

C/034

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SANTA BARBARA • SANTA CRUZ

SPONSORED PROJECTS OFFICE

BERKELEY, CALIFORNIA 94720-5940  
(510) 642-0120  
FAX: (510) 642-8236

July 1, 1998

**Federal Express**

CALFED Bay-Delta Program  
1416 Ninth Street, Suite 1155  
Sacramento, CA 95814

RE: Proposal Solicitation Package (May 1998)  
Ecosystem Restoration Projects and Programs

Enclosed is a proposal submitted on behalf of the Regents of the University of California at Berkeley. The University representative to whom questions may be directed and with whom contract negotiations may be conducted is Lynn E. Deetz who may be reached at (510) 643-6113. Award documents must be issued in the University's corporate name, c/o Sponsored Projects Office, 336 Sproul Hall, University of California at Berkeley, CA 94720-5940.

**The University reserves the right to negotiate the terms and conditions of any contract that results from this solicitation.**

Favorable consideration of our proposal is requested.

Sincerely,

*Roslyn C. Kartychak*

Roslyn C. Kartychak  
Research Administrator

Encls.

cc: J. Radke  
N. Watanabe

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Attachment H

COVER SHEET (PAGE 1 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Mapping Changes in Aquatic and Riparian Habitat Along Floodplain Rivers of the  
Proposal Title: Sacramento-San Joaquin Valley to Prioritize Land Acquisition, Restoration  
Actions, and Flood Management

Applicant Name: The Regents of the University of California  
Mailing Address: Sponsored Projects Office, 336 Sproul Hall #5940, Berkeley, CA 94720-5940  
Telephone: Contract: Lynn Deetz (510) 643-6113, Technical: John Radke (510) 643-5995  
Fax: (510) 642-8236 (510) 643-5571

Amount of funding requested: \$ 353,222 for 2 years

Indicate the Topic for which you are applying (check only one box). Note that this is an important decision:  
see page    of the Proposal Solicitation Package for more information.

- Fish Passage Assessment
- Floodplain and Habitat Restoration
- Fish Harvest
- Watershed Planning/Implementation
- Fish Screen Evaluations - Alternatives and Biological Priorities
- Fish Passage Improvements
- Gravel Restoration
- Species Life History Studies
- Education

Indicate the geographic area of your proposal (check only one box):

- Sacramento River Mainstem
- Delta
- Suisun Marsh and Bay
- San Joaquin River Mainstem
- Landscape (entire Bay-Delta watershed)
- Sacramento Tributary: \_\_\_\_\_
- East Side Delta Tributary: \_\_\_\_\_
- San Joaquin Tributary: \_\_\_\_\_
- Other: Sacramento/San Joaquin River Systems
- North Bay: \_\_\_\_\_

Indicate the primary species which the proposal addresses (check no more than two boxes):

- San Joaquin and East-side Delta tributaries fall-run chinook salmon
- Winter-run chinook salmon
- Late-fall run chinook salmon
- Delta smelt
- Splittail
- Green sturgeon
- Migratory birds
- Spring-run chinook salmon
- Fall-run chinook salmon
- Longfin smelt
- Steelhead trout
- Striped bass



COVER SHEET (PAGE 2 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Indicate the type of applicant (check only one box):

- |  |   |
|--|---|
| <input type="checkbox"/> State agency                    | <input type="checkbox"/> Federal agency |
| <input type="checkbox"/> Public/Non-profit joint venture | <input type="checkbox"/> Non-profit     |
| <input type="checkbox"/> Local government/district       | <input type="checkbox"/> Private party  |
| <input checked="" type="checkbox"/> University           | <input type="checkbox"/> Other: _____   |

Indicate the type of project (check only one box):

- |  |   |
|--|---|
| <input type="checkbox"/> Planning            | <input type="checkbox"/> Implementation |
| <input type="checkbox"/> Monitoring          | <input type="checkbox"/> Education      |
| <input checked="" type="checkbox"/> Research |   |

By signing below, the applicant declares the following:

- (1) the truthfulness of all representations in their proposal;
- (2) the individual signing the form is entitled to submit the application on behalf of the applicant (if applicant is an entity or organization); and
- (3) the person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section II.K) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.

 JUL 1 1998

(Signature of Applicant)

Lynn E. Deetz  
Senior Research Administrator

## II. Executive Summary

### a. Title and Applicant Name:

Title: *Mapping Changes in Aquatic and Riparian Habitat Along Floodplain Rivers of the Sacramento-San Joaquin Valley to Prioritize Land Acquisition, Restoration Actions, and Flood Management.*

Applicant: The Regents of the University of California.

Principal Investigators: John Radke and Joe R. McBride.

### b. Project Description and Primary Biological Objectives:

This proposal is submitted to address topic 3, "Floodplain management and habitat restoration." This project will develop a method for acquiring, analyzing, and integrating different sources of historical hydrologic, fluvial geomorphological, vegetative, land use, and economic data. The future entity(ies) responsible for implementing the Ecosystem Restoration Program Plan (ERPP) will be able to use this methodology to prioritize land and easement acquisitions. This project will also provide a Geographical Information System (GIS) as a decision support and management tool to assist the integration and analysis of historical and contemporary data. The nature of this GIS and the methods developed in this research will provide multiple benefits to a number of problems facing the Bay-Delta. Although focused on floodplain management and habitat restoration, the approach evolved here targets a comprehensive solution where water supply, water quality, levee integrity, etc. could all be integrated into the model. The systems delivered here chart the course for comprehensive flood management. The GIS developed will also help future resource managers and decision-makers prioritize land and easement acquisitions that optimize restoration and flood management benefits.

The execution of the project involves analyzing historical maps, aerial photographs, and other sources to quantify historical changes in the extent of aquatic and riparian habitats in channels and floodplains of the Sacramento and San Joaquin rivers and major tributaries. This historical information will provide a baseline for restoring the ecological processes that sustain aquatic and riparian habitat. This baseline will accommodate prioritization of future acquisition and restoration efforts. The model, prioritizing future acquisition, is not naive and builds in parameters to threshold acquisition when money for this strategy is limited. The spatial patterns that result from this process become the baseline for alternative strategies for better management of the flood plane regime so CALFED's restoration objectives can be realized. The construction of setback levees could provide one of the best strategies of maintaining channel flood capacity while restoring meanders and river habitat. The GIS models produced accommodate a strategy for siting setback levees.

Floodplain/easement acquisition or setback levees can economically impact the local community by taking out of production good agricultural or residential land, thus reducing the tax base. In order to optimize a strategy so that economic impact is minimal and acquisition and restoration is effective, we propose to add to the GIS model economic information of existing land use. We will produce a least cost approach.

