

E1-244

# MERCED RIVER CORRIDOR RESTORATION PLAN

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July 28, 1997

## EXECUTIVE SUMMARY

**PROJECT DESCRIPTION AND ECOLOGICAL OBJECTIVES:** The proposed project will develop a thorough understanding of existing biological, ecological, and geomorphic conditions in the Merced River corridor downstream of the Crocker-Huffman Dam and will develop and implement a comprehensive, scientifically-based restoration and monitoring strategy. The project will be conducted in three phases: Phase I - Development of the Corridor Restoration Plan; Phase II - CEQA/NEPA Compliance; and Phase III - Specific Site Design, Permitting, Implementation, and Monitoring. This proposal includes Phase I. Funds for Phases II and III will be sought in future CALFED funding cycles and through other restoration fund sources.

The ecological objective is to create a self-maintaining, properly functioning riverine ecosystem by restoring large-scale geomorphic and ecological processes and attributes in the lower Merced River, including sediment supply and transport, geomorphically functional channel and floodplain morphology, floodplain connectivity, and functional, high-quality riparian habitat. Implementation of the plan will restore degraded riverine habitat and habitat connectivity for numerous native species, including chinook salmon.

In Phase I, the Stillwater Team will coordinate with stakeholders and conduct technical analyses to develop a feasible and implementable Corridor Restoration Plan. In Phase II, documentation necessary for compliance with NEPA and CEQA at the programmatic level will be completed and will likely include the preparation of a programmatic EIR/EIS. In Phase III, site-specific restoration projects will be implemented.

**APPROACH, TASKS, AND SCHEDULE:** The proposed plan will apply a process-based ecosystem approach, combined with current and future land use considerations and local outreach, to develop specific projects that are implementable in the current social context.

The study will be accomplished through twelve tasks: (1) identify factors limiting the chinook salmon population, (2) map current channel planform, (3) update hydrologic analysis (Vick 1995), (4) assess sediment supply and transport, (5) evaluate geomorphically functional channel and floodplain morphology, (6) assess and map current riparian vegetation, (7) assess constriction of floodplains by levees, (8) identify social, institutional, infrastructure, and legislative opportunities and constraints, (9) coordinate with local and state stakeholders, (10) develop restoration strategy and monitoring program, (11) identify potential funding sources, and (12) develop site-specific conceptual designs for the 2 highest priority projects.

Anticipated time to complete the study is 16 months.

**JUSTIFICATION FOR PROJECT AND FUNDING BY CALFED:** The Merced River has experienced significant alteration of its sediment supply, flow regime, and morphology, which have resulted in the loss and degradation of habitat for native species, particularly chinook salmon. To date, no comprehensive restoration strategy has been developed for the Merced River. Instead, site-specific projects that have not sufficiently considered the role of geomorphic processes have been implemented, with little success.

This project proposes to develop and implement a long-term, large-scale restoration program that will identify and restore critical geomorphic processes that create and maintain healthy riverine ecosystems. Such a strategy will ensure the continuing long-term effectiveness of site-specific restoration projects and provide long-term benefits to ecosystem processes, riverine habitats, and native species.

**BUDGET COSTS AND THIRD PARTY IMPACTS:** The estimated total cost of Phase I of the project is \$522,961. Costs for Phases II and III will be dependent upon the outcome of Phase I.

The proposal includes coordination with local landowners, the Merced Irrigation District (MID), and state and local agencies to ensure that all potential third party impacts are identified and avoided. Plan development and project implementation may provide employment opportunities in the study area.

**APPLICANT QUALIFICATIONS:** The project team is composed of three consulting firms specializing in geomorphic and ecological analyses and experienced in implementation of restoration projects in the San Joaquin Basin, particularly on the Tuolumne and Merced rivers. Team members also specialize in public coordination, land use planning, and environmental compliance. Stillwater Sciences is a interdisciplinary firm with proven expertise in geomorphic analysis, fisheries ecology, wildlife biology, riparian and wetland ecology, and long-term natural resource planning. McBain and Trush specializes in assessing and mitigating the geomorphic and ecological impacts of dams on riverine ecosystems, and is currently preparing a similar restoration plan for the Tuolumne River. EDAW, Inc. has extensive experience in planning and regulatory compliance, particularly with large, multidisciplinary resource studies. EDAW has recently been involved in large-scale restoration planning and CEQA/NEPA compliance on several rivers in central California. The project team includes a scientific advisory committee consisting of recognized experts in the fields of geomorphology, aquatic and riparian ecology, and statistics.

**MONITORING AND DATA EVALUATION:** The restoration plan will include specific guidelines and methods for monitoring and evaluating implemented restoration projects as well as a long-term, basin-wide monitoring program to evaluate the effectiveness of the overall restoration plan.

**LOCAL SUPPORT/COORDINATION WITH OTHER PROGRAMS/COMPATIBILITY WITH CALFED OBJECTIVES:** The project includes informal agency and landowner contacts as well as formal public outreach to inform people about the project and solicit public input. Currently, no organized groups exist that focus on watershed planning or restoration on the Merced River. Development of this proposal has included coordination with CDFG, CDWR, Merced Irrigation District (MID), Merced County Planning Department, and Merced County Association of Governments. Each of these agencies has expressed interest in and a need for this project and will cooperate in its development. A letter of support from the Merced County Planning Department is attached in Appendix E.

