist. Researched and prepared the Biological Assessment in support of the ESA Section 7 consultation with USFWS for the San Pablo Dam Seismic Retrofit Project. Completion of this project required understanding of construction and engineering specifications, coordination with EBMUD project managers and USFWS biologists, and reconnaissance-level biological field surveys. Federal species of concern included wintering bald eagle, steelhead, and California red-legged frog. 2006.

Natural Environmental Study, CEQA Initial Study/Mitigation Negative Declaration Commerce Drive Extension and Pine Creek Bridge City of Concord, California - Environmental project manager Responsible for coordination of biological and cultural resource studies in support of environmental documents, including management of subconsultants and review of technical reports. Prepared NES to Caltrans specifications. 2003-2004

CEQA Initial Study/Mitigated Negative Declaration I-205 Mountain House Parkway Interchange Improvements Mountain House Community Services District, Tracy, California - Deputy project manager Responsible for assisting with project administration and budget monitoring. Researched and prepared Hazardous Materials Section of environmental document. Reviewed and edited Biological Resources, Cultural Resources, and Geology and Soils sections of CEQA document. 2002-2003

CEQA Initial Study/Mitigation Negative Declaration, Multiple Projects Calaveras County Water District, California - PROJECT MANAGER Responsible for preparing CEQA/NEPA compliant documents, including researching, writing and preparation of environmental documents. Coordinated staff assignments, reviewed sections of documents, and acted as liaison with client. IS/MNDs were prepared for the Bear Creek Pipeline Replacement Project, the Bummerville Water Storage Improvement Project, and the West Point Clearwell Replacement Project. 2002-2003

Permitting/Mitigation Compliance Design and Engineering of Willow Creek Drive and Quartz Drive Extension Placer County Public Works Department, California - PROJECT MANAGER Responsible for biological resource studies and wetland permitting according to mandates of the IS/MND. Surveys included tree inventory and mapping, and habitat assessment and surveys for foothill yellow-legged frog. Supervised fieldwork, coordinated project permitting, and provided QA/QC for technical reports. Participated in engineering design meetings. 2003

Endangered Species Act Section 7 Consultation, Giant Garter Snake Rice Fallowing and Water Transfer to Southern California Metropolitan Water District, Sacramento Valley, California - BIOLOGIST Prepared giant garter snake species assessment including an extensive literature review to support ESA Section 7 consultation between MWD, Bureau of Reclamation, and the U.S. Fish and Wildlife Service (USFWS). Consulted with local and regional species experts, summarized current research efforts, and estimated impacts from proposed rice fallowing and water transfer to southern California. Prepared written report for submittal to USFWS, MWD and Rice Growers Associations and attended all negotiation meetings. 2003

Multiple CEQA/NEPA Documents, Twin Cities District California Department of Parks and Recreation - RESOURCE ECOLOGIST Developed and wrote Wildlife Habitat Protection for the Twin Cities District. Provided oversight for work by outside consultants, including preparation of a Recirculated EIR/General Plan Amendment, and preparation of a Multi-Species HCP. Acted as lead for resource agency negotiations and permitting issues. Provided technical assistance to other resource ecologists for endangered species issues. Assisted division staff with CEQA/NEPA issues and regulatory compliance, prepared grant evaluations and provided technical assistance with specific-species issues. 2000 – 2002

Environmental Planning Documents and Third Party Review

Mitigation Monitoring Reports for the Greyhawk Development Project. Researched and reviewed requirements for annual mitigation monitoring reports, provided third party review of monitoring reports prepared by Center for Natural Lands Management for concurrence with U.S. Army Corps of Engineers standards. 2004

Avian Protection Plan for San Diego Gas & Electric. Provided technical review, editing, and oversight for bird protection plan addressing mitigation of potential impacts from transmission lines in southern California. 2003

McClellan Air Force Base Integrated Natural Resources Management Plan. Co-authored and produced the 1997 update of the Integrated Natural Resources Management Plan for Sacramento Army Corps of Engineers and McClellan AFB. Project included compiling and summarizing all associated management plans, updating sensitive species information, and integrating changes in management strategies for the McClellan properties. 1996

Trapping and Habitat Assessment Survey for Pacific Pocket Mice and Other Special-Status Small Mammals in and Adjacent to the San Dieguito Lagoon in Del Mar, California. Senior editor for report on small mammal surveys and habitat assessments in the project area. Surveys emphasized determining presence/absence, relative densities, and habitat requirements of special-status small mammal species. Prepared graphics and final report. 1993

Additional Research

Swainson's Hawks in Modoc and Lassen County. Conducted extensive research concerning the status and distribution of Swainson's hawks in northeastern California, including compiling all historical records of Swainson's hawk nest locations. Conducted road surveys of all suitable Swainson's hawk habitat in Modoc and Lassen counties, documented and mapped locations of nesting Swainson's hawks on USGS topographic maps, and characterized present day habitat characteristics surrounding the nest sites. Unpublished data. 1999

Marbled Murrelet Research. Big Basin State Park, Santa Cruz County. Member of the Santa Cruz County Murrelet Research Group, conducted intensive surveys for marbled murrelet, conducted nest searches and monitored active nests throughout fledging. Located first active nest in Big Basin State Park. May 1991 – August 1994.

Salinas River National Wildlife Refuge. Evaluation of Habitat and Land Use Changes at Salinas River National Wildlife Refuge. Researched and documented history of wildlife refuge, used historic aerial photos to map land use changes (1937 to 1994) and analyze the effects upon natural habitat components at refuge. Report submitted to USFWS and CDFG. Graduate work. 1991

Landels-Hill Big Creek Reserve Natural Resource Inventory. University of California, Santa Cruz. Compiled extensive literature review concerning natural history of Big Sur and Santa Lucia Range, researched previous natural history expeditions, and conducted field surveys over 5,000-acre reserve to collect baseline inventory for new reserve. Assisted with mammal trapping, herpetological surveys and conducted breeding bird surveys of reserve. Work involved coordinating field crew, and being on-site for up to two weeks at a time under rugged field conditions. 1978

Año Nuevo State Park. San Mateo County, California. Led natural history tours, focusing upon geology, breeding biology of marine mammals (e.g., elephant seals, California sea otters, Steller's sea lions), and avian ecology. 1976.

Professional Publications

Cull, R. and F. Hall .2007. Status of burrowing owls in northeastern California. Proceedings of the California Burrowing Owl Symposium, November 2003. Bird Population Monographs No. 1 Institute for Bird Populations and Albion Environmental, Inc.

Remy, C. and R. Cull. 2004. What your environmental consultants should know. Internet resources for environmental permitting and compliance requirements for schools. Prepared for the Coalition for Adequate School Housing (CASH) Web site.

Roberts, T.A., R.L. Cull and A. Flannery. 1996. Distribution of nesting sandhill cranes in the South Fork Pit River Valley, Modoc County, California. California Department of Fish and Game 82/3: 137-140.

Life on the Edge: A Guide to California's Endangered Natural Resources. 1994. Edited by C. Thelander, M. Crabtree, et al. (R. Cull, contributing editor). BioSystems Books, Santa Cruz, CA.

Bianco, S. and R. Cull. 1992. Target Species Field Identification Guide for Edwards Air Force Base. BioSystems Analysis, Inc. and Jacobs Engineering Group.

Cull, R. and D. Melchert. 1980. Birds of the Landels-Hill Big Creek Reserve. In Terrestrial Vertebrates of the Landels-Hill Big Creek Reserve. Environmental Field Program Publication #3. University Of California, Santa Cruz

Kris Kiehne – GIS Specialist/Biologist

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Vast knowledge of issues facing El Dorado County
- Experience with GIS and biology

Education

Graduate course work (soil science, plant water relations, botany) University of California, Davis, 1996-1998.

AB, Biology, Washington University, St. Louis, 1983.

Specialized Training Introduction to GIS. Folsom Lake College, 2009.

CEQA Introduction Workshop. UC Davis Extension, 2008.

CEQA Writing Workshop. UC Davis Extension, 2008.

Recognizing Tree Diseases. Int'l Society of Arboriculture training, 2006.

Writing workshop, Int'l Society of Arboriculture training, 2006.

Ms. Kiehne is a biologist specializing in Arboriculture. She has written evaluations for tree health and tree hazards. She has completed her post-graduate course work in horticulture. Prior to studying horticulture, she conducted genetic research on both forest trees and bacterial organisms.

Professional History

Staff Arborist, Serrano Owners Association, 2006-2008.

Staff Biologist, Foothill Tree Service, 2004-2005.

Program Director, Sacramento Tree Foundation, 1999-2003.

Research Associate, USDA Forest Service, 1994-1998.

Research Associate, Sandoz AgroSciences, 1989-1993.

Professional Affiliations

International Society of Arboriculture, Certified Arborist.

Publications

Kiehne, K., and D. Neale. 1998. DNA Pooling Strategy for saturation mapping in outbred crosses. *Molecular Breeding*.

Kalman, S., Kiehne, K., Cooper, C., Reynoso, M., and T. Yamamoto. 1995. Enhanced Production of Insecticidal Proteins in *Bacillus thuringiensis* Strains Carrying an Additional Crystal Protein Gene in Their Chromosomes. *Applied and Environmental Microbiology*.

Kalman, S., Kiehne, K., Libs, J. and T. Yamamoto. 1993. Cloning of a Novel *cryIC*-Type Gene from a Strain of *Bacillus thuringiensis* subsp. *galleriae*. *Applied and Environmental Microbiology*.

Koning, A., Tanimoto, E., Kiehne, K., Rost, T. and L. Comai. 1991. Cell-specific expression of plant histone H2A genes. *The Plant Cell*.

O'Neal, J., Pokalsky, A., Kiehne, K., and C. Shewmaker. 1987. Isolation of tobacco SSU genes; characterization of a transcriptionally active pseudogene. *Nucleic Acids Research*.

Ethan Koenigs – Biologist/GIS Specialist

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Intimate knowledge of Natural Resources in El Dorado County
- Served as Assistant GIS Specialist for the Oak Woodland Management Plan

Education

Master of Science,
Horticulture & Agronomy, 2001
University of California, Davis

Master of Science, Entomology, 2000
University of California, Davis

Bachelor of Science, Biology, 1996
California State University, Sacramento,

Professional History

Land/Natural Resources Analyst
EN2 Resources, Inc., 2007 to present

GIS Specialist/Biologist
ECORP, 2005-2007

Vineyard Manager
Domaine de la Terre Rouge, 2005

Viticulturist/GIS Specialist
Walsh Vineyards Management, 2002-2004

Viticulturist
Jack Neal and Son Vineyard Management,
2001-2002

Biological Sciences Technician
USDA Forest Service, 1994-2000

Mr. Koenigs is a biologist with 8 years of experience in the management of natural resources and agricultural systems. He has served in technical positions providing cartographic expertise, collecting and analyzing biological field data, and managing vineyard operations.

Mr. Koenigs is a biologist with a variety of experience in natural and managed ecosystems, with particular emphasis on the habitats of the Sierra Nevada and the Sacramento Valley. He has conducted a variety of biological surveys, studies, and habitat assessments. He has studied and practiced the production of winegrapes, including all aspects of vineyard establishment and management, in the Sierra Foothills and North Coast of California. Mr. Koenigs also specializes in the use of Geographic Information Systems (GIS) in biological applications. As an avid naturalist he spends a great deal of time acquiring information and learning about the natural resources of California.

Specialized Training

Management and control of Insects/Weeds/Diseases in agriculture

Army Corps of Engineers' protocol for Wetland Delineations

ESRI suite of GIS software (version 9.2) and 3rd party extensions

GPS data collection and processing with Trimble and Leica units

ISA Certified Arborist (Cert. # WE-8252A)

Project Experience

South Fork American River Watershed Plan – EID - Prepared sections of the South Fork American River Watershed Plan for the South Fork American River Watershed Group in cooperation with the El Dorado Irrigation District. This involved compiling background data across a variety of fields; summarizing the existing knowledge base; preparing goals and objectives; and finally summarizing potential projects to meet the goals of the plan. Additionally, provided GIS data for the project team; prepared all of the original resource maps (11) for the plan; and prepared other graphics for the plan.

Caples Creek Riparian Vegetation and Stream Channel Monitoring – EID – Project biologist with ongoing project to monitor riparian vegetation and stream channel conditions along Caples Creek following the draining and emergency repairs at Caples Lake. Several transects were established to characterize and monitor any physical changes in the stream channel and any changes to riparian vegetation along the “greenline” and across the creek channel.

CEQA Initial Study/Mitigated Negative Declaration Silver Lake Resort Remediation Project – EID – Resource section author for completion of the Initial Study for the El Dorado Irrigation District (District) to approve remediation activities at the Silver Lake Resort. The Initial Study evaluates applicable environmental regulatory review processes required for remediation activities, which include rebuilding of the existing boat launch, demolition of dilapidated Resort buildings, and completion of soil remediation activities.

El Dorado County Oak Woodland Management Plan – El Dorado County -Prepared sections of the Oak Woodland Management Plan, which establishes the background and method for conserving oak woodland resources throughout El Dorado County. A major component of the Plan was preparing GIS maps, modeling and analysis to portray the extent of oak woodland and where conservation efforts should be directed. Following completion of the plan, prepared sections of the CEQA Initial Study and Negative Declaration for the plan.