This information will be embedded in a Geographic Information System (GIS) framework. This framework will include a process for data acquisition, analysis and modeling. Data acquisition will include obtaining paper maps, aerial photographs and digital geographic data from various agencies, as well as ground truthing actual sites for data accuracy and verification. Data analysis

will include determination of the extent of landscape change detected from the earliest known condition to the current state. The GIS analysis will produce two strategies for identifying and carrying out restoration projects:

- 1) identification of those areas at greatest environmental risk and where restoration is most immediately needed (environmentally critical path); and
- 2) an analysis showing the least cost approach to restoring these areas back to their original condition (path of least economic resistance).

If much of the land selected for easement/acquisition in the past has been more market-oriented than restoration/floodplain management oriented, we provide an alternative method that the ERPP implementation entity can use for comprehensive flood management. Unlike strategies that are totally driven by economics and land rents where they first buy land parcels that are simply available for sale (or are relatively cheap), and then later are faced with negotiating the purchase of parcels (at a premium price) adjacent to their restoration sites to enlarge their habitat patches, our project will optimize the effectiveness of funds spent on acquisition and restoration in the Sacramento-San Joaquin system by providing a sound, scientific basis for prioritizing restoration projects. This project will help direct restoration efforts to projects and sites that would provide the greatest benefit, and help avoid projects that would be ineffective or low-priority. Thus, the project will benefit anadromous salmonids and other species, channel and floodplain habitats, and will provide essential information on several stressors, as listed in Table 1.

CALFED will benefit with:

- a. a demonstration of a method for acquiring, analyzing, and integrating different sources of historical information that the future implementation entity for the ERPP can use for prioritizing land/easement acquisitions for both restoration and flood management benefits, and
- b. a decision support and management tool (GIS) that the eventual ERPP implementation entity can use to help identify land/easement priorities.

In addition, the results of this research address some of the issues in topic 4, "Sediment Management", the least of which the GIS developed will form much of the base information needed for modeling.

**c. Approach/Tasks/Schedule:**

This project will involve map and aerial photo interpretation and ground-truthing to quantify historical changes in aquatic and riparian habitats for 12 river and floodplain reaches of approximately 10-miles each. In addition, it will refine procedures, identify necessary resources, and refine cost estimates for applying the method to remaining reaches in the Sacramento-San Joaquin River system. The project will continue for approximately fifteen months after the contract is finalized and work starts. The exact dates will be worked out by agreement with CALFED and the University of California, and will depend on the date the contract is finalized and its concurrence with the academic calendar.

The initial step will be final study reach selection, which will be based on a review of existing information and other similar, on-going studies, and selection of reaches representative of mainstem and tributary channels. For the selected study reaches, we will identify riparian vegetation units, channel habitats, bank conditions, and floodplain water bodies from current aerial photography. We will then conduct field work to ground-truth those interpretations and record

other relevant data. Progress reports will be submitted in twice during the study, with a final report and complete GIS model due at the end of the project, at times mutually agreed upon by the University of California and CALFED. The actual report due dates will depend upon the actual start date and project period.

**d. Justification for Project and Funding by CALFED:**

This project will increase the effectiveness of funds spent by CALFED on restoration and enhancement projects in the Sacramento-San Joaquin system by providing a sound, scientific basis for prioritizing restoration and flood management projects. This project will help direct restoration and flood management efforts to projects and sites that would provide the greatest benefit, and help avoid projects that would be ineffective or low-priority.

**e. Budget Costs and Third Party Impacts:**

The total budget requested for this project is \$353,222. There are no third-party impacts, except to the extent that restoration funding decisions under CVPIA and other programs may be affected by the results of this research.

**f. Applicant Qualifications:**

The principal investigators are well qualified to conduct this research. Each is a University of California professor with solid scientific qualifications, experience in managing large research projects, and experience in conducting research directly relevant to management decisions.

**g. Monitoring and Data Evaluation:**

The results of this research will provide an important baseline and historical perspective for monitoring and evaluation of actual restoration projects. We will obtain peer review of our selection of study reaches and detailed study plan, as well as for our May 1999 progress report.

**h. Local Support/Co-ordination with Other Programs/Compatibility with CALFED Objectives:**

The applicants are in contact with colleagues in other state and federal agencies with whom existing information can be shared and resources used optimally. The project is clearly compatible with CALFED objectives.

### III. Title Page

## Mapping Changes in Aquatic and Riparian Habitat Along Floodplain Rivers of the Sacramento-San Joaquin Valley to Prioritize Land Acquisition, Restoration Actions and Flood Management

#### *Applicant:*

The Regents of the University of California c/o Sponsored Project Office  
336 Sproul Hall #5940, Berkeley, CA 94720-5940  
Lynn E. Deetz, Sr. Research Administrator  
tel. 510-643-6113, fax: 510-642-8236, ldeetz@uclink.berkeley.edu

#### *Principal Investigators:*

John Radke, Associate Professor  
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Joe R. McBride, Professor  
Dept. of Environmental Science, Policy, and Management  
1452 Wurster Hall, University of California, Berkeley, CA 94720  
tel 510-642-3750, fax 510-643-5438, jrm@nature.berkeley.edu

#### *Administering Unit:*

Center for Environmental Design Research  
390 Wurster Hall #1839, Berkeley, CA 94720-1839  
tel. 510-642-2896, fax 510-643-5571

#### *type of organization/tax status*

public, non-profit educational institution  
tax exempt under Section 501(c)(e) of the IRS code

tax id number: 946002123

June 30, 1998

## IV. PROJECT DESCRIPTION

### a. Project Description and Approach

This project will develop basic information on historical changes in geomorphic processes and channel/floodplain habitats along major rivers in the Sacramento-San Joaquin River system that will permit rational prioritization of future restoration and flood management efforts. The project proposed here would be a first phase, in which results would be obtained for selected, key reaches, and the procedures for historical re-constructions are fully developed, resources identified, and time requirements estimated. If it is determined at the end of this project that the same information was needed for all floodplain river reaches in the Sacramento-San Joaquin system, the appropriate procedures and required efforts would be well understood, permitting continuation of the work by agencies or other specialists.

We will conduct a GIS-based analysis of historical maps, aerial photographs, and other sources to quantify historical changes in extent of aquatic and riparian habitats in channels and floodplains of the Sacramento and San Joaquin rivers and major tributaries. This information will be incorporated into a Geographic Information System (GIS) framework. This framework will include a process for data acquisition and analysis. Data acquisition will include obtaining and digitizing paper maps and aerial photographs and securing digital geographic data from various agencies, as well as ground truthing actual sites for data accuracy and verification.