The project will be coordinated with and will provide technical information and data to ongoing restoration programs and studies being conducted by CDFG, CDWR, and MID, including actions currently funded under the Four Pumps Agreement and potentially through CALFED. In addition, CDFG is currently coordinating with MID to conduct a long-term study of chinook salmon. The analyses completed under this proposal will support and complement this study.

The proposed project is consistent with CALFED objectives. In particular, the project will improve and increase productive and functioning riverine habitats that support native wildlife and fish species and will contribute to the health and size of San Joaquin fall-run chinook salmon population.

MERCED RIVER CORRIDOR  
RESTORATION PLAN

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*Technical and  
Financial  
Contact persons:* See contacts above. Primary contact is Jennifer Vick.

*Participants/Collaborators  
in Implementation:* The Stillwater Team proposes to collaborate with the CDFG, CDWR, Merced Irrigation District (MID), Merced County Planning Department, Merced County Association of Governments, and local landowners. The Team coordinated with each of the above-listed agencies and MID during the preparation of this proposal.

*RFP Project Group Type:* Other Services

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July 28, 1997

## PROJECT DESCRIPTION

**A. PROJECT DESCRIPTION AND APPROACH:** The proposed project will develop and implement a comprehensive strategy for restoring the Merced River corridor downstream of the Crocker-Huffman Dam. The project will be conducted in three phases: Phase I - Development of the Corridor Restoration Plan; Phase II - CEQA/NEPA Compliance; and Phase III - Specific Site Design, Permitting, Implementation, and Monitoring. This proposal includes Phase I. Funds for Phases II and III will be sought in future CALFED funding cycles and through other restoration fund sources.

In Phase I, the Stillwater Team will develop a comprehensive understanding of past and current ecological and geomorphic processes and prepare a restoration plan for the Merced River corridor. This phase is not just a planning effort but a rigorous state-of-the-art, scientific study of geomorphic and ecological processes which will provide the critical scientific foundation for a complete and successful restoration. Development of the restoration plan will utilize a process-based, ecosystem approach, aimed at developing recommendations for restoration actions that will improve or restore geomorphic and ecological processes and attributes in the river corridor. The plan will be based on the model illustrated in Figure 1, in which geomorphic processes (governed primarily by sediment supply and streamflow) determine the quality, quantity and distribution of physical habitat. It will build on work already completed by members of the Stillwater Team on the Merced and Tuolumne rivers (Vick 1995; Kondolf et al. 1996a, 1996b; see EA Tuolumne River Study Bibliography Appendix B) as well as studies conducted for the California Department of Fish and Game (CDWR 1994; JSA 1995; WEST Consultants 1995; USFWS 1997). The Team will utilize current technologies, including computer-based geographic information systems (GIS), to facilitate plan analysis and presentation.

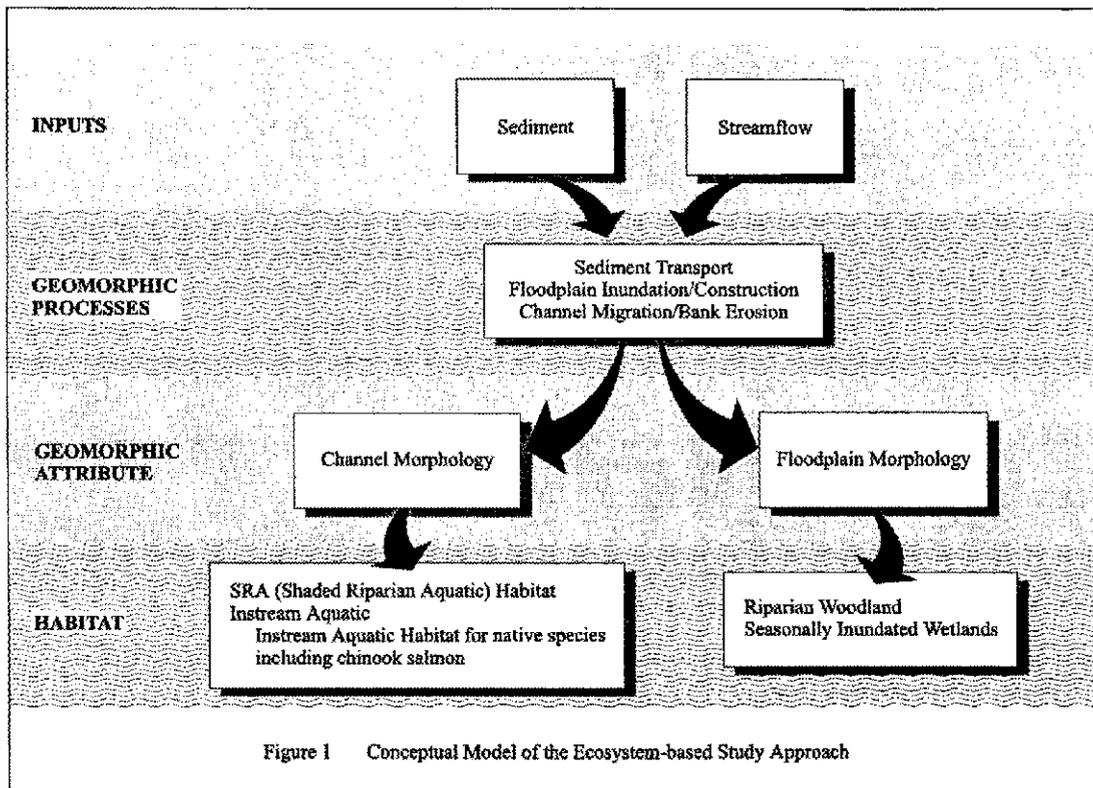
In Phase II, the Team will prepare documentation required for compliance with the California Environmental Quality Act and the National Environmental Policy Act, including (if necessary) the preparation of a programmatic Environmental Impact Report/Statement. Phase II should begin six months after initiation of Phase I to allow time to develop restoration recommendations, after which Phase II should run in parallel with Phase I to reduce project implementation time.