Highway 50 Operational Improvement Project Biological Monitoring and Fish Relocations – Mitchell Engineering – Monitoring construction activities within and adjacent to Hangtown Creek in Placerville, CA. Monitoring includes: water quality for excess sediment discharge, presence of California red-legged frog, migratory bird nests, riparian vegetation, and aquatic wildlife. Diverted areas of the creek are surveyed for fish, which are removed and relocated downstream. Briefed construction crews on permit requirements related to monitoring activities above.

Tree Survey, Preservation, and Replacement Plans / Biological Resources Studies / Habitat Assessments / Wetland Delineations – Various Clients - Surveyed / inventoried oak woodlands on a variety of projects in El Dorado County to meet the requirements outlined in the General Plan Policy concerning oak woodland resources. Characterized and assessed the habitats and potential impacts of the project on those habitats and any associated special-status species (California red-legged frog, foothill yellow-legged frog, gabbro rare plants and others) for CEQA compliance. Recommended mitigation measures to minimize and avoid impacts. Prepared Wetland Delineations according to Corps 1987 Manual and the recent Arid West Supplement for 404 permits. Acquired CWA 404 permits, CWA 401 Water Quality Certifications, and CDFG Section 1600 Streambed Alteration Agreements.

GIS Analysis and Mapping for Environmental Planning and Permitting – Various Clients – Prepared maps and provided analysis for a multitude of regulatory and permitting projects involving the following documents; U.S. Army Corps of Engineers’ wetland delineations, wetland preserve and impact plans, historic wetland restoration using historic aerial interpretation, hydrologic modeling and mapping using ArcHydro GIS extension, tree canopy analysis and mitigation, specific plan maps, special status species maps, Section 404 alternatives analysis maps, and habitat assessment maps.

Regional Conservation Management Plan – GenCorp – Used GIS and feature extraction software to analyze remotely sensed data to map oak canopy and vegetation types on 10,000 acres. Verified and refined analysis with extensive field surveys. Created maps to meet Sacramento County oak tree mitigation requirements.

Kern River Fish Sampling for FERC Relicensing – Southern California Edison – Assisted in electro-fishing survey of the upper Kern river, including identifying potential sampling locations and using Trimble GPS unit to record sites; setting-up sampling sites, and indentifying / measuring / weighing captured fish. Prepared maps for report.

Valley Elderberry Longhorn Beetle (VELB) Mitigation Monitoring – Laguna Creek Mitigation Bank – Provided mapping products and assisted with the yearly U.S.F.W.S -required monitoring program for VELB habitat at Laguna Creek. This included recording the condition of mitigation plantings and surveying for evidence of VELB occurrences.

Yankee Slough Wetland Restoration / Mitigation Bank - Drafted the Restored Wetlands as-built map using GIS. Assisted with agency-required protocol surveys of the federally listed invertebrate species, *Branchinecta lynchi* and *Lepidurus packardi*.

Vineyard Management and GIS Services – Walsh Vineyards Management (various clients) – Provided technical assistance to staff and clients. Instituted a company GIS program using *ESRI ArcGIS* software, including an interactive, internet mapping server allowing clients to view maps and data from their vineyards. Used remote sensing technology in an integrated pest management program where infrared aerial photography was used to create Normalized Difference Vegetation Index (NDVI) maps that could be used to identify potential pest outbreaks and to monitor overall vineyard health. Managed two full time staff and up to eight seasonal laborers to collect and analyze crop data on over 1500 acres of vineyards in Napa and Sonoma counties.

Sustainable Viticulture Project – Domaine de la Terre Rouge and Easton Wines – Responsible for implementing sustainable vineyard practices on 50 acres of estate-operated vineyards on 3 diverse properties; including all cultural operations, pest/disease management, canopy and vineyard health management, and irrigation scheduling. Sustainable practices included using mechanical weed control, reduced-risk fungicides like elemental sulfur, composting for improved soil health, and regulated deficit irrigation.

Goosenest Ranger District Adaptive Management Plan – U.S.D.A. Forest Service (PSW) – Studied an association of insects involved in the breakdown of coarse woody debris (CWD) in a northeastern Californian mixed conifer forest. This study was initiated in order to determine the diversity and community structure of insects found in the (CWD) of a pine/fir dominated forest with the goal to gain an understanding of ecosystem processes that support long term sustainability and biological diversity. Presented results at the "Symposium on the Ecology and Management of Dead Wood in Western Forests", Reno, NV on November 2-4, 1999. Authored the Forest Service Technical Bulletin, "An Investigation of the Insect Fauna Found in Coarse Woody Debris of *Pinus ponderosa* and *Abies concolor* in Northeastern California."

Bark Beetle Research Program - U.S.D.A. Forest Service (PSW) - Testing the efficacy of pheromones in disrupting the colonization of living trees by the Western Pine Beetle, *Dendroctonus brevicornis*, in multiple settings. Monitoring and mapping the population dynamics of bark beetles throughout California. Testing various methods (combinations of tarps and fumigants) of protecting slash piles from infestation by *Ips spp.* bark beetles.

Steve Pavich – Conservation Program Development

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Experience with economic issues facing El Dorado County

Education

M.S., Agricultural and Resource Economics,
Oregon State University, 1999

B.A., Economics, University of California,
Davis, 1994

Discipline/Specialty

- Natural Resource Economics
- Agricultural Economics
- Recreation Planning
- Environmental Compliance
- Quantitative Analysis

Professional Affiliations

Association of Environmental and Resource
Economists (AERE)

Western Agricultural Economics Association
(WAEA)

Sacramento Economics Roundtable (chapter
of the National Association of Business
Economists)

Professional History

ENTRIX, Inc., Senior Economist, June 2007
– present

ENTRIX, Inc., Economist, October 2005 –
June 2007

EDAW, Environmental
Planner/Economist/Project Manager, 2000 –
2005

Forest Wheeler Environmental Corporation,
Environmental Planner, 1998 – 2000

Graduate Research Assistant, Oregon State
University, 1996 - 1998

Steve Pavich is an agricultural and natural resource economist specializing in applied economic analysis, recreation planning, environmental compliance, and Graphic Information System (GIS) applications. His expertise has been applied to a wide range of projects related to land use policy, natural resource management, water resources, recreation, agriculture, and infrastructure development.

His economics-related experience includes assessing recreation-related economic and fiscal impacts for major water supply projects, evaluating land use-based economic effects associated with the development of general plans, and analyzing socioeconomic effects of a wide range of projects under the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). He has applied quantitative techniques to estimate economic impacts, including the application of regional economic models and the use of market and non-market valuation techniques, particularly in the context of recreation and water resource management.

His recreation-related experience includes quantitative analyses of complex survey data in support of hydroelectric relicensing projects, assessing regional opportunities and constraints for recreation development, and the development of long-range recreations plans as part of the California State Park General Plan process.

Mr. Pavich has also provided environmental planning support for numerous projects, which includes NEPA and CEQA compliance and the preparation of various environmental permit applications. His experience and knowledge of land use issues in California have been applied to conducting opportunities and constraints analyses for prospective development and resource management projects, including mitigation bank sites.

His quantitative background includes regional economic input-output modeling using IMPLAN and statistical analysis, including linear regression, using SAS and SPSS.

Applied Economic Research

Economist – Light Brown Apple Moth Eradication Project EIR, California (Statewide) - For the California Department of Food and Agricultural (CDFA), ENTRIX is preparing a programmatic EIR (PEIR) for the eradication of the light brown apple moth (*Epiphyas postvittana*) (LBAM) from affected counties within the State of California. As part of the PEIR, an economic analysis is being prepared that focuses on the potential economic effects related to changes in agricultural production, commodity values, and exports under various eradication and non-eradication alternatives. In addition, the economic analysis is also considering the effect of eradication efforts on organic farmers. The direct effects on agricultural land uses and organic farming is being evaluated in a regional context with the use of regional economic models that quantitatively measure changes in the local economic production, income, and employment associated with the expected changes in agricultural production and management.

Economist – Grassland Bypass Project EIS/EIR, Central Valley, CA - ENTRIX and its subconsultants are preparing a joint Environmental Impact Statement / Environmental Impact Report (EIS/EIR) for an extension of the Use Agreement for the Grassland Bypass Project for the period 2010 through 2019. The proposed Project consolidates subsurface drainage flows on a regional basis (from the 97,000-acre Grassland Drainage Area); applies the drainage to salt tolerant crops to reduce the volume; utilizes a 4-mile channel to place the drainage into the San Luis Drain; utilizes a 28-mile segment of the San Luis Drain to convey the remaining drainage flow around wetland habitat areas; and discharges it to Mud Slough (North) and subsequently to the San Joaquin River. As part of the EIS/EIR, ENTRIX is assessing the economic impacts of changes in agricultural production with and without the proposed project. Regional effects on agricultural production and related farm-level cost and revenues were estimated using an optimization model that focused on the effect that salinity levels would have on crop production. The results of the optimization model served as the inputs to regional economic models, which considered the effects that changes in crop production would have on total production, income and employment in the region.

Economist — Hatchet Ridge Wind Power Development, Shasta County, California; Horse Lake Wind Power Development, Lassen, California - For private wind developers, ENTRIX prepared several economic studies that evaluated the regional economic impacts of several proposed wind developments in northern California. The economic analyses involved collecting baseline socioeconomic data and evaluating effects on recreation, energy prices, land use, community services and tax revenues, as well as impacts on the local economy. Local economic impacts were quantitatively measured using a regional input-output (I-O) model for Shasta and Lassen counties. The I-O models evaluated changes in the local economic production, income, and allowed employment associated with the proposed wind developments. The results of the analysis were compiled into a comprehensive study reports and were presented at public meetings.

Economist — Folsom Dam Economic Reevaluation Study, Sacramento County, California - For the U.S. Army Corps of Engineers, ENTRIX prepared a Regional Economic Development (RED) analysis in support of proposed flood control improvements at Folsom Dam in northern California. The RED analysis, which was prepared in accordance with the federal Principles and Guidelines (P&Gs) for water resource projects, focused on changes in regional income and employment attributed to project construction and hypothetical flood events in the local watershed. In order to estimate economic impacts, a regional economic model was developed using IMPLAN data and software. The regional economic model used estimates of changes in final demand to estimate the indirect economic effects resulting from inter-industry purchases and changes in household income levels. The RED analysis will be used to inform decision-makers regarding the local economic implications of implementing proposed flood control improvements. Mr. Pavich was the lead economist on the project and was responsible for all components of research and analysis, including the regional economic modeling.

Economist — North-of-the-Delta Offstream Storage Project, Colusa County, California - Working in conjunction with the U.S. Bureau of Reclamation and California Department of Water Resources (DWR), Mr. Pavich is participating in a multi-agency economics work group that is analyzing the economic impacts of a new water storage project in northern California. Specifically, he is assisting with the analyses of project benefits, costs, and regional impacts for the federal Plan Formulation Report (PFR) that is being developed in accordance with the federal P&Gs. The analysis of project benefits includes economic benefits attributed to agricultural and municipal water supplies, water quality, recreation, and hydropower production, which are being estimated to support the National Economic Development (NED) analysis. Regional economic impacts are being evaluated in the context of the RED analysis.

Economist — Keystone Oil Pipeline EIS, Midwest Region, United States - ENTRIX is preparing a third-party Environmental Impact Statement (EIS) for the U.S. Department of State for a proposed oil pipeline from the U.S./Canada border to Oklahoma, which would traverse over 50 counties across seven states. Mr. Pavich is analyzing the socioeconomic impacts of the project and preparing the socioeconomic section of the EIS. Key issues include effects on local economic conditions, property values, and local infrastructure. Responsibilities included research on existing economic conditions in the project area and an assessment of project impacts on socioeconomic resources, including local economic activity, population, housing, fiscal resources, and public services.

Economist — Lake Davis Northern Pike Eradication Project EIR/EIS, Plumas County, California - For the California Department of Fish and Game (DFG) and U.S. Forest Service (USFS), served as the Project Economist for the joint EIR/EIS where he analyzed the local and statewide economic effects of proposals to eradicate to Northern pike (*Esox lucius*) from Lake Davis, which serves as an important recreational venue for trout fishing, boating, shoreline-based camping and other associated day-uses, as well as a domestic water supply. The objective of this project is to eradicate pike from Lake Davis and its tributaries using liquid or powder rotenone (a piscicide) formulations, thereby, preventing their downstream spread and reducing the chances of pike being relocated to other California waters. The local economic analysis included a quantitative assessment of regional economic impacts due to declines in recreational activity using input-output modeling (IMPLAN). The statewide analysis evaluated potential economic effects from pike escapement into the Sacramento-San Joaquin Delta, including effects on commercial and recreational fishing, water exports, and agricultural production. This information was summarized into comprehensive socioeconomics chapter in the EIR/EIS.

Economist — Soboba Fee-to-Trust Economic Analysis, Riverside County, California - For the Soboba Band of Luiseño Indians, a comprehensive economic assessment of proposed fee-to-trust land transfer for the Tribe was prepared, including an analysis of proposed retail and commercial establishments. Mr. Pavich's responsibilities included assistance on the quantitative assessment of local economic impacts from project construction and operation using input-output modeling (IMPLAN), which was summarized in a technical report. He also assisted in the development of the fee-to-trust application submitted to the Bureau of Indian Affairs.

Economist — White Mountain Apache Tribe Water Right Claim Cost-Benefit Analysis, Arizona - For the White Mountain Apache Tribe, ENTRIX is conducting a benefit-cost analysis of water right development projects on the Fort Apache Indian Reservation. Mr. Pavich's responsibilities include a technical review of economic studies related to hatchery-related economic impacts in the region, collection and analysis of recreation and related economic data on the Reservation, and an analysis of potential economic impacts of proposed new water storage projects. This assessment included an analysis of recreation spending benefits, as well as an evaluation of recreational values, including non-market values, using as benefits-transfer approach.