*Aerial Photography* will be identified and obtained for the earliest and latest available dates, and for one or two intermediate years. Aerial photographic coverage of the Central Valley is excellent, extending back to the late 1930s or early 1940s with coverage by the Departments of Agriculture and Interior (usually at 1:24,000 scale), and with some flights flown for specific rivers by agencies such as the US Army Corps of Engineers (often at 1:12,000). Selection of flights for analysis will be based on date of photography in relation to construction of major water projects and other human activities, scale, clarity of photography, season, and flow at the time of photography (lower flows preferred to reveal more channel features). Where available, rectified ortho-photo quadrangle maps may be used as a mapping base.

This proposal assumes use of aerial photographs in the extensive holdings of the US Army Corps of Engineers, Sacramento District and other agencies. The costs for aerial photographs in the budget reflect estimated costs to obtain prints for which loan copies are not available, and to obtain prints of current photographs needed as base maps for field work.

Depending on the size of the channel and floodplain, mapping will be conducted at either 1:24,000 or 1:12,000 scale. Smaller-scale aerial photographs are unlikely to provide the resolution needed to identify patches of distinct vegetation stands and floodplain water bodies. In order to accurately identify features, photographs will be viewed stereoscopically using an 8 x magnifying ocular, permitting relative vegetation heights and textures, as well as floodplain water bodies, to be identified.

*Historical Maps* will likewise be analyzed for channel configuration, channel dimensions, and where indicated, floodplain features and wetland habitats. These maps are available from the sources mentioned above, and from other historical archives such as Bancroft Library of the University of California and the files of agencies such as the US Bureau of Reclamation in Denver. Similarly, land survey notes may provide useful information on historical river location and character in the 19th century (Galatowitsch 1990).

**Historical Channel Cross Sections** may be available for many of these rivers from US Geological Survey gauging stations or from flood hazard studies or river surveys preceding dam design. For example, the US Army Corps of Engineers prepared a detailed map and channel cross sections of the San Joaquin River near Fresno prior to construction of Friant Dam in 1942; several cross sections have been resurveyed by Cain (1997). Bed elevation changes are more difficult to document than planform changes because the necessary data are less available than those for planform changes, and because these data typically require more time to obtain and analyze. Thus, the principal focus of this study will be upon planform channel change and associated change in riparian and aquatic habitats.

**Channel Changes** will be quantified using the spatial analysis capabilities described below to yield (for each historical period analyzed) maps of channel change and summary variables relevant to aquatic and riparian habitat, such as total length of channel, sinuosity, length of various channel patterns, length of distinct riffle (mappable from aerial photographs), and channel depths and width/depth ratios (when channel depth data are available).

**Riparian and Aquatic Habitat** will be mapped and quantified for distinct historical periods from the sources described above. Specifically, for riparian habitat, age classes of riparian vegetation that can be identified and mapped from aerial photographs will be chosen and tested by mapping from the current aerial photographs and field testing the actual distributions on site, employing GPS units for accurate location. The categories used by Johnson (1992) of bare alluvium, pioneer-young, pioneer-old, transitional, and equilibrium (or a variant on these) will be used as the basis for an initial classification. However, the final classifications actually used will depend upon the vegetation communities actually present and mappable from aerial photographs.

Similarly, floodplain water bodies identifiable and mappable from aerial photographs (and historical maps) will be mapped. As a starting point, the terminology and classification developed for water bodies on the floodplain of the River Rhone (Amoros et al. 1982, Castella et al. 1984, Ward and Stanford 1995): *eupotamon* (main and side channels), *tributaries*, *parapotamon* (dead arms retaining connection to the main channel at their downstream end only), *paleopotamon* (abandoned meander bends, or oxbow lakes), *springbrooks*, and *plesiopotamon* (former braid channels no longer connected with the main channel, will be adapted for features occurring in the Sacramento-San Joaquin system. For example, the classification will need to include categories for rip-rapped banks, channelized reaches, instream and captured gravel pits, and other features of particular importance to these river systems. The area of wetted channel (a surrogate for total area of aquatic habitat) at the time of aerial photography will also be measured, although the comparability of this measure over time depends on the comparability of discharges at the times of aerial photography.

Thus, the extent and diversity of riparian and aquatic habitats along these floodplain rivers will be quantified over a 60-year period (longer where detailed historical maps exist). From the patterns of dam construction and other human alterations, the relative contribution of various human activities to habitat change will be assessed on a site-specific and watershed scale.

**Digitization** of channel configurations, riparian vegetation, and floodplain features will be accomplished using digitizing tablets in the College of Environmental Design GIS Laboratory,

*AEGIS*<sup>1</sup>, and a combination of Arc/Info 7.1.1 and Microstation 5.5, digital mapping software capable of accurately georeferencing data onto a digital mapped plane. By identifying known landmarks (e.g., road or canal intersections) in the aerial photographs and relating them to known monument points in the digital map projection (coordinates entered by hand or digitized from topographic maps), all photographs and maps can be converted to uniform scale. Moreover, the *AEGIS* rubber sheeting algorithms will be applied to minimize photographic distortion to within the error of landmark identification. In addition to this physical geographic data, we will incorporate data on land use and land value for the regions surrounding the study sites so that economic impact can be modeled. The resulting models will be incorporated into an Arc/Info GIS for further analysis. *AEGIS* has a library of data in digital form as USGS digital line graphs (DLGs) and digital elevation models (DEMs), with which the newly mapped data will be integrated.

*Embedding the Models Within a GIS Framework* will enable a variety of metrics to be applied which will measure the change in pattern, direction, area and structure over time. Both vertical and horizontal spatial analysis will be undertaken to accurately measure the magnitude and extent of landscape change over time. This will help us model and identify those areas at greatest environmental risk. The GIS will also facilitate computations of areas in various habitats in different time periods, and permit manipulations to test various management approaches. The excellent *AEGIS* facilities have the capability of digital capture, scanning, correction, image analysis, and vector and raster spatial modeling. The GIS analysis will produce two strategies for identifying and carrying out restoration projects:

- 1) identification of those areas at greatest environmental risk and where restoration is most immediately needed (environmentally critical path); and
- 2) an analysis showing the least cost approach to restoring these areas back to their original condition (path of least economic resistance).

#### **b. Scope of work**

The project proposed here will generate information on historical changes in aquatic and riparian habitats of the Sacramento-San Joaquin River and floodplain reaches of approximately 10-miles each. In addition, it will refine procedures, identify necessary resources, and refine cost estimates for applying the method to remaining reaches in the Sacramento-San Joaquin River system, so that ultimately a complete inventory of freshwater channel and floodplain habitats could be completed. Thus, the proposed project is self-contained, but would also serve as the first phase of a complete inventory project.