Project implementation (Phase III) may be conducted by state agencies (such as the California Department of Fish and Game and California Department of Water Resources), local stakeholders (such as aggregate mine operators), private companies, or other groups.

**B. PROJECT LOCATION AND GEOGRAPHIC BOUNDARIES:** The project area includes the 52-mile reach of the Merced River and its floodplain downstream of the Crocker-Huffman Dam in Merced County, CA (Figure 2).

**C. EXPECTED BENEFITS:** By restoring large-scale geomorphic and ecological processes and attributes, project implementation will address a number of stressors and will benefit high-priority species and habitats identified by CALFED. Stressors that will be addressed include: migration barriers and straying, physical isolation of the floodplain, elimination of fine sediment replenishment (to the floodplain), alteration of channel form, prevention of channel meandering, isolation of side channels and tributaries, reduction of gravel recruitment, loss of the existing riparian zone or lack of recruitment potential, and elevated predation and competition losses.

Project implementation will directly benefit instream aquatic habitat, shaded riparian habitat, seasonally inundated floodplain habitat, and riparian habitat as well as enhance physical and



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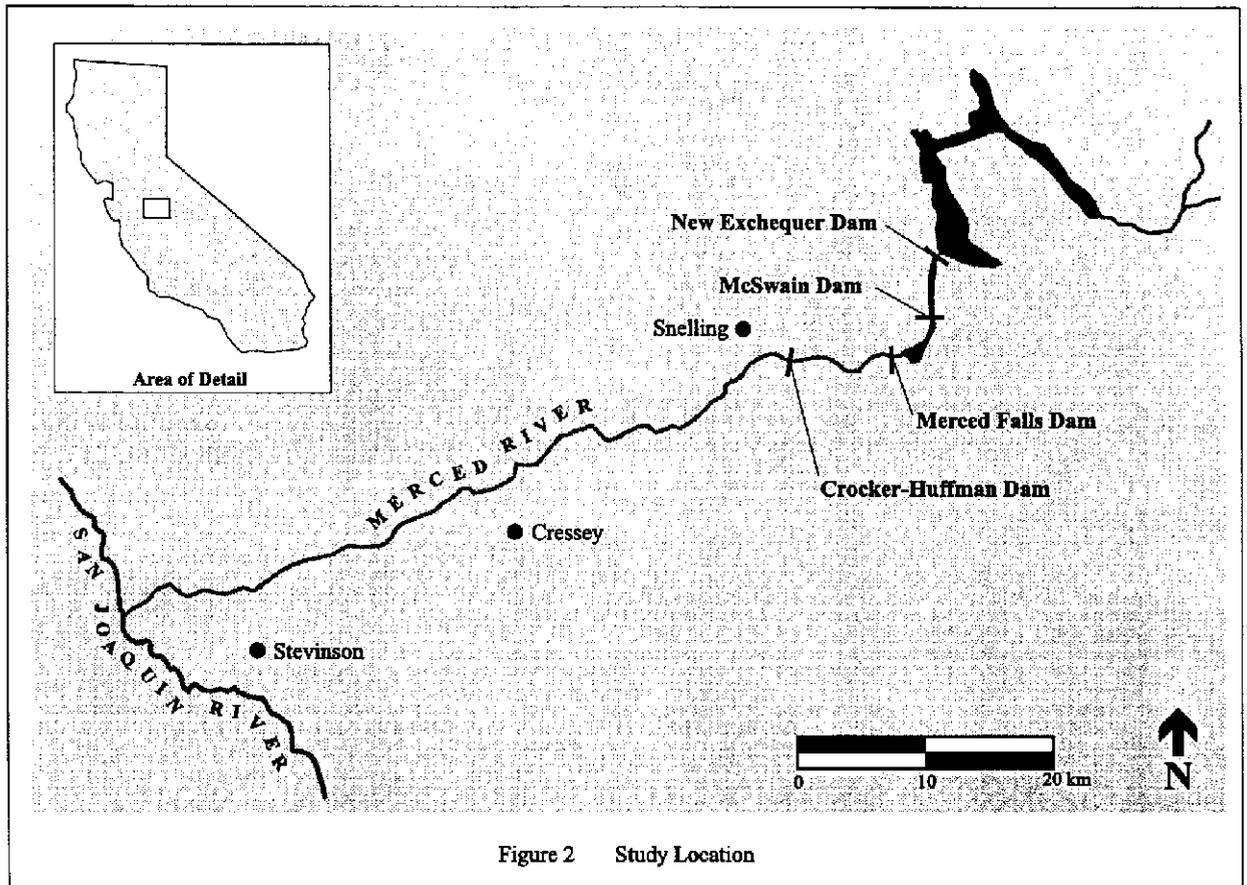