Economist — Coyote Springs Planned Development EIS, Clark and Lincoln Counties, Nevada - For the project developer, Mr. Pavich assisted in the preparation of the socioeconomic sections for two EISs addressing development of the proposed Coyote Springs Planned Development in Clark and Lincoln Counties, respectively. The proposed development is a master planned community consisting of residential development, commercial and retail centers, recreational facilities, as well as associated infrastructure. Responsibilities included research on existing economic conditions in the project area and an assessment of project impacts on socioeconomic resources, including local economic activity, population, housing, and fiscal resources.

Economist — San Joaquin Water Exchange Contractors Groundwater Pumping / Water Transfer EIS, Central Valley, California - For the San Joaquin River Exchange Contractors, ENTRIX prepared an EIS covering the environmental and economic effects of a proposed water transfer involving 20,000 acre-feet of water from surface and groundwater sources. Mr. Pavich helped prepare a technical economic assessment related to a proposed water transfer. Based on changes in water supplies, impacts to agricultural resources and production were estimated using representative cropping patterns and values. The economic effects of changes in agricultural production were also estimated using IMPLAN, which showed the direct and indirect effects on economic output, income, and employment. This information was summarized in a technical appendix to the EIS.

Economist — Mendocino County Grading Ordinance Economic Analysis, Mendocino County, California - For the Mendocino County Farm Bureau, ENTRIX prepared a technical analysis addressing the agricultural and related economic effects from a proposed new grading ordinance being considered for adoption in Mendocino County. Mr. Pavich assisted in the analysis of how provisions of the ordinance would affect the economic viability of existing and potential new agricultural operations, as well as related effects on property values and trends in agricultural conversion to non-agricultural uses.

Economist — Economic Analysis of Water Supply Reductions, Central Valley, California - For the Friant Water Users Authority, Northwest Economic Associates analyzed the regional economic impacts of potential reductions in surface water supplies, due to CVPIA and other causes, on the Friant Water Users Authority service area. The analysis employed a model of Central Valley agriculture to analyze the impacts of the water reductions on land fallowing and on higher costs for land remaining in production, and used an input-output model of the region to determine the off-farm impacts of the reductions in terms of lost output and employment to the entire region. Mr. Pavich assisted in data collection and analysis and technical review of project reports.

Economist — White Pine Energy Station EIS, White Pine County, Nevada - For the BLM, served as project economist for a third-party EIS that focuses on the examination of alternatives for a coal-fired power plant within the Ely BLM District in northern Nevada. Mr. Pavich's responsibilities included the preparation of the socioeconomic section of the EIS. The socioeconomic analysis evaluated the project's impact on the local economy using regional IMPLAN to assess the effects of the project on local employment and income levels. The analysis also evaluated effects on the provision of public services, property value effects, and related effects on the fiscal resource conditions of local jurisdictions. Other out-of-county economic effects related to infrastructure improvements and commodity production were also addressed.

Economist — BLM-Ukiah Field Office RMP/EIS, Northwestern, California - For the BLM, served as the project economist for the development of a Resource Management Plan (RMP) and associated EIS for the Ukiah Field Office. The Ukiah Planning Area encompasses a large, highly diverse region of northwest California, stretching across nine counties and encompassing a diverse variety of habitats and land uses. The 300,000 acres of BLM land within the planning area are divided between six major subunits, each with its own distinct characteristics. Key issues for the planning effort include recreation management, coordination with Native American interests and cultural resources, geothermal and wind energy development, fire management, and sensitive species and habitats management. Mr. Pavich's responsibilities included the development of a social and economic baseline and impact assessment covering the nine-county planning area as part of the RMP/EIS. Key economic issues include, but are not limited to, recreation-related spending, power production, fire management, and resource extraction, and related effects on local economic activity and fiscal resources.

Economist — King Range National Conservation Area RMP/EIS, Humboldt and Mendocino Counties, California - For the BLM, Mr. Pavich assisted in the development of a Resource Management Plan (RMP) and EIS for the King Range NCA. Responsibilities included the preparation of a socioeconomic report that addressed the economic impact of proposed resource management alternatives. Key issues addressed include effects on the local economy, primarily on recreation and agriculture industries, as well as fiscal effects to local governments and service providers.

Economist/Planner — Coeur Rochester Mine Expansion and Closure EIS, Pershing County, Nevada - For the BLM-Winnemucca Field Office, Mr. Pavich served as the project economist in addition to providing recreation and land use planning support for a proposed mine closure project in Nevada. Coeur Rochester is planning a major expansion and subsequent comprehensive reclamation and closure of an existing open pit silver and gold mine in Pershing County, Nevada. Mr. Pavich assisted the BLM and Coeur Rochester with the EIS prepared pursuant to NEPA, including impact assessment, alternatives development, and agency coordination. His responsibilities included the preparation of the socioeconomics, land use, and recreation sections of the EIS. The socioeconomic analysis focuses on local economic impacts, including effects on employment and income, public service effects, and related fiscal resource effects on local jurisdictions.

Economist — Feather-Bear Rivers Levee Setback Project, Yuba County, California - For the Yuba County Water Agency, Mr. Pavich prepared the economic analysis component of the Land Acquisition and Management Plan for a proposed levee setback project on the Feather River. Key issues addressed included the economic costs and benefits associated with agricultural production; recreation activity and spending; construction, operation, and maintenance; habitat restoration; and flood control. The primary fiscal issues considered include property and sales tax effects.

Economist — Tahoe City Marina Expansion Master Plan EIR/EIS, Tahoe City, California - For the Tahoe Regional Planning Agency (TRPA), Mr. Pavich participated in the preparation of the EIR/EIS for the Tahoe City Marina Master Plan. The proposed Master Plan included expansion of marina facilities, measures to increase public access, and implementation of Best Management Practices (BMPs). Responsibilities included the preparation of recreation resources component of the EIR/EIS and an associated economic analysis that analyzed the supply and demand for boat mooring facilities in the project area.

Economist — Salinas Valley Water Project EIR/EIS, Salinas, California - For the Monterey County Water Resources Agency (MCWRA), provided economics support related to the Salinas Valley Water project. MCWRA is charged with the long-term management and preservation of water resources in the Salinas Valley. MCWRA has developed the Salinas Valley Water Project, a series of structural and program-based components, to address the critical issues facing the management and longevity of the Basin's water resources. Responsibilities included assisting on the development of the Final EIR/EIS by addressing public and agency comments on the project. Also assisted in the acquisition of data and provided analytical support for several economic studies that analyze, project-related effects on recreation, the local economy—including fiscal resources—and property values in the project area.

Economist — Cantonment Programmatic Environmental Assessment, Vandenberg Air Force Base, Santa Barbara County, California - Mr. Pavich prepared a socioeconomic report that details the baseline socioeconomic conditions in the region surrounding Vandenberg Air Force Base and the potential effects from area-wide growth. Areas analyzed included Santa Barbara County, and the Cities of Lompoc and Santa Maria. Analysis included the topic areas of population, housing, employment, and public schools.

Cost of Service and Rate-Making

Economist — Imperial Irrigation District Cost of Service Study, Imperial, California - For Imperial Irrigation District (IID), ENTRIX is conducting a water cost of service (COS) and rate-making study for the water department. IID has rights to 3.1 million acre-feet per year of Colorado River water. It distributes 97 percent to agricultural users and the remainder to municipal and industrial users. Costs have risen sharply over the last five years, but the District has been unable to implement higher rates to cover those costs. The primary purpose of the COS study is to analyze the present and projected costs of the water department, current and projected revenues from water sales, and determine the size and likelihood of ongoing deficits.

Conservation Economics

Economist — South Sacramento Habitat Conservation Plan, Sacramento, California - ENTRIX is conducting a comprehensive economic analysis in support of the South Sacramento Habitat Conservation Plan (HCP) for Sacramento County. The analysis includes a detailed evaluation of land values, restoration and enhancement, management and monitoring, and plan administration costs associated with implementation of the HCP. It also entails the development of a fee-based funding program design to cover HCP costs to ensure sustainability of the plan over time. Responsibilities include development of a comprehensive land value database, fee calculations, and sensitivity analyses.

Economist — Economic Analysis of Critical Habitat Designation for Three Willamette Species, Oregon and Washington - For the U.S. Fish and Wildlife Service, ENTRIX conducted a cost analysis of proposed critical habitat designation for three species in the Willamette valley in Oregon and Washington. The cost estimates are used to understand the potential economic ramification of critical habitat designation. Mr. Pavich was responsible for the analysis of transportation and related costs. Responsibilities included identifying potential cost factors, coordination with local transportation agencies, acquiring cost information, and quantifying total costs over time.

Recreation and Planning Economics

Economist/Recreation Planner — Oroville Hydroelectric Project Relicensing, Oroville, California - Mr. Pavich assisted the California Department of Water Resources (DWR) in designing, managing, and implementing a comprehensive program to obtain a new license from FERC. Lake Oroville is a key water storage and electrical generation facility for the State Water Project, delivering water for agriculture, cities and industries, and provides flood control, recreation, water quality improvement, fish and wildlife protection and enhancement, and hydroelectric power. Responsibilities included the preparation of land use reports in support of the relicensing application, quantitative analyses of future recreation-use levels, technical assistance in the implementation of several socioeconomic studies for the project, including a hedonic property-pricing analysis and summarizing stakeholder meetings.

Recreation Planner — Upper North Fork Feather River Hydroelectric Project Relicensing, Chester, California - For Pacific Gas & Electric Company, Mr. Pavich participated in several major resource studies for the Upper North Fork Feather River Project hydroelectric relicensing effort. Mr. Pavich prepared the recreation studies necessary to support the development of the Exhibit E draft and final license application. His responsibilities included analyzing recreation survey data for the Bucks Lake area of the project and developing quantitative data that will be used in the development of recreation resource reports in support of the relicensing application.

Recreation Planner — Sacramento River Public Recreation Access Study, Red Bluff to Colusa, California -

For The Nature Conservancy, Mr. Pavich participated in a comprehensive recreation assessment and planning study for the 100-mile middle reach of the Sacramento River from Red Bluff to Colusa in Northern California. The study addressed the issues, needs, opportunities and constraints related to public recreation access in this dynamic, unvegetated reach of the river. The study included a comprehensive inventory, map and data set characterizing all public and private lands with public recreation access. It included public input from recreation user group interviews and from public meetings. The study also included input from managers of public lands and law enforcement regarding issues, needs and opportunities for coordinated management of the area. Demographic and recreation trends were also analyzed. Responsibilities included the development of a comprehensive GIS base map and GIS analysis in support of the project, analyzing the demographic characteristics of the study area and potential recreation user groups, and analyzing the recreational use and supply characteristics influencing the recreational environment in the area.

Recreation Planner — Upper Truckee River and Wetland Restoration Project, Lake Tahoe, California -

For the California Tahoe Conservancy and the California Department of General Services, Real Estate Services Division, Mr. Pavich prepared baseline recreation opportunities analysis that will be used in future restoration-planning work. In addition, he prepared a recreation survey protocol that was used by the Conservancy in estimating current recreation use and patterns. The project involved restoration of a functioning floodplain and wetland in a portion of the historic Truckee Marsh in Lake Tahoe, California.

Research Management and Planning

Project Manager — Bidwell-Sacramento River State Park General Plan/EIR, Chico, California -

Mr. Pavich served as project manager by assisting The California Department of Parks and Recreation (DPR) in developing and/or updating the general plan and associated EIR for nine park units, including Bidwell-Sacramento River State Park. Bidwell-Sacramento River State Park consists of four discontinuous properties that are located primarily along the banks of the Sacramento River just west of the City of Chico in Northern California. The Park is characterized by valley oak riparian woodland and other riparian communities, and possesses substantial recreational resources and opportunities ranging from nature trails, fishing, and picnicking to boating and tubing. Project management responsibilities included the development and implementation of project work plan, maintaining project schedule and budget, and managing a large interdisciplinary team of resource professionals. Technical responsibilities included various aspects of resource management, recreation, planning, and GIS analyses.

Environmental Planner/Economist — El Dorado County General Plan EIR, El Dorado County, California -

Mr. Pavich assisted El Dorado County in the preparation of the County's General Plan EIR. Major responsibilities included collaboration on the land use and economic forecasts prepared for the project, internal project coordination, preparation of various technical sections of the EIR, and advanced applications of GIS in support of the planning and environmental review efforts.

Land Use and Feasibility Studies

Planner — Power Plant Siting Study and Opportunities/Constraints Analysis, Alameda County, California -

Working as an Environmental Planner contracted to the Calpine Corporation, Mr. Pavich performed land use research in support of an opportunities and constraints analysis. He was responsible for identifying areas in a defined region, characterized as suitable for infrastructure development. On several identified sites, he prepared the Land Use, Noise, and Environmental Opposition sections of a feasibility study that evaluated any potential fatal flaws facing the project. Duties included analyzing zoning and general plan documents, applying basic noise principles in evaluating noise impacts, and researching public/environmental groups that have the potential to impact the project.

Planner — Quinto Farms Mitigation Bank Feasibility Study, Merced County, California - For a local water district, Mr. Pavich analyzed the economic feasibility of establishing a habitat mitigation bank in the central valley of California as a project planner. Responsibilities included researching applicable legislation, analyzing economic/market data, and coordinating with state agency staff to determine feasibility of a prospective mitigation bank development.