The project will begin as soon as possible after the contract is finalized and in coordination with the academic calendar. Initially, we will review recent and ongoing studies collecting data relevant to this project, and consult with those investigators, to select sites that will avoid duplication, or where appropriate, complement existing information. For the study reaches selected, the initial step will be identification of riparian vegetation units, channel habitats, bank conditions, and floodplain water bodies from current aerial photography for mainstem river reaches. We will then conduct field work to ground-truth those interpretations and record other relevant

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<sup>1</sup> A complete description of the *AEGIS* facilities is available on line at <http://www.ced.berkeley.edu/aegis>.

data. Aerial photo interpretation and ground-truthing will be undertaken on an iterative basis.

Two progress reports will be submitted on mutually agreed dates, and a final report at the end of the project. The progress reports will include draft maps and GIS products to illustrate progress. If the nature of the research results permits, complete results for some tributaries will be included in the progress reports. The final report and the complete GIS model, including protocols for expanding the study area to other reaches, will be submitted by 3/31/2000.

#### **c. Geographic boundaries of project**

The analysis of historical change in channels and floodplains will be conducted on twelve 10-mile river reaches in total, two each on the mainstem Sacramento and San Joaquin Rivers, and eight on major tributaries. Preliminary reach selections are indicated in Figure 1, but final reach selection will reflect input from agencies and other reviewers, and to avoid duplication with existing or ongoing studies. We will also identify maps, photographs, and other resources needed to complete mapping over the entire mainstem and most other tributaries as well, facilitating a second phase study to complete mapping these channels and floodplains if indicated.

#### **d. Expected benefits**

This project will increase the effectiveness of funds spent on floodplain land acquisition and restoration in the Sacramento-San Joaquin system by providing a sound, scientific basis for prioritizing acquisition and restoration projects. A demonstration of a method for acquiring, analyzing, and integrating different sources of historical information that the future implementation entity for the ERPP can use for prioritizing land/easement acquisitions for both restoration and flood management benefits will be delivered. A decision support and management tool (GIS) that the eventual ERPP implementation entity can use to help identify land/easement priorities will also be delivered.

This project will help direct efforts and sites that would provide the greatest benefit, thus benefiting the project will benefit anadromous salmonids and other species, channel and floodplain habitats, and providing essential information on several stressors, as listed in Table 1.

#### **e. Background and technical justification**

This research project addresses all or in part, all four objectives of the program as specified on pages 5-6 of the Proposal Solicitation Package. It develops a method to improve and increase aquatic and terrestrial habitats through restoration, while at the same time prioritizing acquisition strategies to reduce risk to land use and associated economic activities brought on by budget constraints. In short it provides alternative strategies for better management of the flood plane regime so CALFED's restoration objectives can be realized.

Under the Ecosystem Restoration Program Plan (ERPP), CALFED proposes to undertake a wide range of projects to purchase land, alter flow regimes or sediment supply, and physically modify channel and floodplain form. Similar actions are currently be taken under the Central Valley Project Improvement Act. While most of these projects are probably worthwhile, we have little basis to judge their relative importance without a clear understanding of the former extent of various habitats prior to significant human alterations. The effectiveness of habitat restoration actions will depend in large part on our ability to target the most important habitats, and this will

depend, in part, on our understanding of the nature and distribution of habitats under natural conditions. For example, by reconnecting a given side channel, have we restored 20%, 2%, 0.2%, or less of the original extent of this habitat? This historical context can then guide us in assigning priorities to future restoration projects.

Some alterations (such as hydraulic mining debris transport and deposition, initial levee construction and floodplain clearing) occurred prior to 1900, and thus pre-disturbance conditions can only be reconstructed using early maps. However, much channel and floodplain habitat alteration has occurred since the 1930s, and is thus captured in excellent detail on historical aerial photographs. This is illustrated for a reach of the Merced River, in which extensive floodplain habitats were eliminated by gold dredging and leveling for agriculture (Table 2).

The benefits of this project would be durable in that the project would increase the effectiveness of restoration actions undertaken by CALFED (and other agencies), and would help avoid projects that would likely to be ineffective. This is a new project.

#### **f. Monitoring and evaluation**

The results of this research project will provide an important baseline and historical perspective for monitoring and evaluation of actual restoration projects. We will obtain peer review of our selection of study reaches and detailed study plan, as well as for our May 1999 progress report. We will identify peer reviewers with help from the Center for Water and Wildland Resources of the University of California, Davis.

#### **g. Implementability**

The proposed project will be a research project that involves some field work but a majority of effort in laboratory analysis and GIS development. Thus, the project will be relatively easy to implement and will not depend heavily upon cooperation from landowners or other agencies.

## **Table 1. Project Benefits**

### ***Benefits***

The project will benefit these priority species and habitats:

#### **Priority species:**

San Joaquin and east-side tributaries fall-run chinook salmon  
winter run chinook salmon  
spring-run chinook salmon  
late-fall run chinook salmon  
steelhead trout  
other species of fish  
migratory birds

#### **Priority habitats:**

seasonal wetland and aquatic habitat  
instream aquatic habitat  
shaded riverine aquatic habitat

### ***Stressors***

The project will provide essential information on stressors as listed below:

#### **Floodplain changes**

hydrological and physical isolation of floodplain  
isolation of floodplain water bodies  
physical alteration of floodplain features

#### **Channel form changes**

Direct physical alteration of channel form  
Channel adjustments to dams and other human alterations  
Reduced meandering  
Isolation and elimination of side channels  
Reduction of gravel recruitment  
Loss of existing riparian vegetation

#### **Water quality**

Increased contaminants and nutrient/carbon input  
(by virtue of changes in floodplain vegetation)

#### **Water temperature**

Increased water temperature  
(by virtue of changes in riparian shading)

**Table 2. Proposed Study Channels**

*(all sites to in alluvial reaches, final selection to await review of existing data availability and complementarily to current and ongoing studies)*

Sacramento River in meandering reach near Hamilton City  
Sacramento River in leveed reach near Feather River confluence  
Feather River  
Yuba River  
Butte Creek  
Cottonwood Creek  
Cache Creek

San Joaquin River near confluence with Stanislaus  
Merced River  
Tuolumne River  
Mokelumne River  
Marsh Creek (or other west-side tributary)

## References Cited

Amoros, C., A.L. Roux, and G. Patou. 1982. "Les 'ensembles fonctionelles': des entites ecologiques qui traduisent l'evolution de l'hydrosysteme en integrant la geomorphologie et l'anthropisation" (exemple du Haut-Rhone francais). *Rev. Geogr. Lyon*. 57:49-62.