Figure 2 Study Location

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biological interactions between these habitats, and benefit San Joaquin fall-run chinook salmon (a CALFED priority species), migratory birds (a CALFED second priority), and numerous other native species, including several endangered or sensitive species. Restoration efforts will also reduce habitat for largemouth and smallmouth bass, introduced species that prey on juvenile salmonids.

In addition to the long-term benefits of complete implementation of the restoration plan, the geomorphic, biological, ecological analyses conducted for this project will benefit the design and implementation of near-term restoration projects currently under consideration by CDFG and CDWR. Also, the GIS developed under this proposal will be available to CDFG and other resource agencies for future applications.

**D. BACKGROUND AND BIOLOGICAL/TECHNICAL JUSTIFICATION:** The Merced River corridor has been significantly altered by dam construction and operation, flow diversion, gold and aggregate mining, levee construction, and land use conversion. The Crocker-Huffman Dam and the dams upstream functionally isolate the upstream portion of the watershed from the downstream portion, preventing longitudinal connectivity of geomorphological and ecological riverine processes. Flow in the river is regulated by four mainstem dams (Figure 2), which, since 1926, have eliminated the coarse sediment supply from the upper watershed and reduced the 1.5-year flood magnitude by approximately 83%, from 8,260 cfs to 1,420 cfs. In addition, gold and aggregate mining have removed stored bedload from the channel and floodplain and have substantially altered channel morphology. A study by Vick (1995), which assessed geomorphic trends in the Merced River corridor, is the only large-scale evaluation that has been conducted for the Merced River. Vick (1995) documented the following channel responses to these perturbations: (1) reduction in active channel width averaging 85 feet (33% of the 1937 channel width), (2) channel incision of up to 20 feet, (3) elimination of channel migration, (4) elimination of floodplain slough complexes, and (5) creation of 5.6 miles (273 acres) of instream mining pits that occupy 33% of the historically available spawning reach (Figure 3).

Physical alterations of the Merced River have blocked anadromous fish access to the upper watershed, reduced and degraded habitat for native species, created habitat or increased suitability for introduced species, and eliminated or impaired fluvial processes that, under natural conditions, form and maintain riverine habitats and ecological processes. CDFG has identified the Merced River as "the most degraded among the San Joaquin tributaries" (Reynolds et al. 1993: p. VII-92). Vick (1995) concluded that without active and large-scale restoration of channel and floodplain morphology and geomorphic processes in the river corridor, salmonid habitat quality will likely continue to decline because of continued channel incision and bed armoring.

To date, no long-term restoration strategy has been developed for the Merced River corridor. Instead, individual habitat restoration and rehabilitation projects have been constructed on a project-by-project basis. In the early 1990s, CDFG and CDWR constructed three spawning habitat restoration projects on the Merced River. These projects took a narrow perspective of restoration, attempting to construct specific physical parameters in the channel (bed slope, flow velocity, and substrate size) deemed suitable for chinook salmon spawning without consideration of hydraulic and geomorphic conditions at these sites or the overriding geomorphic processes driving the fluvial system. As a result, these projects have performed poorly (Kondolf et al. 1996a, 1996b).

Based on a comprehensive understanding of ecological, biological and geomorphic conditions and processes, the proposed project will develop a plan to restore (to the extent

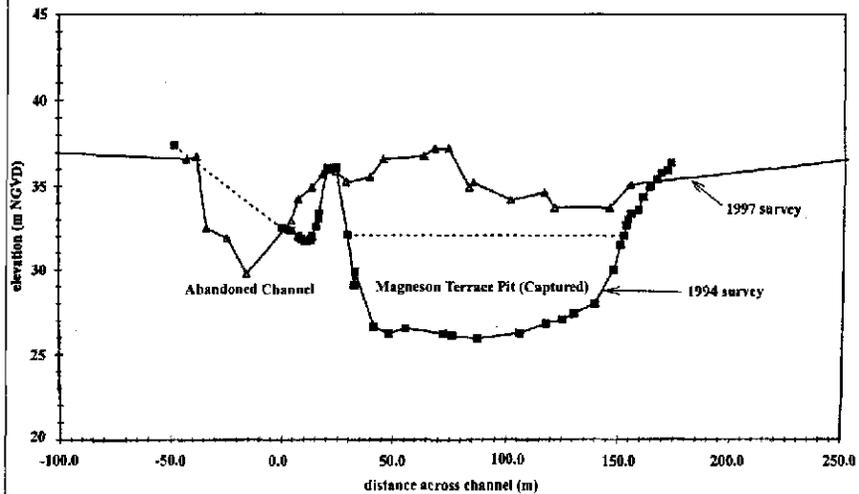


Figure 3 Aerial View and Cross Section of a Typical Captured Mining Pit in the Merced River. Note the 3.5-m increase in depth and three-fold increase in channel width caused by the pit capture.