Environmental Compliance and Planning

Project Manager — North Fork American River Trail EIR, Placer County, California - For the County of Placer, Mr. Pavich served as the project manager and planner for the EIR that analyzed the environmental effects of the development of a 12.6-mile trail along the North Fork of the American River in the Auburn State Recreation Area. Responsibilities included technical oversight, budget and scheduling, staff management, and client interaction.

Project Manager — City of Rocklin General Plan, Rocklin, California - For the City of Rocklin, served as the project manager for the City's General Plan EIR. The General Plan will guide future land use in the City over the next 20 years. The EIR analyzed the environmental effects of proposed land uses and policies. Responsibilities included technical oversight of EIR sections, budget and scheduling, staff management, and client interaction.

Project Manager — Prairie City SVRA Adventure Park IS/MND, Folsom, California - For the California Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation Division, Mr. Pavich served as project manager in the preparation of the IS/MND and provided recreation planning; wetland and endangered species regulatory compliance and agency coordination; environmental analysis; wetland delineations; wildlife biology, botany, and invasive species management; habitat restoration planning; cultural resources; visual analysis; and GIS analysis and mapping for the Prairie City State Vehicular Recreation Area Adventure Park. Key operational issues for environmental review included estimating expected use and the potential for special events, including traffic impacts on White Rock Road, Prairie City /Scott Road, US Highway 50, and other surrounding roadways.

Environmental Planner — Orestimba Creek Flood Control Facility EIS, Stanislaus County, California - The U.S. Army Corps of Engineers is evaluating the feasibility of developing a flood control facility along Orestimba Creek in Stanislaus County, California. The purpose of the project was to provide flood damage reduction, ecosystem restoration, and groundwater recharge opportunities in the project area. Responsibilities included the preparation of the socioeconomic analysis for the EIS, including a description of the existing socioeconomic conditions in the project area and an analysis of project-related socioeconomic effects on nearby communities.

Project Manager — Henry W. Coe State Park IS/MND, Santa Clara County, California - For the California Department of Parks and Recreation, Mr. Pavich served as project manager and prepared and managed an initial study/mitigated negative declaration (IS/MND), pursuant to CEQA, for the development of a new day-use area at the state park. Responsibilities included preparation of the environmental analyses and project management activities including maintaining budget/schedule and direct interaction with client.

Project Manager — New Brighton State Beach IS/MND, Santa Cruz County, California - Mr. Pavich assisted the California Department of Parks and Recreation as project manager by preparing and managing an IS/MND, pursuant to CEQA, for the rehabilitation of campground facilities and development of new campsites increasing the capacity of the park.

Project Manager — Morro Bay State Park EIR, Morro Bay, California - For the California Department of Parks and Recreation Mr. Pavich assisted in the management and preparation of an EIR, pursuant to CEQA, that was prepared for a comprehensive campground rehabilitation and road realignment project at Morro Bay State Park. Key issues include land use and recreation, visual resources, air quality, noise, traffic and circulation, biological resources, cultural resources, geology and soils, and water usage/wastewater disposal.

Environmental Planner — Sacramento Autoplex, Sacramento, California - Mr. Pavich assisted in the preparation of an EIR for the development of a regional auto mall in Sacramento. Responsibilities included preparing environmental analyses and GIS support.

Environmental Planner — North Natomas Town Center and Regional Park Master Plan, Sacramento, California - For the City of Sacramento, Mr. Pavich analyzed the environmental impacts of the implementation of a master plan for the North Natomas Town Center. He performed a comparative evaluation of impacts between the North Natomas Community Plan and the proposed master plan

Environmental Planner — Falcon to Gonder 345kV Transmission Line EIS and Reclamation Plans, Nevada - In a project for the Sierra Pacific Power Company, Mr. Pavich assisted in preparing restoration and reclamation plans for an EIS that was prepared for the approximately 180-mile transmission line in Nevada. The project involved collaboration with BLM and Nevada Department of Wildlife staff.

Environmental Planner — Natural Gas Pipeline Regulatory Compliance Program, California and Arizona - Serving as an Environmental Planner, Mr. Pavich assisted with the preparation of various Resource Reports, including Land Use, for a Section 7(c) Federal Energy Regulatory Commission (FERC) application in California and Arizona. Responsibilities included describing land use for the approximate 80-mile-long pipeline, analyzing consistency with local plans and policies, analyzing compliance with the Farmland Mapping and Monitoring Program of the Department of Conservation, and evaluating impacts on floodplains using GIS.

Environmental Planner — Fiber Optic Conduit Installation Regulatory Compliance Program, California and Arizona - Mr. Pavich prepared major sections of two EAs under CEQA for fiber optic regeneration/amplification sites in California (OR/CA border to Sacramento and Sacramento to the CA/AZ border). He was responsible for evaluating project impacts in relation to all environmental disciplines mandated by CEQA including: land use, population/housing, geology, water resources, air quality, aesthetics, transportation, energy resources, noise, hazards, public services, utility systems, and recreation. He was also responsible for creating a detailed Mitigation Report and responding to California Public Utilities Commission data requests. Other relevant project work included preparing graphics documents to support regulatory compliance.

Environmental Planner — Fiber Optic Regulatory Compliance Program, San Diego to Blythe, California - For AT&T/PF.Net in Southern California, Mr. Pavich assisted in the preparation of a feasibility study to analyze the regulatory environment impacting a prospective fiber optic conduit installation regulatory compliance program. He was responsible for researching the various regulatory requirements, by jurisdiction, applicable to the project, in addition to standard CEQA standards. He directly interacted with public planning personnel. He assimilated data into a cohesive written technical report. He prepared major sections of an EA under NEPA covering the installation of fiber optic conduit on BLM land in California; pertinent sections include land use, visual resources, recreation, and range resources.

Environmental Planner- Newark Power Plant Application for Certification, Newark, California - For Calpine Corporation, Mr. Pavich prepared the land use, socioeconomic, and traffic and transportation sections of the Application for Certification (AFC) for a 500 MW power plant in the Bay Area of California. He also integrated the use of GIS throughout project development and in graphics preparation. He performed assistant project manager duties.

Environmental Planner — Fiber Optic Construction Workbook, CA/OR Border to Sacramento, California - Mr. Pavich was responsible for organizing major sections of the workbook including a Construction Action List, Biological and Cultural Resource reports and mitigation measures, and all applicable permits. He served in the role of project manager by interacting extensively with internal and external clients to produce the deliverable product on schedule.

Environmental Planner — Elk Hills Power Plant Application for Certification, Elk Hills, California - For Calpine Corporation, Mr. Pavich assisted in the preparation of the Application for Certification (AFC) that was submitted before the California Energy Commission for a 500 MW power plant in central California. Tasks involved collecting and analyzing extensive data in the areas of demographics, housing resources, educational infrastructure, labor markets, General Plan analysis, geology, and paleontology.

Environmental Planner — Headwaters Forest Land Exchange, Habitat Conservation Plan and Sustained Yield Plan EIS, Humboldt County, California - Mr. Pavich processed and analyzed an extensive amount of public comments for the joint EIS/EIR/HCP/SYP on this controversial timber land exchange.

Environmental Planner — Master Schedule and EIS, Oakland Army Base, Oakland, California - Mr. Pavich maintained the Master schedule for environmental management activities in accordance with Base Realignment and Closure (BRAC) guidelines. Components of the schedule included an EIS, Environmental Restoration Plan, BRAC Cleanup Plan (BCP), local reuse/redevelopment plan, real property transfer, utilities study, and an ecological risk assessment. He assisted with the preparation of the EIS for the disposal and reuse of OARB through technical editing, regulatory compliance with the Coastal Zone Management Act, and document production.

Environmental Planner — Sutter Power Plant Application for Certification, Sutter County, California - For Calpine Corporation, Mr. Pavich prepared land use maps and other graphics documents in support of the AFC that was submitted before the California Energy Commission for a 500 MW power plant in Northern California. The project, which includes 14-miles of natural gas line and 5-miles of transmission lines, deals directly with natural resource management issues including wetland and wildlife habitat management.

Environmental Planner — Statewide Historic Buildings and Structures Inventory, California - Mr. Pavich managed an extensive database of historic properties for the statewide historic buildings on military installations in California using Microsoft Access[®] software. He was responsible for acquiring and evaluating applicable reports and entering information into the database. He analyzed the database to generate information needed for qualitative analysis in a final report.

Environmental Planner — Deseret Chemical Depot Integrated Cultural Resources Management Plan, Tooele, UT - Mr. Pavich researched and prepared the background information sections. The Management Plan included installation location, history and mission, and landscape and land use analysis.

Academic Research

Masters Thesis: Using GIS to Analyze the Relationship between Open Space and Property Values, Oregon State University - In support of his Masters Degree, Mr. Pavich conducted an applied research project that evaluated the effect that open space has on property values in the Lake Tahoe Basin in California. Research activities included collecting, evaluating, and analyzing property value data in relation to spatial proximity to open space in the region. Statistical regression analysis using the hedonic property-pricing methodology was performed to identify factors that influenced property values.

Karen Quidachay – General Plan Consistency Review

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Extensive experience working in El Dorado County, with diverse interested parties
- Familiarity with El Dorado County General Plan
- Development of American/Cosumnes Watershed Conservation Plan

Education

Master of Arts, Environmental Policy
(Water Resources), 1997
California State University, Sacramento
Department of Environmental Studies

Bachelor of Arts, Sociology
(Environmental Problems), 1989
Seattle Pacific University

Professional History

Land Use/Recreation Analyst,
EN2 Resources, Inc., 2007 to present

Relicensing Specialist,
ENTRIX Inc., 2005-2007

Principal/Sole Proprietor,
KBQ Environmental Consulting Services,
established November 1999

Environmental Specialist,
Resource Insights, 1996 – 1999

Graduate Assistant Intern,
California Department of Water Resources,
Division of Local Assistance, 1996-1997

*Archaeological Technician/Research
Assistant,* United States Forest Service,
Eldorado and Los Padres National Forests,
1992 – 1996

Ms. Quidachay has over 15 years experience in environmental planning and permitting, conservation planning, and water and energy-related project and program development. Presented below are summary descriptions of representative experience.

Ms. Quidachay specializes in California, federal and local environmental regulatory compliance, agency consultations and watershed conservation planning. She is skilled in a variety of disciplines including land uses, watershed management, recreation, transportation, and cultural resource management. She has performed environmental analyses for complex, multiple-party projects throughout California. Ms. Quidachay works constructively with regulatory agencies to identify, address, and resolve critical issues.

Regulatory programs in which Ms. Quidachay has experience include the California Environmental Quality Act, National Environmental Policy Act, Federal Energy Regulatory Commission Hydroelectric Licensing, Clean Water Act, Clean Air Act, National Historic Preservation Act, and CALFED Ecosystem Restoration Program Plan.

Project Experience

El Dorado Canal Flume Replacement Program Draft Programmatic Environmental Impact Report – El Dorado Irrigation District (EID) - Completed final preparation, editing and delivery of a Draft EIR. Responsible to compile the final distribution lists and file the Notice of Preparation with the State Clearinghouse and the Mountain Democrat newspaper.

CEQA Specialist, El Dorado Irrigation District — Compiled numerous CEQA Categorical Exemption documents and public Notice of Exemption filings on behalf of EID. Engineering projects included pipeline and ditch installation repair and maintenance.

South Fork American River Watershed Plan – El Dorado Irrigation District — Team leader and principal author of a comprehensive watershed plan for the South Fork American River watershed which is designed to work in conjunction with the Cosumnes, American, Bear, and Yuba Watershed Integrated Regional Water Management Plan. Worked closely with Geographic Information System (GIS) specialists, natural resource specialists and the South Fork American River Watershed Group.

El Dorado Trail Extension Project – El Dorado County Department of General Services, Airports, Parks and Grounds –Served as Project Manager and principal author for a study evaluating alternative routes to extend a recreational trail approximately 15 miles and establish a link between the existing El Dorado Trail and the National Pony Express Trail outside Pollock Pines, California. Responsibilities included development of trail evaluation criteria, landowner surveys and coordination with diverse recreational trails interest groups such as El Dorado County Recreation Planning Commission, Trails Now, Backcountry Horsemen’s Association, and the Trails Advisory Group.

South Fork American River Watershed Stewardship Project: Watershed Assessment, Watershed Evaluation, and Draft Integration Plan - Georgetown Divide Resource Conservation District – Principal author of a comprehensive stewardship program funded by the CALFED Bay-Delta Program. Worked closely with Geographic Information System (GIS) specialists, fire management and water quality technicians to compile a comprehensive analysis of the water quality and fuel management status of the South Fork American River watershed. This project ultimately gained recognition and further financial support from CALFED.

Upper Cosumnes River Watershed Conservation Project – American River Conservancy – Principal author of an environmental assessment and strategic plan for conservation of the Upper Cosumnes River Basin. Coordinated with diverse organizations including The Nature Conservancy, the El Dorado County Tax Collector's Office and Farm Advisory Council, Native American Tribes, the State Office of Historic Preservation, Forest Service, the Cosumnes River Task Force, and individual landowners. This project ultimately gained recognition and financial support from a variety of foundations and agencies.

El Dorado Hydroelectric Project, Integrated Pest management Plan - El Dorado Irrigation District Facilitated compliance with United States Forest Service Special Use Authorization and Federal Energy Regulatory Commission (FERC) license requirements for the use of pesticides at all EID facilities located on National Forest System lands. Principal author of the EID Integrated Pest Management Plan and assisted with all aspects of National Environmental Policy Act (NEPA) compliance on behalf of the Eldorado National Forest. Compiled NEPA documentation including the Preliminary Environmental Assessment, Public Scoping Notices, Finding of No Significant Impact and draft Decision Memo.