Cain, John Richard Jr. 1997. *Hydrologic and Geomorphic Changes to the San Joaquin River Between Friant Dam and Gravelly Ford and Implications for Restoration of Chinook Salmon (Oncorhynchus tshawytscha)*. Center for Environmental Design Research #CEDR-15-97, 162 pages.

Campbell, J.C., J. Radke, J.T. Gless and R.M. Wirtshafter. 1992. "An Application of Linear Programming and Geographic Information Systems: Crop Allocation in Antigua." *Environment and Planning B*, 24:535-549.

Castella, E., M. Richardot-Coulot, P. Richoux. 1984. "Macroinvertebrates as 'describers' of morphological and hydrological types of aquatic ecosystems abandoned by the Rhone River." *Hydrobiologia*. 119:219-225.

Galatowitsch, S. M. 1990. "Using the original Land Survey Notes to reconstruct Pre-settlement Landscapes in the American West," *Great Basin Naturalist*. 50(2):181-191.

Johnson, W.C. 1992. "Dams and riparian forests: case study from the upper Missouri River." *Rivers*. 3:229-242.

Radke, J. 1997. "Detecting Potential Erosion Threats to the Coastal Zone: St. John, USVI." *International Journal of Marine Geodesy*. 20:235-254.

Radke, J. 1995. "Modeling Urban/Wildland Interface Fire Hazards within a Geographic Information System." *Geographic Information Sciences*, 1:1:7-20.

## V. Costs and Schedule to Implement Proposed Project

### a. Budget Costs

Assumes a start date of 1 September 1998, must be adjusted for actual start date.

	Yr. One <i>9/1/98-8/31/99</i>	Yr. Two <i>9/1/99-3/31/00</i>	Total (19 mos) <i>2 Yr Project</i>
<b>Salaries (Direct Labor):</b>			
Radke: Assoc Prof III/IV--1.5 summer months	\$6,673	\$3,558	\$10,231
McBride: Prof V (o/s)--donated	\$0	\$0	\$0
Associate Specialist I @100%	\$42,942	\$15,153	\$58,095
Associate Specialist II @ 50%	\$22,963	\$12,094	\$35,057
Graduate Student Researchers--4 students	\$59,166	\$16,023	\$75,189
Administrative Assistant II	\$5,422	\$1,867	\$7,289
<b>Subtotal Salaries</b>	<b>= \$137,166</b>	<b>\$48,695</b>	<b>\$185,861</b>
<b>Fringe Benefits</b>	<b>= \$32,118</b>	<b>\$10,006</b>	<b>\$42,124</b>
<b>Service Contracts:</b>	<b>= \$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Miscellaneous/Other Direct Costs (Supplies and Expenses):</b>			
Aerial photography	= \$5,000	\$0	\$5,000
Computer printer charges 250 plots @ \$8	= \$2,000	\$0	\$2,000
Communications: telephone, fax, postage 16 mos @ \$30	= \$360	\$120	\$480
Photocopying 16 mos @ \$20	= \$240	\$80	\$320
Report production/distribution	= \$0	\$2,000	\$2,000
<b>Subtotal Supplies and Expenses</b>	<b>\$7,600</b>	<b>\$2,200</b>	<b>\$9,800</b>
<b>Miscellaneous/Other Direct Costs (Travel: field work and meetings):</b>			
Private auto: mileage 5,100 miles @ \$0.325	= \$1,463	\$195	\$1,658
Rental car: 12 days @ \$50	= \$500	\$100	\$600
Lodging/meals: average 32 days @ \$70	= \$2,100	\$140	\$2,240
<b>Subtotal Travel</b>	<b>\$4,063</b>	<b>\$435</b>	<b>\$4,498</b>
<b>TOTAL DIRECT COSTS</b>	<b>= \$180,947</b>	<b>\$61,336</b>	<b>\$242,283</b>
<b>Indirect Costs: Student fee remission not subject to indirect costs</b>			
on campus, research 50.40% of \$220,117	= \$82,240	\$28,699	\$110,939
<b>TOTAL DIRECT AND INDIRECT COSTS</b>	<b>= \$263,187</b>	<b>\$90,035</b>	<b>\$353,222</b>

This project budget is not broken down in to tasks or subtasks. Due to the nature of the project, it is not possible to identify discrete tasks as might be appropriate for construction projects. Many of the tasks are conducted simultaneously (for example, digitizing will occur throughout the project and it may be necessary to return to the field at any time to verify data).

It will not be possible to conduct this project without funding from CALFED. No University funds are available to conduct the project, and no other sources have been identified to date. The project as structured would require full funding from CALFED for the budget as requested. It may be possible to restructure the project to allow CALFED funding in phases, however there would be a major loss in efficiency resulting in a much higher overall cost for the project.

**b. Schedule milestones:**

For the purpose of this schedule and budget, the project was assumed to begin 1 September 1998. However, we understand that it is difficult to predict the actual start date and that for last round of Category III projects, the period between proposal due date and final contracts will be approximately one year. However, assuming for illustrative purposes, as 1 September 1998 start date, progress reports will be submitted by 30 May 1999 and 30 September 1999. The progress reports will include draft text, maps, tables and charts produced from the GIS analysis to illustrate project progress. If the nature of the research results permits, complete results for some tributaries will be included in the progress reports. The final report and the complete GIS model, including protocols for expanding the study area to other reaches, will be submitted by 31 March 2000.

**c. Third party impacts:**

There are no third-party impacts, except to the extent that restoration funding decisions under CVPIA and other programs may be affected by the results of this research.

## **VI. Applicant Qualifications**

### **Planned Staff Organization**

The project will be administered under the direction of the two principal investigators. Day-to-day management of project tasks will be the responsibility of a full-time specialist hired for the project. This person will coordinate the efforts of another specialist working 50% time on the project and the efforts of four graduate student research assistants. The full-time staff person will have a strong background in natural sciences and experience in managing research projects (possibly a post-doctoral fellow). This person will be responsible for compiling historical materials, coordinating field work, training and supervising the graduate student research assistants in mapping and digitizing, and insuring that the results are accurate and compatible with integration into the GIS system. The 50% staff person will be an experienced GIS researcher, who will have responsibility for managing the GIS analysis.

The graduate student research assistants will be drawn from the pool of very qualified graduate students in natural sciences and GIS from a variety of departments, such as Landscape Architecture and Environmental Planning, Geography, and Environmental Science, Policy, & Management.