feasible) disturbed riverine habitats and to re-establish the fluvial processes necessary for maintaining the system in the long term. This holistic approach recognizes the dynamic nature of the fluvial system as well as the physical and biological connectivity among channel, floodplain, and riparian habitats. It is emerging as the dominant paradigm in ecological restoration and has been adopted by the U.S. Forest Service, National Research Council, U.S. Army Corps of Engineers, and the National Marine Fisheries Service.

Benefits of this approach have been demonstrated on the Tuolumne River by CDFG and CDWR at the Ruddy Gravel site (RM 35). Although this project is still relatively new, preliminary evaluation shows evidence of beneficial morphological changes. Similar approaches have been developed or implemented on the Russian River, Trinity River, Cosumnes River, and Rush and Lee Vining creeks (tributaries to Mono Lake).

The proposed project is new but will build on work already completed by Stillwater Team members, which includes an assessment of historic and current geomorphic conditions in the Merced River.

## E. PROPOSED SCOPE OF WORK

### PHASE I: DEVELOP MERCED RIVER CORRIDOR RESTORATION PLAN

#### **Task 1: Identify Factors Limiting the Fall-run Chinook Population in the Merced River:**

Factors limiting the chinook salmon population on the Merced River have not been identified by previous studies. Long-term studies on the Tuolumne River (conducted by members of the Stillwater Team) concluded that salmon production is limited primarily by predation by introduced species (particularly in areas disturbed by gravel mining), operation of the Delta pumps, poor gravel quality, and redd superimposition in heavily used spawning riffles. These studies provide the basis for the restoration plan currently being developed by members of the Stillwater Team on the Tuolumne River. Because of the Merced River's close proximity and similarity in watershed and channel conditions, it is likely that the extensive research conducted on the Tuolumne River can be used as a foundation for a much more rapid assessment of chinook salmon ecology on the Merced River.

The Merced River studies will include the following: (1) estimation of centrarchid predator abundance in instream mining pits; (2) evaluation of spawning gravel quantity and quality; (3) assessment of juvenile rearing habitat quality and food supply, (4) assessment of water temperature regimes and potential effects on salmonid populations, and (5) assessment of ecological processes (e.g., food webs) that may affect salmon and other native species. These analyses will utilize studies already completed on the Merced River (CDWR 1994; JSA 1995; WEST Consultants 1995; USFWS 1997). Studies conducted prior to the 1997 flood may require updating.

**Task 2: Map Current Channel Planform:** No current basemap of the Merced River is available. The most recent aerial photographs of the river were taken in 1993 by the Bureau of Reclamation. In the flood events of January 1997, the river experienced flows of 8,000 cfs, which resulted in significant channel alteration (K. Faulkenberry, CDWR, and W. Loudermilk, CDFG, pers. comm.). To develop a basemap, the Stillwater Team will contract with an aerial photography firm to produce 1:6,000-scale, stereo photographs of the lower river. The Team will rectify these photographs and create a GIS basemap which includes active channel boundaries, floodplain and terrace features, and riffle and pool habitats.

**Task 3: Update Hydrologic Analysis (Vick 1995):** Vick (1995) analyzed flood frequencies and constructed average annual hydrographs at several gauges on the Merced River. The Team will update these analyses to include recent hydrologic data. This task will include (1) an analysis of flood frequency downstream of the Crocker-Huffman Dam near Snelling and at Stevinson and (2) an analysis of annual flow patterns downstream of Crocker-Huffman Dam.

**Task 4: Assess and Predict Sediment Supply and Transport in the Gravel-bed Reach**

**4.1 Fine Sediment: Assess the Impact of Fine Sediment, Identify Major Sources of Fine Sediment, and Develop Strategies to Reduce Input of Fines to the Channel:** Increased fine sediment delivery to streams can have numerous deleterious ecological effects including reduction of salmonid embryo survival when fine sediments infiltrate spawning gravels. The status of fine sediment in the study reach of the Merced will be assessed using a reconnaissance-level sediment budget. A field reconnaissance will be used to develop estimates of the size and quantity of fine sediment delivered to the study reach from upland sources, in storage in the channel bed and floodplain, and in transport by the fluvial system. The sediment budget will be used to assess whether present fine sediment supply is excessive and develop measures, if needed, for reducing fine sediment input.