El Dorado Hydroelectric Project (FERC No. 184) – El Dorado Irrigation District -- Served as Project Manager and primary author of a number of management plans and license requirements set forth by the FERC hydroelectric license issued October 18, 2006. Responsibilities included coordination with Project Engineers, facilities managers and EID staff to produce plans and receive required agency approval. Assignments included:

- | | |
|---|---|
| ▪ Preferred Canal Drainage Structure and Release Point Plan | ▪ Streamflow and Lake Level |
| ▪ Facility Management Plan | ▪ Public Information Plan |
| ▪ Exhibit F (Facilities Drawings) | ▪ Transportation and Trails System Management Plans |
| ▪ Flow Deviation Procedures | ▪ Exhibit G (FERC License Boundary) |
| | ▪ Statement of Federal Lands |

Middle Fork American River Hydroelectric Project (FERC No. 2079) – Placer County Water Agency – Prepared the recreation resources, visual resources, comprehensive plans, and land use reports required for relicensing the Middle Fork American River Hydroelectric Project. Coordinated with the United States Forest Service, the California Department of Parks and Recreation and the Bureau of Reclamation to comply with requirements set forth by the FERC Integrated Licensing Process and the National Environmental Policy Act (NEPA).

Big Creek No. 4 Hydroelectric Project (FERC No. 2017) – Southern California Edison, Fresno County – Developed an environmental database to track compliance with the Big Creek No. 4 FERC hydroelectric license issued December 4, 2003. Monitored and tracked requirements outlined in numerous management plans including the Bald Eagle Management Plan, Vegetation Management Plan, Transportation System Management Plan, Cultural Resources Management Plan, and the Fire Management Plan.

El Dorado Hydroelectric Project 184 (FERC No. 184) Relicensing – El Dorado Irrigation District – Assisted with the preparation of the FERC relicensing First Stage Consultation Package and Exhibit E Report and the CEQA Environmental Impact Report (EIR) for Acquisition, Permanent Repair and Operation of the El Dorado Hydroelectric Project. Major assignments included assistance with a variety of recreational resources studies including cabin owner surveys, surveys of recreationists in the project area, and coordination with resort owners. Major contributor to land use analyses and cultural resource studies.

Relocation of Sections of the Kettleman - Los Medanos (KLM) Pipe Line – Chevron Pipe Line Company – Researched and wrote the cultural resources CEQA and Clean Water Act, Section 404 documentation for five Chevron KLM pipeline repair projects.

Pleasant Oak Main Pipeline Replacement Project - El Dorado Irrigation District - Assisted with the CEQA cultural resources pre-field research, field surveys and site record documentation for a 5.5 mile pipeline replacement project in El Dorado County.

San Onofre Nuclear Generating Station Offshore Artificial Reef Project – Southern California Edison, San Clemente – Prepared impact analyses and conducted agency consultations for the draft Environmental Assessment/Initial Study and EIR of an offshore artificial reef project. The project was designed as part of long-term mitigation program required by the State Lands Commission.

Edison Divestiture of Gas Fired Generating Stations – Southern California Edison Company – Assisted with the preparation of a CEQA-equivalent Proponents Environmental Assessment (PEA) for the California Public Utilities Commission which analyzed the environmental impacts for the divestiture of twelve gas-fired generating stations located in southern California.

Mammoth Pool Hydroelectric Project (FERC No. 2085) - Southern California Edison, Fresno/Tulare Counties, CA - Compiled a recreation use database and assisted with the preparation of a recreation use report required for relicensing the Mammoth Pool Hydroelectric Project. Tasks included coordination with the USFS and campground concessionaires to comply with requirements set forth by the FERC Alternative Licensing Process.

Big Creek Nos 1 and 2 Hydroelectric Project (FERC No. 2175); Big Creek Nos 2A, 8, and Eastwood Hydroelectric Projects (FERC No. 67 and 120), Southern California Edison, Fresno/Tulare Counties, CA - Coordinated with the USFS and campground concessionaires to retrieve recreation use and seasonal use information at recreation facilities in the vicinity of Shaver Lake, Huntington Lake, Florence Lake, Mono Creek Forebay, and Balsam Forebay. Compiled a detailed recreation use database and assisted with the preparation of a recreation use report in compliance with requirements set forth by the FERC Alternative Licensing Process.

Lake Aloha Dam Repairs and Telemetry Station Installation Project - El Dorado Irrigation District - Assisted with agency consultations, project coordination and compiled the Archaeological Resource Report on behalf of the Federal Energy Regulatory Commission to implement Section 106 of the National Historic Preservation Act. This project involved repairs to historic dams which triggered formal consultation with the State Historic Preservation Officer.

Caples Lake Resort, Alpine County- Currently assisting the owner of the Caples Lake Resort with renewal of the USFS Special Use Authorization which expires December 2010. Responsibilities include development of an annotated bibliography to document survey coverage of biological and archaeological resources in the project area, assistance with a narrative description of proposed improvements and consultation with the United States Forest Service, Amador Ranger District.

Maria Santos – Corridor Ecologist

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Experience working in Sierra Nevadas
- Knowledge of corridor ecology (currently working with Dr. Fraser Shilling)

Education

University of California Davis, California, USA, PhD student (Advanced to candidacy) Ecology, current

Northern Arizona University, Flagstaff, Arizona, USA, M. Sc. Environmental Sciences and Policy, May 2003

Universidade de Lisboa, Lisboa, Portugal, Licenciatura Biology Applied to Animal Resources, June 1998.

Awards and Honors

2007 and 2008: Calouste Gulbenkian Foundation Fellowship

2007: Henry A. Jastro and Peter J. Shields Research Fellowship

2006: NASA-MSU Professional Enhancement Award (US IALE conference)

2005: Fulbright-FLAD Fellowship; Institute for International Education and Louise Woods Memorial Fund

2001: Luso-American Foundation Masters Fellowship

Scholarly Presentations

28 oral and 32 poster presentations in annual meetings of the Ecological Society of America, US Chapter of the International Association of Landscape Ecology, Society for Conservation Biology, Society for Conservation GIS, American Geographers Union, CARNIVORES, European Congress of Mammalogy, International Martes Symposium, SECEM, among others.

Ms. Santos' research interests include carnivores, ecology, landscape ecology, mammals, multidisciplinary approaches, remote sensing, sustainability and Mediterranean ecosystems.

Professional History

University of California Davis (*Graduate Student Researcher*)

2007 to present: "Analysis of Hyperspectral to detect and map tree decline at Ft. Benning, GA".

2005 to 2007: "Mapping Invasive Plants in the Sacramento-San Joaquin Delta using Hyperspectral imagery".

Universidade de Lisboa (*Researcher*)

2003 to 2005: "Riparian galleries as corridors and linkage habitats in the fragmented landscape in Southern Portugal: applications to conservation planning"

2000 to 2001: "Program of Minimization of impacts to Natural Heritage. Studies of Animal Biology and Ecology (impact area of Alqueva and Pedrógão dams). Pm6 – Block l) Polecat – *Mustela putorius*".

1999 to 2001: "Carnivore Monitoring Program of the impact area of the Alqueva and Pedrógão dams"

1999: "Program of Minimization of impacts to Natural Heritage. Studies of Animal Biology and Ecology (ALQUEVA and PEDRÓGÃO dams impact area). Pm6 – Block m) Wildcat- *Felis silvestris*"

1998 to 1999: "Development of an integrated model for the sustainable management of cork oak woodlands"

Teaching Experience

University of California Davis Spring 2008 and 2009: Biology and Conservation of Wild Mammals – WFC110L. Dept. of Wildlife, Fish and Conservation Biology. *Teaching Assistant.* Fall 2008: Principles of Ecology – ECL200A. Dept. of Environmental Sciences and Policy. *Teaching Assistant.*

Northern Arizona University Spring 2003: ENV 101L - Introduction to Environmental Sciences Lab. Math and Science Learning Center. *Graduate Students Improving Students Achievement Success.* Spring 2002, Fall 2002 and Spring 2003: Introduction to Environmental Sciences Laboratory- ENV101. Center for Environmental Sciences and Education. *Teaching Assistant.*

Peer-Reviewed Publications

- [22] Santos, M.J., H. Matos, F. Palomares, & M. Santos-Reis. *Submitted*. Do diverse riparian plant assemblages consistently enhance carnivore diversity? *Oecologia*.
- [21] Rodriguez-Refojos C., Zuberogoitia I., Rosalino L.M., Zabala J., Camps D., Santos M.J., Santos-Reis M. *Submitted*. Body size variation of common genets (*Genetta genetta*) in south-western Europe (Iberian Peninsula): geographical and sexual differences. *Mammalia*.
- [20] Santos, M.J. & T.G. Whitham. *Submitted*. From trees to landscapes: predictors of bark beetle outbreaks during a record drought in Southwestern U.S.A. *Environmental Management*.
- [19] Santos, M.J. & M. Santos-Reis. *Submitted*. Multi-scale stone marten (*Martes foina*) habitat selection a Mediterranean ecosystem. *European Journal of Wildlife Research*.
- [18] Santos, M.J., L.M. Rosalino & M. Santos-Reis. *Submitted*. Range expansion of the Egyptian mongoose in the Iberian Peninsula: a case of "invasion in slow motion"? *Annales Zoologici Fennici*.
- [17] Santos, M.J., H. M. Matos, C. Baltazar, C. Grilo & M. Santos-Reis. *Submitted*. Is Polecat (*Mustela putorius*) diet affected by "mediterraneity"? *Mammalian Biology*.
- [16] Skalski T., I. Wierzbowska, M.J. Santos, L.M. Rosalino, M. Santos-Reis & M. Eskreys-Wójcik. *In review*. Is it worth doing detailed identification of invertebrate species in carnivores' diet analyses? *Acta Zoologica Academiae Scientiarum Hungaricae*.
- [15] Santos, M.J., S. Khanna, E.L. Hestir, M.E. Andrew, S.S. Rajapakse, J.A. Greenberg, L.W.J. Anderson & S.L. Ustin. 2009. Use of Hyperspectral Remote Sensing to Evaluate Efficacy of Aquatic Plant Management in the Sacramento-San Joaquin River Delta, California. *Invasive Plant Science and Management*.
- [14] Pinto, B., M.J. Santos & F. Rosell. 2009. Habitat selection of the Eurasian beaver near carrying capacity: an example from Norway. *Canadian Journal of Zoology* 87:317-325.
- [13] Khanna, S., M.J. Santos, E. Hestir, J.A. Greenberg & S.L. Ustin. 2009. Patterns of change in water hyacinth distribution in the Sacramento-San Joaquin Delta. *Proceedings of the California Invasive Plant Council Symposium*. 102-106.
- [12] Santos, M.J., L.W. Anderson & S.L. Ustin. 2009. Spatial patterns in native and exotic submersed aquatic plant species in the Sacramento-San Joaquin River Delta. *Proceedings of the California Invasive Plant Council Symposium*. 96-99.
- [11] Rosalino, L.M., M.J. Santos, I. Pereira & M. Santos-Reis. 2009. Sex-driven differences in Egyptian mongoose's (*Herpestes ichneumon*) diet in its northwestern European Range. *European Journal of Wildlife Research*.
- [10] Ustin, S.L., P.G. Valko, S.C. Kefauver, M.J. Santos, J.F. Zimpfer & S.D. Smith. 2009. Remote Sensing of Biological Soil Crust Under Simulated Climate Change Manipulations in the Mojave Desert. *Remote Sensing of Environment*. 113(2): 317-328.

- [9] Matos, H.M., M.J. Santos, F. Palomares & M. Santos-Reis. 2009. Does riparian habitat condition influence mammalian carnivore abundance in Mediterranean ecosystems? *Biodiversity and Conservation*.
- [8] Santos, M.J. & P. Beier. 2008. Habitat selection by European badgers at multiple spatial scales in Portuguese Mediterranean ecosystems. *Wildlife Research* 35(8): 835-843.
- [7] Hestir, E.L., S. Khanna, M.E. Andrew, M.J. Santos, J.H. Viers, J.A. Greenberg, S.S. Rajapakse & S.L. Ustin. 2008. Identification of invasive vegetation using hyperspectral remote sensing in the California Delta ecosystem. *Remote Sensing of Environment. Monitoring Freshwater Systems Special Issue* 112(11): 4034-4047.
- [6] Rosalino, L. M., M.J. Santos, P. Beier & M. Santos-Reis. 2008. Eurasian badger habitat selection in Mediterranean environments: does scale really matter? *Mammalian Biology* 73(3): 189-198
- [5] Santos, M.J., N.M. Pedroso, J.P. Ferreira, H.M. Matos, T. Sales-Luís, I. Pereira, C. Baltazar, C.B. Grilo, A.-T. Cândido & M. Santos-Reis. 2007. Assessing dam implementation impact on threatened carnivores: the case of Alqueva in SE Portugal. *Environmental Monitoring and Assessment* 142(1-3): 47-64.
- [4] Santos, M.J., B.M. Pinto & M. Santos-Reis. 2007. Is trophic niche partitioning the solution for the coexistence of carnivores in a Mediterranean landscape of SW Portugal? *WebEcology* 7: 53-62.
- [3] Rosalino, L.M., M.J. Santos, S. Domingos, M. Rodrigues & M. Santos-Reis. 2005. Body size and population structure of sympatric carnivores in a Mediterranean landscape of SW Portugal. *Revista Biologia (Lisboa)* 23:135-146.
- [2] M. Santos-Reis, L.M. Rosalino, F. Loureiro & M.J. Santos. 2005. Badgers in Portugal: distribution, status and conservation. In E. Virgós, J.G. Mangas, E. Revilla & X.-D. Roura, eds. *Ecología, distribución y estatus de conservación del tejón ibérico*. Sociedad Española de Conservación y Estudio de Mamíferos. Madrid. España. Pp: 241-250.
- [1] M. Santos-Reis, M.J. Santos, S. Lourenço, T. Marques, I. Pereira & B. Pinto. 2004. Relationships between stone martens, genets and cork oak woodlands in Portugal. In D. J. Harrison, A. K. Fuller, and G. Proulx, eds. *Marten and fishers (Martes) in human-altered environments: An international perspective*. Springer Science + Business Media, NY, USA. Pp: 147-172.