### **Principal Investigators**

The principal investigators are well qualified to conduct this research. Each is a University of California professor with solid scientific qualifications, experience in managing large research projects, and experience in conducting research directly relevant to management decisions. They have worked collaboratively on a variety of research and teaching projects, including research projects in California and China.

### **John Radke**

John Radke is a geographic information scientist with extensive experience in the Bay-Delta region. He conducted research on landscape risk management projects (Radke, 1995) in the Bay area, economic land use optimization projects (Campbell et al, 1992), and landscape erosion hazards (Radke, 1997), all using GIS in the role of decision support systems. Over the past decade, Dr. Radke has undertaken a number of GIS projects dealing with landscape, risk and erosion issues. He is an authority on the design, construction and implementation of GIS and has established several facilities to support such research. He is an expert in the characterization or recognition of form and pattern in data, advancing our ability to better understand spatial structure, morphology, function and distribution; and aid in the construction of better models which help us simulate, planning and design of our world.

He is the Director of the campus wide Geographic Information Science Center at Berkeley ([www.gisc.berkeley.edu](http://www.gisc.berkeley.edu)), directs the Applied Environmental Geographic Information Science laboratory ([www.ced.berkeley.edu/aegis](http://www.ced.berkeley.edu/aegis)), and teaches the main courses in Geographic Information Science on the campus. He was a founding member of REGIS and CAMFER and is the current secretary for the University Consortium for Geographic Information Science ([www.ucgis.org](http://www.ucgis.org)), the national organization of universities conducting basic and applied research in GI Science.

**Joe McBride**

Joe McBride is a forester who has consulted in the fields of urban forestry, vegetation analysis, and management for over 25 years. He has served as a consultant to federal, state, regional, county, and city governmental agencies, private landscape and land use planning firms, citizen groups, and private land owners. He is a registered professional forester in California (license #1306). His research is concerned with (1) urban forestry, (2) the influence of land management on forest succession, (3) regeneration of California oaks, and (4) riparian woodland ecology.

He is currently the Chair of the Department of Environmental Science, Policy, and Management in the college of natural resources, and has chaired the Department of Landscape Architecture. He has won a number of awards including: Merit Award for Stanford University Vegetation Management Plan (ASLA 1983), Resources Preservation Award for San Francisco Presidio Study (National Resources Council 1987), Distinguished Teaching Award (University of California 1991), Carl Alwin Schenck Award for Distinguished Teaching (Society of American Foresters 1992), Honor Award for Sutro Baths Historic Restoration Plan (ASLA 1993), Donald P. Gasser Award for Distinguished Contributions to Forestry Education (University of California 1997), and Fellow Society of American Foresters (1997).

## **VII. Compliance With Standard Terms and Conditions**

Agreement No. \_\_\_\_\_

Exhibit \_\_\_\_\_

**STANDARD CLAUSES -  
INTERAGENCY AGREEMENTS**

**Audit Clause.** For contracts in excess of \$10,000, the contracting parties shall be subject to the examination and audit of the State Auditor for a period of three years after final payment under the contract. (Government Code Section 8546.7).

**Availability of Funds.** Work to be performed under this contract is subject to availability of Category III funds through the State's normal budget process.

**Interagency Payment Clause.** For services provided under this agreement, charges will be computed in accordance with State Administrative Manual Section 8752.

**Termination Clause.** Either State agency may terminate this contract upon 30 days advance written notice. The State agency providing the services shall be reimbursed for all reasonable expenses incurred up to the date of termination.

## U.S. Department of the Interior

**Certifications Regarding Debarment, Suspension and  
Other Responsibility Matters, Drug-Free Workplace  
Requirements and Lobbying**

Persons signing this form should refer to the regulations referenced below for complete instructions:

**Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions - The prospective primary participant further agrees by submitting this proposal that it will include the clause titled, "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions. See below for language to be used or use this form for certification and sign. (See Appendix A of Subpart D of 43 CFR Part 12.)**

**Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions - (See Appendix B of Subpart D of 43 CFR Part 12.)**

**Certification Regarding Drug-Free Workplace Requirements - Alternate I. (Grantees Other Than Individuals) and Alternate II. (Grantees Who are Individuals) - (See Appendix C of Subpart D of 43 CFR Part 12)**

Signature on this form provides for compliance with certification requirements under 43 CFR Parts 12 and 18. The certifications shall be treated as a material representation of fact upon which reliance will be placed when the Department of the Interior determines to award the covered transaction, grant, cooperative agreement or loan.

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**PART A: Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions**

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*CHECK \_\_\_ IF THIS CERTIFICATION IS FOR A PRIMARY COVERED TRANSACTION AND IS APPLICABLE*

- (1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency;
  - (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
  - (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
  - (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
- (2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

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**PART B: Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions**

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*CHECK \_\_\_ IF THIS CERTIFICATION IS FOR A LOWER TIER COVERED TRANSACTION AND IS APPLICABLE*

- (1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
- (2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

DI-2010  
June 1995  
(This form replaces DI-1963, DI-1964,  
DI-1965, DI-1966 and DI-1967)

**PART C: Certification Regarding Drug-Free Workplace Requirements**

*CHECK \_\_\_ IF THIS CERTIFICATION IS FOR AN APPLICANT WHO IS NOT AN INDIVIDUAL*

**Alternate I. (Grantees Other Than Individuals)**

**A. The grantee certifies that it will or continue to provide a drug-free workplace by:**

- (a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
- (b) Establishing an ongoing drug-free awareness program to inform employees about—
  - (1) The dangers of drug abuse in the workplace;
  - (2) The grantee's policy of maintaining a drug-free workplace;
  - (3) Any available drug counseling, rehabilitation, and employee assistance programs; and
  - (4) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;
- (c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);
- (d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will —
  - (1) Abide by the terms of the statement; and
  - (2) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;
- (e) Notifying the agency in writing, within ten calendar days after receiving notice under subparagraph (d)(2) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification numbers(s) of each affected grant;
- (f) Taking one of the following actions, within 30 calendar days of receiving notice under subparagraph (d)(2), with respect to any employee who is so convicted —
  - (1) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
  - (2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;
- (g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a) (b), (c), (d), (e) and (f).

**B. The grantee may insert in the space provided below the site(s) for the performance of work done in connection with the specific grant:**

Place of Performance (Street address, city, county, state, zip code)

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Check \_\_\_ if there are workplaces on file that are not identified here.