**4.2 Coarse Sediment: Assess Coarse Sediment Supply and Transport, and Develop a Coarse Sediment Augmentation Strategy in the Gravel-bed Reach:** The supply of coarse sediment to the river immediately downstream of the Crocker-Huffman Dam has been eliminated since 1926 by construction of the Exchequer Dam. In addition, reduction in flow magnitude downstream of the dams has reduced the channel's capacity to transport sediment. Coarse sediment supply and transport are key geomorphic processes that maintain channel morphology and bed material character as well as habitat quality. To develop a coarse sediment augmentation strategy, the Team will (1) identify sources and estimate input rates of coarse sediment, and (2) measure and predict coarse sediment transport in the gravel-bed reach. The results of these analyses will be used to develop a coarse sediment management plan that attempts to balance coarse sediment supply with the river's transport capacity by introducing coarse sediment into the river. The management plan will identify particle sizes and volumes of material to be added as well as location, timing, and monitoring of placement.

Coarse sediment transport will be predicted based on models developed by Parker and Klingeman (1982). This model will be calibrated from field measurements at two sites in the gravel-bed reach. Field measurements will include sampling of hydraulic parameters and bedload transport during as many different flows as possible.

**Task 5: Identify and Predict Geomorphically Functional Channel and Floodplain Morphology in the Gravel-bed Reach:** At some locations, the lower Merced River channel has adjusted to the new flow regime imposed by the dams. However, at mined or otherwise disturbed locations, the channel has not attained an equilibrium morphology and cannot attain an equilibrium morphology under current sediment supply and flow conditions. Active restoration of channels and floodplain morphology is required to attain a geomorphically functional riverine system. The geomorphically functional morphology is defined as the channel configuration that conveys the bankfull discharge (approximately the 1.5-year flow) within the channel, allowing flows exceeding this discharge to spill over onto the adjacent floodplain, and in which the bed is mobilized by the bankfull discharge.

The Team will estimate the geomorphically functional channel and floodplain morphology in the gravel-bed reach, using a set of model reaches. To identify the functional morphology, the Team will (1) document bed mobilization thresholds in natural/model reaches, (2) identify and survey reference reaches that can be used for design criteria, and (3) identify sediment traps in the channel that impede sediment transport continuity.

**Task 6: Assess and Map Current Riparian Vegetation and Wetlands:** Riparian and wetland habitats in the Central Valley have been progressively reduced since the mid-1800s as land was converted for agriculture, grazing, and mining purposes. The Team will (1) identify losses of riparian and wetland habitat that have occurred since 1937, (2) assess current riparian and wetland vegetation conditions, (3) identify and map existing riparian vegetation types and their associations with key geomorphic units, and (4) identify and map unique riparian and wetland wildlife habitats. Results of these analyses will be used to identify potential sites for the preservation and restoration of riparian and wetland habitat and to develop design criteria for riparian and wetland restoration. Riparian restoration will specifically address habitat required for migratory birds, including the endangered yellow-billed cuckoo, as well as habitat for the endangered riparian brush rabbit and giant garter snake. Results will be entered into the GIS database.

**Task 7: Assess Constriction of Floodplains by Levees Downstream of the Gravel-bed Reach:** From Crocker-Huffman Dam downstream, the Merced River channel is bordered by flood control levees. The designated maximum flow release from the New Exchequer and McSwain dams is 6,000 cfs, as measured approximately 5 miles upstream of the San Joaquin River confluence. In the gravel-bed reach, floodplain assessment is included as part of the channel restoration analysis. Downstream of this reach, where channel restoration may not be necessary, the floodplain assessment will be conducted as a separate task. The Team will review maps and aerial photographs to identify opportunities for using levee setbacks to improve floodplain connectivity to the channel allowing greater channel meandering and creation of floodplain wetland habitats such as sloughs and oxbow lakes. This task will include the following: (1) develop criteria for adequate floodplain width based on hydrologic, hydraulic, and ecological analyses; (2) identify (from aerial photographs and maps) locations where the floodplain is narrower than this width; and (3) identify where floodplain width could be increased within existing land use and land ownership constraints.

**Task 8: Identify Social, Institutional, Infrastructure and Legislative Opportunities and Constraints:** Key factors affecting potential future restoration opportunities within the river corridor include land ownership patterns, existing land use and zoning, existing and planned aggregate mining activities and mineral reserve classifications, and MID operations. Opportunities and constraints associated with each of these factors will be identified for use in developing appropriate restoration strategies and assessing the feasibility of specific projects.

**Task 9: Coordinate with Local, State, and Regional Stakeholders:** Effective and meaningful public and agency involvement will be an integral component of the overall program. Landowner involvement is seen as particularly critical to its ultimate success. Outreach and opportunities for active stakeholder involvement will be staged throughout the planning process, including both informal and formal consultation. Efforts will be targeted at identifying and encouraging partners from within the local communities with the goal of developing additional

local support from the outset. Stakeholders will be encouraged to get involved in assessing and evaluating baseline conditions as well as establishing goals and an overall vision. Educational opportunities will be explored, including incorporation with school programs. These opportunities could be associated with initial data collection and/or long-term monitoring. Six structured public workshops are assumed for Phase I.