Kristin Schaeffer – Natural Resource Analyst

Reasons for Assignment to the Integrated Natural Resources Management Plan

- CEQA experience
- Extensive knowledge of El Dorado County issues

Education

Master of Arts, Public Administration
(Natural Resource Policy), 2000
Portland State University
Mark O. Hatfield School of Government

Bachelor of Science, Geography (Natural
Resources), 1998
Portland State University

Rx 450 Course, Smoke Management, US
Forest Service, 2002

American Management Association:
Improving Project Management Skills

U.C. Extension Planning Certification
Program:

- CEQA: Update, Issues, and Trends
- CEQA: A Step by Step Approach
- NEPA: Overview and Refresher
- Successful CEQA Compliance: An Intensive Two-Day Seminar
- Environmental Planning and Site Analysis
- Implementing Planning Law

Professional History

Natural Resources Analyst, Sierra
Ecosystem Associates, 2003 to present

Air Quality Specialist II, El Dorado County
Environmental Management Department,
2001-2003

Coordinator, City of Portland, Southwest
Watershed Resource Center, 2000-2001

Graduate Assistant Intern, City of Portland,
Community Watershed Stewardship
Program, 1998-2000

Research Assistant, Portland State
University, Community Environmental
Services Program, 1997-1998

Ms. Schaeffer has broad experience in California Environmental Quality Act environmental regulatory requirements for air quality regulatory compliance, land use planning, water resources projects, water quality data collection and analysis, and watershed restoration. She specializes in preparing Air Quality Analyses for residential and commercial development projects for compliance with CEQA guidelines utilizing the URBEMIS-2002 Modeling Software Program, and the Sacramento Metropolitan Air Quality Management District's Road Construction Emissions Modeling Software Program.

Ms. Schaeffer has considerable experience in professional inspections, investigations and evaluation of existing and potential sources of air contaminants. She has performed evaluations for industrial, commercial and residential establishments for compliance with applicable air quality management regulations. Ms. Schaeffer also has experience in developing and facilitating community watershed restoration grant programs, coordinating volunteer support for grant program implementation, and performing water quality evaluations.

Project Experience and Responsibilities

Completed Air Quality Analyses for the below bulleted projects to analyze the potential air quality impacts as a result of project implementation. These analyses were prepared utilizing the thresholds of significance outlined in the El Dorado County Air Quality Management District's *Guide to Air Quality Assessment: Determining Significance of Air Quality Impacts Under the California Environmental Quality Act* and the URBEMIS-2002 Modeling Software Program.

- ***Sunstone Business Park Project in El Dorado Hills, CA***
- ***Snowline Hospice Medical Facility Project in El Dorado, CA***
- ***Placerville Heritage Homes Project in Placerville, CA***
- ***Chevron Gasoline Station Development Project in Freshpond, CA***
- ***Fausel Professional Building Project in Placerville, CA***

Review of Fugitive Dust Plans for El Dorado County – As an employee of El Dorado County, conducted review of fugitive dust plans pertaining to commercial and residential development projects submitted by contractors for regulatory compliance purposes. Many of the plans reviewed were in the El Dorado Hills area where there are known high concentrations of naturally occurring asbestos.

Upper Hangtown Creek Watershed Restoration – Smith Flat Partnership – Prepared analyses for Phase I planning for the remediation of lands and restoration of stream channels within approximately 1000 acres of watershed for the Smith Flat Project Area. Historical uses of the project area include a lumber mill site and underground mining excavation. The Phase I planning and preliminary design phase evaluates the technical, land use, and land management aspects of the upper Hangtown Creek watershed surface and subsurface hydrology of the project area.

Pleasant Oak Main Project in El Dorado County – Completed an Air Quality Analysis for the replacement of approximately 5.5 miles of the El Dorado Irrigation District's Pleasant Oak Main. The analysis was prepared utilizing the thresholds of significance outlined in the El Dorado County Air Quality Management District's *Guide to Air Quality Assessment: Determining Significance of Air Quality Impacts Under the California Environmental Quality Act* and the Sacramento Metropolitan Air Quality Management District's Road Construction Emissions Modeling Software Program.

Mill Creek to Bull Creek Canal Bench Restoration Project 184 – El Dorado Irrigation District – Assisted the El Dorado Irrigation District with restoring and revegetating the 2.3-mile section of the canal bench that was bypassed by the newly constructed Mill to Bull Tunnel. Responsibilities include coordinating the preparation and development of engineering and environmental elements of the restoration; planning and assisting with environmental compliance permitting; assisted in ensuring the work was being conducted according to the approved Fugitive Dust Plan; agency consultation, coordinating between the USFS and the construction contractor to minimize impacts to special status species including the Northern Goshawk and California Spotted Owl; and taking lead responsibility for preparing and processing US Army Corp of Engineers Nationwide Permitting and California Department of Fish and Game Streambed Alteration Agreement, to address construction activity in and near stream zones.

Smog Check II Program Development, El Dorado County – As an employee of El Dorado County, researched and assisted in development of the Smog Check II Program within El Dorado County. Responsibilities included researching Census Bureau data and El Dorado County Planning Department land use plans for population projections for program implementation, developed press releases to assist in community awareness of the Smog Check II program, and acted as the primary contact for local smog check industry representatives.

CEQA Notice of Preparation and Initial Study Sacramento Municipal Utility District North Natomas Sub-Transmission Line Reinforcement Project – Assisted Sacramento Municipal Utility District in the development of a Notice of Preparation and Initial Study for a Draft Environmental Impact Report for the Airport-San Juan Neighborhood Distribution Substation and Associated 4.8-Mile 69,000 Volt (69 kV) Subtransmission Lines Project located in North Natomas/Sacramento. The proposed project includes the installation and operation of a neighborhood electric distribution substation and associated 69 kV power supply line. The Notice of Preparation addresses seven alternatives for electric system planning in the proposed project area. The Initial Study evaluates the potentially significant impacts to aesthetic resources on an existing neighborhood to residents living adjacent to the proposed aboveground powerlines.

CEQA Initial Study/Mitigated Negative Declaration Lake Aloha Dam Maintenance and Telemetry Station Installation Project – El Dorado Irrigation District – Principal author of the Initial Study and Mitigated Negative Declaration adopted by the El Dorado Irrigation District (District) for the Lake Aloha Dam Maintenance and Telemetry Station Installation Project, located in the Desolation Wilderness on U.S. Forest Service land within the Eldorado National Forest. The project reduced leakage, improved dam-safety, and now conserves available water supplies; minimizes reservoir spills and the associated effects on trout that pose threats to mountain yellow-legged frog populations; reduces the potential for auxiliary dam failure caused by rodents and vegetation; minimized potential effect to the historic characteristics of the Lake Aloha Main Dam and auxiliary dams by designing the project actions to blend with the existing setting to the extent feasible; and retained the qualities of the wilderness character and the natural visual landscape within Desolation Wilderness. Assisted with securing, on schedule, several permits and other agency approvals including USFS Special Use Permit, U. S. Army Corps of Engineers Nationwide Permits, State Water Resources Control Board Clean Water Act Section 401 Water Quality Certification, and National Historic Preservation Act clearances to allow on-time District repairs to dam within narrow Fall season construction window.

Elizabeth Sheppard – Environmental Specialist

Reasons for Assignment to the Integrated Natural Resources Management Plan

- CEQA/NEPA experience
- Knowledge of issues faced by El Dorado County

Education

BS, Environmental Science, California
State University, Sacramento, 2003

Specialized Training

- Project Planning: Integration of Environmental Permits, UC Davis Extension
- Special Topics in Road Ecology: Water Resources, UC Davis Extension
- Compensatory Wetland Mitigation, UC Davis Extension
- Clean Water Act Section 404: Nationwide and Other Specialized Permits, UC Davis Extension
- Water Quality Monitoring SWAMP Workshop, Sacramento River Watershed Program/Surface Water Ambient Monitoring Program
- National Stormwater Summit: Stormwater Compliance Training

California Department of Fish and Game
Scientific Collector's Permit (SC-008182)

Ms. Sheppard specializes in planning and permitting. She is proficient in writing permit applications and consulting with regulatory agencies to secure permits and ensure that applicants remain in compliance with state and federal laws and regulations. She has prepared CEQA/NEPA documents and assisted project applicants with submittal and approval of these documents. Ms. Sheppard is skilled in data analysis, water quality testing, and data collection of sites using a professional GPS data mapper. Ms. Sheppard has assisted with rare plant surveys, riparian restoration projects, biological resource evaluations, and tree preservation plans. In addition, Ms. Sheppard has experience sampling benthic macroinvertebrates for regulatory purposes and has experience in assessing air quality impacts using the URBEMIS program.

Professional History

Environmental Specialist, Sierra Ecosystem Associates, 2005 to present

Lead Coder, Jones & Stokes, 2005

Environmental Specialist, Versar, Inc., 2004-2005

Student Intern, State Water Resources Control Board, Division of Water Quality, 2003-2004

Lab Technician, Kiff Analytical, LLC, 2001-2003

Project Experience and Responsibilities

Trails and Transportation Plan – El Dorado Irrigation District – Conducted a needs assessment of a trail utilized by staff for maintenance operations and provided analysis and maintenance recommendations. Collected and processed lat/long coordinate data to be utilized by GIS staff. Analyzed GPS waypoint data collected to ensure point properties met USFS collection specifications.

Isleton and Walnut Grove Arsenic Treatment Projects – California American Water Company (Cal-Am) – Prepared sections of the CEQA Initial Study/Mitigated Negative Declaration for agency and public review and adoption. Conducted project site visit to evaluate and analyze impacts on natural resources.

El Dorado Diversion Dam Fish Passage Improvements – El Dorado Irrigation District (District) – Support the District with resources agency consultation and environmental permitting prior to the initiation of the project. Coordinate with resource agency staff to ensure project compliance with state and federal laws.

BMI and Water Quality Sampling and Analysis for Butte Creek Monitoring – El Dorado Irrigation District – Sampled for benthic macroinvertebrates (BMI), measured field and habitat quality data and performed water quality tests in the field for monitoring and enforcement purposes to determine impacts to water quality from sediment deposition. Sampling was conducted in accordance with the California Department of Fish and Game’s protocol for point-source sampling design. Collected Lat/Long data using Leica GS20 and post processed data. Arranged for laboratory analysis that was in accordance with CSBP level II identification and setup contract with lab.

Biological Resource Evaluation and Air Quality Analysis– Snowline Hospice – Assisted with rare plant and tree identification surveys. Measured tree diameters and tree canopy cover to determine the amount of tree retention needed for the project. Assisted with completing the Air Quality Analysis to analyze the potential air quality impacts as a result of project implementation. The analyses was prepared utilizing the thresholds of significance outlined in the El Dorado County Air Quality Management District’s *Guide to Air Quality Assessment: Determining Significance of Air Quality Impacts Under the California Environmental Quality Act* and the URBEMIS-2002 Modeling Software Program.

USDA Forest Service/Roadless Rule – Jones & Stokes – Reviewed and analyzed public comments to ensure that all comments issues were addressed on the 2004 repeal of the Roadless Area Conservation Rule as proposed by the Bush Administration and in accordance with NEPA. Assisted in leading the team of professionals working on project and trained on proper technique and content analysis procedure.

Clean Water Act Section 401 Water Quality Certification Program – State Water Resources Control Board – Analyzed 401 Certifications that were certified by the Regional Water Quality Control Board (RWQCB) staff and assisted in their overall understanding of the requirements and procedures when reviewing 401 applications for completeness. Developed a web-based fee calculator that assists staff, applicants, and consultants in calculating 401 application fees. Developed spreadsheets and prepared reports to be distributed among the nine RWQCBs.

Upper Hangtown Creek Water Quality Monitoring – Smith Flat Limited Partnership – Developed work plan and conducted site reconnaissance of project area to determine the appropriate water quality monitoring locations. Performed in-field water quality testing to measure baseline water quality conditions upstream and downstream of proposed project site. Ensured that water quality monitoring followed QA/QC procedures as described in our QAPP and on the State Water Resource’s Control Board website for Watershed Monitoring and Assessment.