**PART D: Certification Regarding Drug-Free Workplace Requirements**

*CHECK \_\_\_ IF THIS CERTIFICATION IS FOR AN APPLICANT WHO IS AN INDIVIDUAL*

**Alternate II. (Grantees Who Are Individuals)**

- (a) The grantee certifies that, as a condition of the grant, he or she will not engage in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance in conducting any activity with the grant;
- (b) If convicted of a criminal drug offense resulting from a violation occurring during the conduct of any grant activity, he or she will report the conviction, in writing, within 10 calendar days of the conviction, to the grant officer or other designee, unless the Federal agency designates a central point for the receipt of such notices. When notice is made to such a central point, it shall include the identification number(s) of each affected grant.

DI-2010  
June 1995  
(This form replaces DI-1953, DI-1954,  
DI-1955, DI-1956 and DI-1963)

**PART E: Certification Regarding Lobbying  
Certification for Contracts, Grants, Loans, and Cooperative Agreements**

**CHECK IF CERTIFICATION IS FOR THE AWARD OF ANY OF THE FOLLOWING AND THE AMOUNT EXCEEDS \$100,000: A FEDERAL GRANT OR COOPERATIVE AGREEMENT; SUBCONTRACT, OR SUBGRANT UNDER THE GRANT OR COOPERATIVE AGREEMENT.**

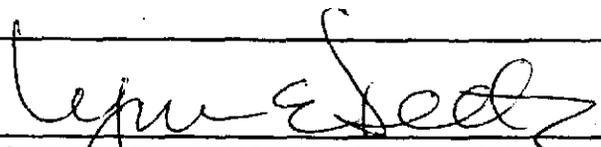
**CHECK IF CERTIFICATION IS FOR THE AWARD OF A FEDERAL LOAN EXCEEDING THE AMOUNT OF \$150,000, OR A SUBGRANT OR SUBCONTRACT EXCEEDING \$100,000, UNDER THE LOAN.**

The undersigned certifies, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

As the authorized certifying official, I hereby certify that the above specified certifications are true.



SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL

Lynn E. Dretz  
Senior Research Administrator

TYPED NAME AND TITLE

DATE JUN 1 1998

DI-2010  
June 1995  
(This form replaces DI-1863, DI-1864,  
DI-1865, DI-1866 and DI-1867)

**John D. Radke**

Department of Landscape Architecture and Environmental Planning  
and  
Department of City and Regional Planning  
and  
Department of Geography  
University of California, Berkeley, CA 94720

**EDUCATION:**

University of British Columbia, Vancouver, B.C. Ph.D. / 1983  
Wilfrid Laurier University, Waterloo, Ontario Hons. B.A./1975, M.A./1977

**EMPLOYMENT:**

Assistant Professor, Associate Professor, Department of Landscape Architecture and Environmental Planning, and Department of City and Regional Planning, and Department of Geography.  
University of California. 1991-present.

**TEACHING EXPERIENCE:**

- University of California, Berkeley, CA Quantitative Methods, Geographic information Systems, Computer Mapping, Computer Aided Design, Digital Terrain Modeling, Spatial Modeling
- Univ of Pennsylvania, Philadelphia, PA Computerized Ecological Planning, Computer Mapping, Digital Terrain Modeling, Geographic Information Systems
- Temple University, Philadelphia, PA: Geographic Information Systems
- Wilfrid Laurier University, Waterloo, Ontario: Geographic Information Systems, Statistics, Quantitative Methods, Urban Spatial Behavior.

**PRACTICE EXPERIENCE:**

- Geographic Information Science Center, UC Berkeley: Director
- National Aeronautics Space Administration (NASA): Consultant
- Expert Information Systems, Inc.: GIS Director
- Applied Environmental GIS Laboratory (AEGIS), University of California, Berkeley, CA:  
Lab .Director
- Laboratory for Geographical Information Systems (TGIS) Engineering, Computer Science & Architecture, Temple University: Lab. Director
- AGRA Engineering Group Limited, Toronto, Ontario: Information Scientist

**PROFESSIONAL & ACADEMIC ACTIVITIES:** (the last five years)

- Secretary, Executive Committee, Membership Committee, Web Committee, Editor Research Priorities, University Consortium for Geographic Information Science (A National Organization), and
- Editorial Board Member, Geographic Information Sciences (An International Journal).

### **Publications, Projects and/or Reports (recent)**

- \* "Detecting Potential Erosion Threats to the Coastal Zone: St. John, USVI" " *International Journal of Marine Geodesy*. 1997, Vol. 20, pp. 235-254.
- \* "Boundary Generation for Dissagregate Point Data With Possible Applications to Ecological Classification" accepted, *GEOMATICA*.
- \* "A Strategy for Detecting Spatial Change in Landscapes in the Absence of Accurate Geopositioning" is in review at: *Landscape and Urban Planning*.
- \* "Spatial Decompositions and Detecting the Bounding Hull of a Set of Points" accepted with minor revisions by: *The Canadian Geographer*.
- \* "A Spatial Decision Support System (SDSS) to Aid The Vegetation Management Plan in the East Bay Hills", *ESRI Map Book*, 1995, Vol. 10, p 46.
- \* "A Spatial Decision Support System for Urban/Wildland Interface Fire Hazards", *Proceedings of the 15th Annual ESRI User Conference*, 1995.
- \* "Modeling Urban/Wildland Interface Fire Hazards within a Geographic Information System" in *Geographic Information Sciences*, 1995, Vol. 1, No.1, pp. 1-14.
- \* "History of the Human Ecology of the Delaware Estuary", with Jon Berger and John Sinton, a report for the Delaware River Basin Commission (peer reviewed and accepted), February 1994.
- \* "Phase III: Regional Ground Water Assessment Using Geographic Information Systems", a report for the United States Environmental Protection Agency, Region III, May 1993.
- \* "A Database Prototype For A National Ecological Inventory", with Ian L. McHarg, Jon Berger and Kathleen Wallace, a report for the United States Environmental Protection Agency (peer reviewed and accepted), September 1992.
- \* "An Application of Linear Programming and Geographic Information Systems: Crop Allocation in Antigua" with J.C. Campbell, J.T. Gless and R.M. Wirtshafter, in *Environment and Planning A*, Fall 1992, Vol. 24, pp. 535-549.