**Task 10: Develop the Merced River Corridor Restoration and Monitoring Plan:** Based on the resource information, public input, and land use assessments, an overall restoration strategy will be developed. A range of alternative strategies will be explored in developing the final strategy. The final strategy will incorporate a vision statement for the corridor developed through public and agency consultation as well as specific restoration goals and objectives. Specific actions will be identified which integrate the results of the resource assessment with analysis of social/institutional opportunities and constraints. Factors to be considered will include magnitude of the potential benefits, presence of cooperative landowners, and consistency with existing plans and regulations. A draft restoration plan will be prepared and reviewed by interested stakeholders prior to issuing a final report.

**Task 11: Develop Conceptual Designs for Two Top Priority Projects:** Based on the findings of the technical analyses and the final restoration and monitoring plan, the team will develop conceptual project designs for the two top priority projects. These designs could be used to develop project proposals by the Stillwater Team, by resources agencies, or other parties collaborating in implementation of the restoration plan.

**F. MONITORING AND DATA EVALUATION:** The corridor restoration plan will include specific guidelines and methods for monitoring and evaluating past restoration projects as well as a long-term, basin-wide program to monitor and evaluate the effectiveness of the overall restoration plan. Details for monitoring project implementation will be included in the Phase III application. The Team is experienced in developing focused, cost-effective and scientifically-sound monitoring programs for stream restoration projects, integrated natural resource management plans, and multi-species habitat conservation plans.

**G. IMPLEMENTABILITY:** One of the primary goals of this scientific assessment and planning effort will be to assess the feasibility of various restoration strategies with respect not only to physical and biological conditions but to social, institutional, legal, and regulatory conditions as well. Issues such as compatibility with existing land use and zoning and compliance with laws, regulations, and special designations will be specifically addressed throughout the process. These analyses combined with the environmental compliance and permitting planned for Phase II will lay the foundation for moving quickly to site-specific restoration projects. The effort is specifically designed to be coordinated with on-going and planned restoration activities being conducted by CDFG and CDWR in the Merced River corridor. The proposed project includes significant resources dedicated to public outreach and involvement, which are viewed as critical to the success of the program and are aimed at expediting implementation.

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## COSTS AND IMPLEMENTATION SCHEDULE

### A. BUDGET COSTS

The estimated total cost of Phase I of the project is \$522,961. Costs for Phases II and III will be dependent upon the outcome of Phase I. The detailed budget for Phase I is provided in Table 1.

### B. SCHEDULE MILESTONES

The schedule for implementation and deliverables for Phase I is presented in Table 2. Office tasks (Tasks 2, 3, and 8) can begin immediately upon approval of funding. Tasks that require field surveys (Tasks 1, and 4 through 7) are limited by seasonal conditions. To cover a broad range of seasonal conditions, biological studies (Task 1) will extend from October 1997 through May 1998. Field work for geomorphic and riparian habitat assessments (Tasks 4 through 7) are limited by flow conditions. Field work for these tasks will begin in March 1998, provided that flows are low enough to allow in-channel work. Higher flows will delay field work to later in the spring or summer.

The final restoration and monitoring plan will be completed in December 1998, assuming that work is initiated in October 1997. To facilitate on-going restoration efforts by CDFG and CDWR, interim reports will be provided as follows: Limiting Factors Analysis (Task 1) - May 31, 1998; Coarse Sediment Management Strategy (Task 4.2) - September 30, 1998.

Payment shall be in arrears on a monthly basis. Stillwater Sciences will invoice on a monthly basis, according to percentage of work completed by task.

### C. THIRD PARTY IMPACTS

No adverse impacts to third parties are anticipated. The project proposal includes coordination with local landowners, MID, and state and local agencies to assure that all potential third party impacts are identified and avoided. In addition, all recommended restoration actions will depend on the cooperation of willing landowners.

The project may provide employment opportunities in the area. Plan development and implementation will require a substantial field component, which may provide summer employment, particularly for local students. Project implementation will require transport of required materials and construction.