Dr. Fraser Shilling – Corridor Ecologist

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Extensive experience with issues relating to corridor ecology, particularly in El Dorado County
- GIS and biology experience
- Experience with indicator species identification and analysis
- Co-Director of UC Davis Road Ecology Center

Education

Ph.D. in Biological Sciences, University of Southern California, 1991

B.Sc. in Biological Sciences, University of Southern California, 1986

Professional Research History

2000-present Staff Research Associate IV, Department of Environmental Science and Policy

1998-2000 Research Coordinator, Sierra Nevada Network for Education and Research, UC Center for Water and Wildlands Resources

1995-1998 Postdoctoral Fellow, Division of Biological Sciences and the Institute of Theoretical Dynamics, University of California, Davis

1991-1994 Postdoctoral Fellow, University of Connecticut

Mr. Shilling's road ecology related research includes the development of a habitat fragmentation and connectivity analysis of the Sierra Nevada foothills; GIS analysis to determine habitat suitability for a variety of native species. He has also been involved with the application of ecological information in decision-support for agencies involved with transportation system design, construction, and removal (Girvetz & Shilling 2003).

Mr. Shilling currently has 3 active research areas: road ecology, indicators of ecosystem performance, and policy issues associated with water pollution. He is co-Director of the Road Ecology Center at UC Davis as the primary instructor and developer of grant-supported research. Mr. Shilling is also involved with a collaborative program, which brings together social scientists, natural scientists, and humanities professors in inter-disciplinary investigations of land-use, water policy, and transportation policy implications. He practices at the interface between science and policy, requiring that he collaborates and interact with regulatory agencies, land management agencies, transportation agencies, and academics of many disciplines. This is reflected in the projects that Mr. Shilling led, totaling over 1 million dollars in the last 8 years.

Supervisory and Educational Experience

Supervision - Supervised 11 undergraduates, 6 graduate students, 1 post-doctoral fellow, 3 technicians, and 3 senior Ph.D. researcher/analysts (1994-2009, UC Davis)

Course Director - “Improving Community and Landscape Connectivity” (graduate seminar), Transportation Studies Program, University of California, Davis, 2009 (Fall). “Road Ecology: Road Effect Zone” (graduate seminar), Transportation Studies Program, University of California, Davis, 2008 (Winter). “Road Ecology” (graduate course), Transportation Studies Program, University of California, Davis, 2007 (Spring). “Modeling Reserve Design” (graduate seminar) Department of Environmental Science and Policy, UC Davis, 1995-96.

Guest Lecturer - “Water Policy”, University of California, Davis, 2005, 2006, 2007, 2008

Recent Workshops - Designed and directed 5 regional workshops on watershed assessment throughout California (2004-2006). Designed and directed 3 Road Ecology Center workshops on road effects; integrated land-use, conservation, and transportation planning; and habitat connectivity. Co-designed and coordinated the California Connectivity Forum (2008), which brought together ~200 scientists and practitioners to discuss wildlife connectivity planning and implementation.

Conference Presentations - Invited and contributed presentations at conferences of the: American Society of Limnology and Oceanography, American Society of Zoologists/Society for Integrative and Comparative Biology, CALFED Science Program, Ecological Society of America, Great Valley Center, Korea Institute for Construction Technology, Marine Biological Laboratory, Sierra Nevada Alliance, Western Section of The Wildlife Society, and other regional symposia, conferences, and workshops.

Recent Grant Supported Projects

(Note: ** represent lead role on project)

**2009 – 2010 Grant from the UC Davis Sustainable Transportation Center (\$10,000) to develop a pilot GIS tool to measure and map the “Road Effect Zone”, for use by transportation planners.

**2009 – 2010 Grant from the Ford Foundation (\$40,000) to investigate cultural fishing practices and assist community organizations with technical information.

**2008 – 2010 Contract from CALFED Watershed Program (\$197,000, through Napa County) to develop an environmental indicator reporting system for the Bay and Delta.

**2008 – 2010 Contract from CALFED Watershed Program (\$77,000, through Sacramento River Watershed Program) to develop an environmental indicator reporting system for the Sacramento River watershed.

**2009 Grant from the Wildlife Conservation Society (via Defenders of Wildlife, \$35,000) to develop a pilot regional approach for connectivity analysis and planning in California.

**2008 – 2009 Grant from the PATH program (\$25,000) to investigate new ways to model the integrated circuitry of traffic and wildlife movement.

**2008 – 2010 Contract from Caltrans (\$98,000) to develop an economic valuation approach for the environmental attributes associated with transportation infrastructure.

2007 – 2009 Contract from the California Regional Water Quality Control Board (Region 1, \$150,000) to investigate causes and locations of surface-waters contaminated with urban and agricultural waste.

2007 – 2008 Grant from the UC Davis Sustainable Transportation Center (\$60,000) to develop a road ecology lab in association with the Pavement Research Center and to develop conceptual models for the “Road Effect Zone”.

2007 – 2008 Contract from Caltrans (\$85,000) to develop the California Wildlife Crossing Manual.

**2007 – 2008 Contract from the South Yuba River Citizens League (\$30,000) with Prop 50 funds to develop spatial information knowledge base, conceptual watershed modeling, and risk analysis in association with watershed management planning.

**2007 – 2009 Contract from Department of Fish and Game (\$101,000, through CSUC Research Foundation) to measure effectiveness of the Ecosystem Restoration Program’s investments in Sacramento River Riparian Management Areas.

**2007 - 2008 Grant from the California Endowment (\$96,000) to investigate fishing and fish consumption behavior on the Sacramento River policy involvement of impacted communities.

**2005 - 2007 Contract from the Sacramento Regional County Sanitation District (\$54,000) to investigate fishing and fish consumption behavior on the Sacramento River and methods for recruiting input from impacted communities.

**2006 USDA Forest Service contract (\$25,000) to provide GIS modeling and expert input into their recreational trails analysis.

2005 Contract from the California Regional Water Quality Control Board (Region 1, \$75,000) to develop a riparian mapping tool to inform thermal restoration of surface waters.

**2002 - 2009 Contracts from the California Department of Forestry-FRAP (\$384,000) to develop the “California Watershed Assessment Manual, Volumes I and II”. Funds from CA General Fund and CALFED Watershed Program.

**2002 - 2003 USEPA grant (\$27,000) to work with the Delta Tributaries Mercury Council developing a fishing activities and demographic GIS for the Bay-Delta watershed to support the development through CALFED of a fish consumption study for the Central Valley.

Select Publications

Environmental Science

F.M. Shilling, J.S. Hilty, B. Dugelby, E. Girvetz, M. Soule, and others (in preparation). Conserving connectivity in a contested and changing landscape. To be submitted to Ecological Applications.

Li, T., F.M. Shilling, F. Li, J. Thorne, H. Schott, A.M. Berry (in preparation). Fragmentation of China’s landscape by roads and land-use. To be submitted to Landscape Ecology

Shilling, F.M., S. Reed, J. Boggs, and M.N. Lubell (in preparation). Bio-geographic and social optimization of National Forest recreational trails. To be submitted to Environmental Management.

Shilling, F.M., A.B. White, L. Lippert, and M.N. Lubell (in review). Contaminated fish consumption in California’s Central Valley Delta. Environmental Research.

Shilling, F.M. (2007). Repairing road impacts on landscape connectivity. Transactions of the Western Section of the Wildlife Society, 43: 11-18.

Shilling, F.M. and R. Harris (2007). Effectiveness monitoring by California community watershed groups. IMPACT (American Water Resources Association), Volume 9(5): 21-24.

Shilling, F.M. and E. Girvetz (2007). Barriers to implementing a wildland network. *Landscape and Urban Planning*. Volume 80(1-2): 165-172.

Kattelman, R. and F.M. Shilling (2004). Aquatic systems and watersheds. In: *Proceedings of the Sierra Nevada Science Symposium*; 2002 October 7-10; Kings Beach, CA. Murphy, D.D. and P.A. Stine (eds.) General Technical Report PSW-GTR-193. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 287 p.

Girvetz E. and Shilling F.M. (2003). Decision support for road system analysis and modification on the Tahoe National Forest. *Environmental Management*. 32(2):218-233

Shilling, F.M. (2001). Watershed assessment in a Sierra Nevada river basin – Yuba River. *Proc. 8th Biennial Watershed Management Conference*, Robert N. Coats (ed.). Univ. California Water Resources Center Report No. 101, pp. 169-175.

Shilling, F.M. (1997). Do habitat conservation plans protect endangered species? *Science*, 276: 1662-1663.

Reports to Agencies

Shilling, F.M., S. Sommer, L. Leonelli, and D. Shimoum (2008). Community-based strategies to reduce mercury exposure in Delta fishing communities. Report to the California Department of Public Health and the Central Valley Regional Water Quality Control Board. 48 pages

Shilling, F.M. and J.H. Viers (2008). Russian River Pathogen Project. Report to the North Coast Regional Water Quality Control Board. 36 pages.

Shilling, F.M. (2008). Yuba strategy project: conceptual and risk models. Report to the South Yuba River Citizens League. 18 pages.

Shilling, F.M. (2007). Decision support for recreational route prioritization. Report to the Tahoe National Forest. 10 pages.

Pettler, A., G. Erickson, J.F. Quinn, R.J. Meese, and F.M. Shilling (2007). An analytical framework for wildlife crossing policy in California. In *Proceedings of the 2007 International Conference on Ecology and Transportation*, edited by C. Leroy Irwin, Debra Nelson, and K.P. McDermott. Raleigh, NC: Center for Transportation and the Environment, North Carolina State University. p. 623.

Meese, R.J., F.M. Shilling, and J.F. Quinn (2007). *Wildlife Crossings Guidance Manual*. Prepared for the California Department of Transportation. 87 pages.

McCord, S.A., F.M. Shilling and others (2007). Localized mercury bioaccumulation study. Report to the Sacramento Regional County Sanitation District. 78 pages.

Shilling, F.M., S. Sommarstrom, R. Kattelmann, B. Washburn, J. Florsheim, and R. Henly. California Watershed Assessment Manual, Volume I. (2005) & Volume II (2007). Prepared for the California Resources Agency and CALFED (<http://cwam.ucdavis.edu>).

J. Kennedy, F.M. Shilling, and J.H. Viers (2005). Current and potential riparian forest condition along Scott River watershed tributaries. Report to the North Coast Regional Water Quality Control Board. 52 pages.

Shilling, F.M. (2004). Fishing activity analysis in the Sacramento/San Joaquin rivers Delta region. Report for the California Department of Public Health. 22 pages.

Shilling, F.M. (2002). Doing roads analysis with a GIS-based decision-support system. A manual for USFS technical staff conducting road system analysis. 42 pages.

Shilling, F.M., E.H. Girvetz, C. Erichsen, B. Johnson, and P.C. Nichols (2002). "A Guide to Wildlands Conservation Planning in the Greater Sierra Nevada Bioregion". California Wilderness Coalition. 187 pages.

Shilling, F.M. (2001). State of the Yuba: An assessment of the Yuba River watershed. Report to the South River Citizens League. 73 pages.

Robert Smart – Forestland Interface Specialist

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Decades of experience with issues facing El Dorado County
- Worked closely with County staff, Board of Supervisors and other special interest groups in County
- Familiarity with parks, open space and trail systems throughout the County
- Served as Forestland Interface Advisor on the Oak Woodland Management Plan

Education

Bachelor of Science in Forest Management,
University of Idaho

Master of Forestry, University of Idaho

Executive Training by Department of
Agriculture and Defense Department

National Incident Commander certified by
the National Wildland Fire Coordination
Group (NWFCG)

Registered Professional Forester (RPF 300),
State of California

39 years of experience in managing public lands administered by the United States Department of Agriculture, Forest Service. Over 30 years of working with the issues of the central Sierra Nevada. Extensive experience as an executive working with the public, agency employees, federal, state, county and local government entities. Heavily involved in the administration and planning of hydroelectric projects on the west slope of El Dorado County. Leader in managing complex major wildland fires and other natural disasters. Strong advocate for parks, trails, and walkable/ bike friendly communities. Registered Professional Forester. Consultant on fuels, fire, oak woodland and water projects.

Work Experience

District Ranger, United States Department of Agriculture, Forest Service - District Ranger (line officer) on two diverse ranger districts which included full spectrum of land uses. Activities included the planning and administration of permits for a major ski area, hydroelectric projects, recreation areas, and resorts. Heavily involved with Project 184 administration, repairs, re-licensing, and transfer from 1977-1999. Familiar with small hydro electric projects. Oversaw the preparing of timber sales that would result in fire resilient forests and firesafe communities. Extensive experience in road planning and construction. Very active in the development of the Sierra Nevada Ecosystem Project (SNEP), the Sierra Nevada Framework, and Forest and project level planning.

National Incident Commander, National Wildland Fire Coordination Group - Obtained the highest level of interagency emergency leadership and led efforts on major wildfires, hurricanes, and an earthquake throughout the United States and its territories. Planning Coordinator for Multi-Agency Coordination Group for State of Montana Fires in CY 2000.

Operations Branch Chief, FEMA, Department of Homeland Security - Worked with federal, state, and local officials in coordinating FEMA support activities on major Arizona Fires in 2002 and Southern California Fires in 2003.

Consulting Activities - Co-author in the development of a community wildfire protection plan for Grizzly Flats. Consulting forester for an oak woodland management plan for El Dorado County. Instruct fire training sessions for major wildland fires. Hydroelectric Advisory Panel member for El Dorado County Water Agency.

Marcelo Tognelli – Corridor Ecologist

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Vast experience with conservation ecology, GIS modeling
- Member of UC Davis Road Ecology Center

Education

Ph.D. in Ecology, Area of Emphasis: Conservation Ecology. University of California, Davis, 2003 Dissertation: Patterns of species richness and conservation of South American terrestrial mammals. Advisor: Douglas A. Kelt.