### **Papers Presented (the last four years)**

- "Enhancing The Application Of The Revised Universal Soil Loss Equation (RUSLE) Through The Use Of A Digital Terrain Model (DTM)", *CPGIS Informatics '96*, West Palm Beach, Florida, April 27, 1996.
- "NASA's Mission: Workforce 2005", Invited Discussant, Charlotte, North Carolina, April 12, 1996.
- "The role of the World Wide Web and HTML in delivering GIS in Higher Education", *Association of American Geographers 92nd Annual Meeting*, Charlotte, North Carolina, April 10, 1996.
- "University Consortium for Geographic Information Science (UCGIS): a Draft Brochure", with A. Calkins, *GIS/LIS '95*, November 14, 1995.
- "A Report on Spatial Information Infrastructure in the City of Berkeley", Information Systems Group, *City of Berkeley*, with Bruce Appleyard, August, 1995.
- "The Integration of Geographic Information Systems, Global Positioning Systems and Remote Sensing in Developing Fire Risk Models", Invited Lecture, Department of Landscape Architecture and Environmental Technology, Universitas Trisakti, Jakarta, Indonesia, June 6, 1995.
- "Predicting Potential Fire Risk on the Urban Fringe using Geographic Information Systems", Invited Speaker, *Beijing Urban GIS Workshop*, Institute of Remote Sensing and GIS, Peking University and CPGIS, Beijing, China, June 4, 1995.
- "A Spatial Decision Support System for Urban/Wildland Interface Fire Hazards", *15th Annual ESRI User Conference*, Palm Springs, CA. May, 1995.

- “GIS and the California Central Valley”, Center for Sustainable Resource Developments, UC Berkeley, April, 24, 1995 (Invited Discussion).
- “The role of GIS in Environmental Planning”, *Environmental Spirit Conference*, April 15, 1995. (Invited Lecture).
- “GIS in Geographic Inquiry”, Department of Geography, UC Berkeley, December 9, 1994. (Invited Discussion).
- “Virtual College of Environmental Studies”, *Environmental Council Fall Colloquium Series*, November 9, 1994. (Invited discussion).
- “Practice and the role of Geographic Information Systems”, *Professional Practice Seminar Series*, LA160, Department of Landscape Architecture, UC Berkeley, October 20, 1994. (Invited Lecture).
- “An Alternate Approach To Emergency Response: The Use Of GIS To Plan And Manage Strategies For Fighting Fires In The Eastbay Hills”, *Bay Area Automated Mapping Association (BAAMA)*, October 19, 1994. (Invited Lecture).
- “Landscape Characterization and the Use of Geographic Information Systems in Planning”, LA130, Department of Landscape Architecture, UC Berkeley, October 12, 1994. (Invited Lecture).
- “An Alternate Approach to Emergency Response System: The Use of GIS to Plan and Manage our Environment”, *REGIS Seminar Series on GIS and the Environment*, September 29, 1994. (Invited Lecture).
- “Design of the Decision Support System for Vegetation Management in the East Bay Hills”, Colloquium in Landscape Architecture and Environmental Planning, UC Berkeley, August 31, 1994. (Invited Lecture).
- “Towards a National Emergency Management Information System”, *Lawrence Livermore National Laboratory*, August 26, 1994. (Invited Lecture).
- “The Klamath Province Bioregion GIS Project”, with Yvonne Everett, *Association of American Geographers 90th Annual Meeting*, March 30, 1994.
- “A Method for Detecting Spatial Change in Landscapes Where Geopositioning is Problematic”, with Yvonne Everett, *Annual Landscape Ecology Symposium*, March 25, 1994.
- “GIS instruction in a UNIX computing environment”, Instructional Technology Board of the Chancellor's Academic Planning Board, UC Berkeley, March 18, 1994. (Invited Lecture).
- “To Develop a Meta Data Dictionary for the Klamath Province”, Santa Rosa, CA., November 18, 1993; Eureka, CA., November 19, 1993; Redding, CA., December 10, 1993; Santa Rosa, CA., February 3, 1994; Eureka, CA., February 4, 1994; Redding, CA., April 15, 1994.

**Joe R. McBride**  
Department of Environmental Science, Policy, and Management  
and  
Department of Landscape Architecture and Environmental Planning  
University of California, Berkeley, CA 94720

**Education:**

B.S. (Forestry) - University of Montana - 1960  
M.S. (Forestry) - University of California, Berkeley - 1964  
Ph.D. (Botany) - University of California, Berkeley - 1969

**Employment:**

Assistant Professor. Department of Forestry. Iowa State University. 1969-70.  
Assistant Professor, Associate Professor, Professor. Department of Forestry and  
Department of Landscape Architecture. University of California. 1970-present. Chair,  
Department of Forestry, University of California, 1986-89; Chair, Department of  
Environmental Science, Policy, and Management, University of California, 1996-present.

**Teaching:**

Courses in ecology for landscape architects and land use planners; forest ecology;  
vegetation management; urban forestry; regional landscape analysis; native plant  
materials for landscaping.

**Research:**

Studies concerned with (1) urban forestry, (2) the influence of land management on  
forest succession, (3) regeneration of California oaks, and (4) riparian woodland  
ecology.

**Professional Experience:**

Worked as a consultant in the fields of urban forestry, vegetation analysis, and  
management for over 25 years. Served as a consultant to federal, state, regional,  
county, and city governmental agencies, private landscape and land use planning firms,  
citizen groups, and private land owners. Registered professional forester in California  
(license #1306).

**Professional Affiliations:**

American Association for the Advancement of Science  
American Society of Landscape Architects  
California Botanical Society  
Ecological Society of America  
International Society for Landscape Ecology  
Society of American Foresters  
Society for Restoration Ecology

**Awards:**

Merit Award for Stanford University Vegetation Management Plan. ASLA. 1983  
Resources Preservation Award for San Francisco Presidio Study. National Resources Council. 1987  
Distinguished Teaching Award. University of California. 1991  
Carl Alwin Schenck Award for Distinguished Teaching. Society of American Foresters. 1992  
Honor Award for Sutro Baths Historic Restoration Plan. ASLA. 1993  
Donald P. Gasser Award for Distinguished Contributions to Forestry Education. University of California. 1997  
Fellow Society of American Foresters. 1997

**Publications:**

Over 200 articles and research reports

**Community Service:**

Natural Heritage Advisory Committee, DFG, Sacramento, CA - 1980 to 1982  
Blue Ribbon Fire Management Committee, EBRPD, Oakland, CA - 1982 to 1983  
Task Force on Prescribed Burning in the National Parks, NPS - 1986 to 1987  
Task Force on Biological Diversity, SAF, Washington, DC - 1987 to 1989  
Natural Resource Advisor Amazanga Institute, Puyo, Ecuador - 1991-1994  
Advisory Task Force on Vegetation Management in the National Parks of China, Chinese Academy of Forestry, Beijing - 1992-94  
California Biodiversity Council, DFG, Sacramento, CA - 1996-97  
Science Advisory Committee for the Southwestern Willow Flycatcher, USFWS and US Army Corps of Engineers, Sacramento, CA. 1997-present