Biologist (5 year degree that includes a short thesis). Universidad Nacional de Córdoba, Argentina, 1991 Thesis: Practical keys for the identification of Lepidoptera larvae in crops of agricultural importance in Córdoba, Argentina. Advisor: Daniel Igarzábal.

Research Experience

Postdoctoral Research: Dept. of Environmental Sciences and Policy, University of California, Davis (research advisor: Dr. Fraser Shilling) 2008-present

Adjunct Researcher: Consejo Nacional de Investigaciones Científicas y Tecnológicas, Instituto Argentino de Investigaciones de Zonas Áridas 2007-present

Postdoctoral Research: Instituto Argentino de Investigaciones de Zonas Áridas, (research advisor: Dr. Jorge M. Lobo, and Dr. Sergio Roig-Juñent) 2005-2007

Postdoctoral Research: Center for Advanced Studies in Ecology and Biodiversity, Pontificia Universidad Católica de Chile, (research advisor: Dr. Pablo A. Marquet) 2003-2004

Doctoral Research: Department of Wildlife Fish and Conservation Biology, University of California, Davis, (research advisor: Dr. Douglas A. Kelt) 1996-2003

Research Assistant: Dept. of Wildlife, Fish, and Conservation Biology, University of California, Davis, (P.I. Dr. Douglas A. Kelt) 1998-2001

Research Fellow: Instituto Argentino de Investigaciones de las Zonas Áridas, (research advisor: Agronomist Virgilio Roig) 1993-1996

Publications

1. Schipper et al. (103 authors). 2008. The status of the world's land and marine mammals: diversity, threat, and knowledge. *Science*, 332: 225-230.
2. **Tognelli, M.F.**, P.I. Ramirez de Arellano, and P.A. Marquet. 2008. How well do the existing and proposed reserve networks represent vertebrate species in Chile? *Diversity and Distributions*, 1: 148-158.
3. Roig-Juñent, S.A., Agrain, F., Carrara, R., Ruiz Manzanos, E., and **Tognelli, M.F.** 2008. Description and phylogenetic relationships of two new species of *Baripus* (Coleoptera: Carabidae: Broscini) and considerations regarding patterns of speciation. *Annals of the Carnegie Museum*, 77:211-227.
4. Roig-Juñent, S.A., Carrara, R., Ruiz Manzanos, E., Agrain, F., Sackmann, P., and **Tognelli, M.F.** 2007. Phylogenetic relationships and biogeographic considerations of four new species of Tognelli-CV 2 *Cnemalobus* (Coleoptera: Carabidae) from Patagonia. *Insect Systematics and Evolution*, 38: 267-292.

5. Ferrer, M.S., A. E. Marvaldi, and **M.F. Tognelli**. 2007. First records of three species of *Oxycraspedus* Kuschel (Coleoptera: Belidae) in Argentina and use of a predictive model to compare their potential distribution with the range of their host-plant, *Araucaria araucana*. *Revista Chilena de Historia Natural*, 80: 327-333.
6. Campos C.M, Borghi C.E, Gianonni S.M, Mangeaud A., **Tognelli M.F.** 2006. Herbivory by cuises on *Larrea cuneifolia* plants: effect on survival and reproduction. *Ecología Austral*, 16: 1-6.
7. **Tognelli, M.F.**, Silva-Garcia, C., F.A. Labra, and P.A. Marquet. 2005. Priority areas for the conservation of coastal marine vertebrates in Chile. *Biological Conservation*, 126: 420-428.
8. Marquet, P.A., R.A. Quiñones, Abades, S., Labra, F., **Tognelli, M.**, Arim, M., Rivadaneira, M. 2005. Scaling and power laws in ecological systems. *Journal of Experimental Biology*, 208: 1749-1769.
9. **Tognelli, M.F.** 2005. Assessing the utility of indicator groups for the conservation of South American terrestrial mammals. *Biological Conservation*, 121: 409-417.
10. **Tognelli, M.F.**, and D.A. Kelt. 2004. Analysis of determinants of mammalian species richness in South America using spatial autoregressive models. *Ecography*, 27: 427-436.
11. **Tognelli, M.F.**, C.M. Campos, and R.A. Ojeda. 2001. *Microcavia australis*. *Mammalian Species*, 648: 1-4.
12. Campos, C.M., **M.F. Tognelli**, and R.A. Ojeda. 2001. *Dolichotis patagonum*. *Mammalian Species*. 652: 1-5.
13. Kelt, D.A. and **M.F. Tognelli**. 1999. Harris, G. 1998. A guide to the birds and mammals of coastal Patagonia. *Journal of Mammalogy*, 80: 1375-1378 (Book review).
14. **Tognelli, M.F.**, C.E. Borghi, and C.M. Campos. 1999. Effect of gnawing by *Microcavia australis* (Rodentia, Caviidae) on *Geoffroea decorticans* (Leguminosae) plants. *Journal of Arid Environments*, 41:79-85.
15. **Tognelli, M.F.**, C.M. Campos, R.A. Ojeda, and V.G. Roig. 1995. Is *Microcavia australis* (Rodentia: Caviidae) associated with a particular plant structure in the Monte Desert of Argentina? *Mammalia*, 59: 327-333.
16. Igarzábal, D., P. Fichetti y **M.F. Tognelli**. 1994. Claves prácticas para la identificación de larvas de Lepidoptera en cultivos de importancia agrícola en la provincia de Córdoba, Argentina. *Gayana (Zoología)* 58(2): 93-142.

Book Chapters

1. Ramirez de Arellano, P.I., **Tognelli, M.F.**, Garin, C. and P.A. Marquet. 2008. Vacíos de conservación y sitios prioritarios para la conservación de los vertebrados nativos de la Región de Atacama. In: *Libro Rojo de la Flora Nativa y de los Sitios Prioritarios para su Conservación: Región de Atacama* (F.A. Squeo, G. Arancio, and J.R. Gutiérrez, eds). Pp. 251-266. Ediciones Universidad de La Serena, La Serena, Chile.
2. **Tognelli, M.F.** 2007. How well do protected areas represent the terrestrial mammal fauna of South America? In: *The quintessential naturalist: honoring the life and legacy of Oliver P. Pearson* (Kelt, D. A., E. Lessa, J. A. Salazar-Bravo, and J. L. Patton, eds.). Pp. 353 -366. University of California Publications in Zoology.

3. Marquet, P.A., **Tognelli, M.F.**, Barría, I., Escobar, M., Garin, C., and Soublette, P. 2004. How well are Mediterranean ecosystems protected in Chile? Insights from gaps in the conservation of Chilean vertebrates. In: *Proceedings 10th Medecos Conference, 2004* (Arianoutsou and Papanastasis, eds.). Rhodes Island, Greece, Millpress, Rotterdam.

Tom Wegge – Resource Economist

Reasons for Assignment to the Integrated Natural Resources Management Plan

- Experience with economic issues facing El Dorado County
- Assisted with the Financial Management Plan for the Oak Woodland Management Plan

Education

M.S., Environmental Economics,
Department of Environmental Studies,
California State University, Fullerton,
California, 1980.

B.A., Urban Studies, University of Southern
California, Los Angeles, California, 1973.

Socioeconomic impact assessments, recreation demand modeling, and fish and wildlife economic valuations for CEQA/NEPA compliance documents, water rights adjudications, and hydroelectric relicensing studies.

Professional Memberships

Association of Environmental and Resource Economists
National Association of Business Economists
Sacramento Economics Roundtable (past President)

Project Experience

Thomas Wegge served as senior economist at Jones & Stokes Associates from 1980 to 1996. His responsibilities included project manager, technical team leader, and principal investigator on economic studies, primarily for NEPA/CEQA compliance documents for water resource projects. He is currently principal economist at TCW Economics, an economic consulting firm established in 1996 that specializes in economic analysis for natural resource management and land use planning. Selective experience includes the following projects.

Socioeconomic Assessment for the Trinity River Restoration EIS/EIR (U.S. Fish and Wildlife Service) - Analyzed the socioeconomic impacts of Trinity River flow and fish production alternatives on affected ocean and in-river fisheries and reservoir recreation.

Socioeconomic Assessment for the Programmatic EIR/EIS on Implementing the Central Valley Project Improvement Act (U.S. Bureau of Reclamation) - Analyzed the socioeconomic impacts of implementing the Central Valley Project Improvement Act, focusing on estimating socioeconomic impacts associated with changes in predicted flows in affected rivers and lake levels at affected reservoirs within California's Central Valley.

Projections of Recreation Use and Associated Economic Values of a Restored San Joaquin River (Natural Resources Defense Council) – Developed a recreation use model for projecting recreation use along the San Joaquin River associated with increased flows and enhanced habitat conditions for salmonids. Evaluated economic values and impacts associated with these projected use conditions.

Environmental Benefits of Fish and Wildlife Resources in the San Joaquin Valley (San Joaquin Valley Drainage Program) - Estimated the monetary benefits of protecting salmon, wetlands, and wildlife resources in the San Joaquin Valley using the contingent valuation method.

Socioeconomic Assessment of Proposed Habitat Restoration within the Riparian Corridor of the Sacramento River Conservation Area (The Nature Conservancy) - Characterized and evaluated the effects on recreation and the local economy along the Sacramento River from Red Bluff to Colusa of converting agricultural lands to habitat.

Regional Economic Analysis of the Delta Wetlands Project (State Water Resources Control Board) - Estimated the regional employment and income effects of converting four islands in the Sacramento-San Joaquin Delta from farmland to water storage, wildlife habitat, and hunting clubs.

Cost-Benefit Analysis of Lake Level Alternatives for Mono Lake in the Water Rights Amendment EIR (California State Water Resources Control Board) – Served as technical team leader in analyzing the costs and benefits of lake level alternatives affecting fisheries, recreation and ecosystem preservation.

Socioeconomic Analysis for an EIS on the Western Suisun Marsh Salinity Control Project (U.S. Bureau of Reclamation) - Prepared socioeconomic sections for an EIS for the Western Suisun Marsh Salinity Control Project. Analyzed economic effects resulting from potential changes in recreational use of public and private lands, including recreation spending changes and subsequent effects on regional employment and economic activity. Also assessed economic effects on private hunting clubs resulting from water management changes.

Regional and Socioeconomic Analyses for the Programmatic EIR/EIS on the CALFED Bay-Delta Program (CALFED) - Evaluated the regional and socioeconomic effects in the Sacramento and San Joaquin River Basins of potential changes in recreation use of rivers, reservoirs, and wildlife refuges from implementing the Program.

Socioeconomic Assessment for Relicensing of Hydroelectric Generating Facilities at Lake Oroville (California Department of Water Resources) - Analyzing socioeconomic effects of potential changes in recreation activity Lake Oroville, focusing on employment, income, and fiscal effects in Butte County and communities.

Economic Benefits of Improved Delta Fisheries from the Los Vaqueros Reservoir Project (U.S. Bureau of Reclamation) - Estimated the monetary benefits to sport and commercial fishermen of alternative design capacities for the Los Vaqueros Reservoir using estimates of fishery improvements and the existing willingness-to-pay literature.

Expert Testimony

Provided expert testimony on economic impacts in evidentiary hearings for the Mono Lake and Big Bear Lake water rights cases. Provided expert testimony for a deposition on economic damages of a fish kill for a natural resource damage assessment in eastern Washington. Provided expert testimony in evidentiary hearings on impacts of the proposed merger of the Southern California Edison and San Diego Gas & Electric companies. Provided expert testimony in depositions on the recreation and economic impacts of reservoir drawdown at Lake Nacimiento in the Central Coast of California.

Paper Presentations and Publications

“Site Quality and the Demand for Sport Fishing for Different Species in Alaska”. Presentation at the 1988 Symposium on Demand and Supply of Sport Fishing sponsored by the Sport Fishing Institute. Charleston, South Carolina. March, 1988.

“Economic Valuation of Sport Fisheries: Concepts, Terminology, and Methods”. Presentation at the 1988 Meeting of the American Fisheries Society, Alaska Chapter. Anchorage, Alaska. November, 1988.

“Bioeconomic Models: Opportunities and Problems in Applications to Sport Fisheries”. Presentation at the 1988 Meeting of the American Fisheries Society, Alaska Chapter. Anchorage, Alaska. November, 1988.

“Appropriate Public Policy Uses of Economic Values and Impacts of Southcentral Alaska Sport Fisheries”. Presentation at the 1989 Meeting of the American Fisheries Society, Alaska Chapter. Anchorage, Alaska. September, 1989.

“Economic Value of San Joaquin Valley Fish and Wildlife”. Presentation at the 1991 Conference of The Wildlife Society, Western Section. Sacramento, CA. February, 1991.

“Environmental Values Included in Water Benefits and Costs”. Presentation at the 1993 Conference of the Western Economic Association International. South Lake Tahoe, Nevada. June 1993.

“Analyzing Project-Induced Recreation Effects of Hydropower: In Need of a Tune-up for the New Millennium?”. Presentation at the 1999 Congress on Recreation and Resources Capacity. Snowmass, CO. December, 1999.

“The Economic Value of Water to Wildlife and Fisheries in the San Joaquin Valley: Results of a Simulated Voter Referendum”. Paper prepared with John Loomis, Michael Hanemann, and Barbara Kanninen. Transactions of the 55th North America Wildlife & Natural Resources Conference. 1990.

“Comparing Benefits and Costs of Water Resource Allocation Policies for California’s Mono Basin”. Book chapter prepared with Michael Hanemann and John Loomis. Advances in the Economics of Environmental Resources. JAI Press. 1996.