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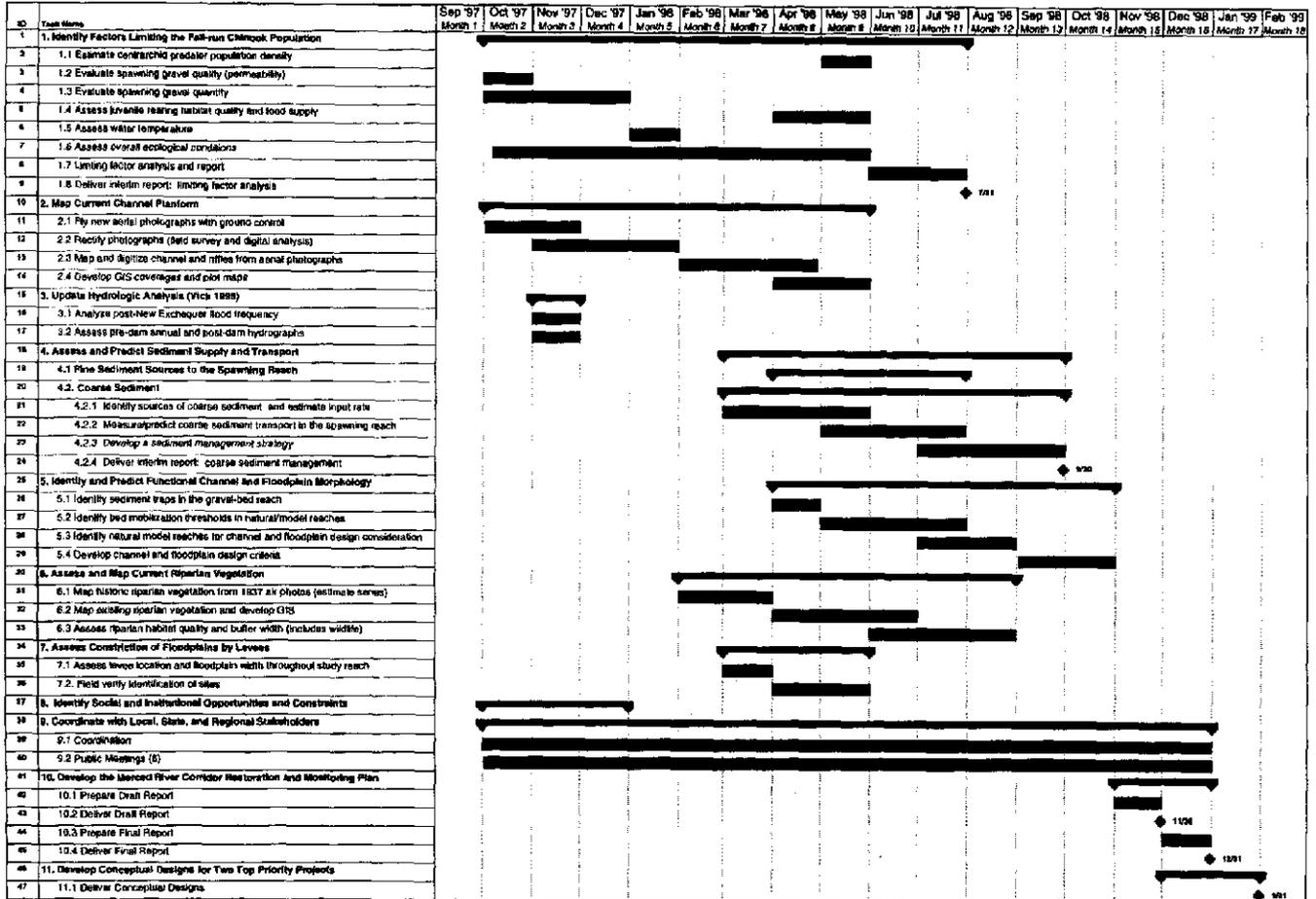
Table 1. Project Budget

TASK	TOTAL HOURS	DIRECT SALARY AND BENEFITS	OVERHEAD LABOR	SERVICE CONTRACTS	MATERIAL AND ACQUISITION CONTRACTS	MISC. AND OTHER DIRECT COSTS	TOTAL COST
<b>PHASE I: DEVELOP MERCED RIVER CORRIDOR RESTORATION PLAN</b>							
1. Identify Factors Limiting the Fall-run Chinook Population	924	\$27,714	\$36,955	\$0	\$0	\$3,501	\$70,170
2. Map Current Channel Planform	655	\$17,186	\$23,121	\$0	\$6,500	\$4,291	\$53,097
3. Update Hydrologic Analysis Vick (1995)	57	\$1,764	\$2,123	\$0	\$0	\$0	\$3,888
4. Assess and Predict Sediment Supply and Transport	1213	\$34,333	\$40,028	\$0	\$0	\$7,005	\$81,366
5. Assess Functional Channel and Floodplain Morphology	1040	\$25,479	\$26,403	\$0	\$0	\$9,461	\$61,342
6. Assess and Map Current Riparian Vegetation	1078	\$26,311	\$26,362	\$0	\$0	\$4,491	\$57,164
7. Assess Constriction of Floodplain by Levees	139	\$4,860	\$5,751	\$0	\$0	\$562	\$11,173
8. Identify Social and Institutional Opportunities and Constraints	340	\$7,320	\$17,861	\$0	\$0	\$500	\$25,681
9. Coordinate with State, Local and Regional Stakeholders	588	\$17,348	\$30,279	\$0	\$0	\$2,791	\$50,418
10. Develop Corridor Restoration and Monitoring Plan	560	\$20,320	\$26,143	\$0	\$0	\$2,500	\$48,964
11. Develop Conceptual Designs for Two Top Priority Projects	333	\$10,583	\$9,417	\$0	\$0	\$0	\$20,000
Scientific Advisory	120	\$0	\$0	\$14,700	\$0	\$0	\$14,700
Project Management (5% of total)	355	\$10,065	\$14,535	\$0	\$0	\$0	\$25,000
<b>Total</b>	<b>7,396</b>	<b>\$203,293</b>	<b>\$261,378</b>	<b>\$14,700</b>	<b>\$6,500</b>	<b>\$36,102</b>	<b>\$522,951</b>

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TABLE 2: PROJECT SCHEDULE



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## APPLICANT QUALIFICATIONS

**STILLWATER TEAM STRUCTURE:** The Stillwater Team consists of three consulting firms—Stillwater Ecosystem, Watershed & Riverine Sciences, Inc. (Stillwater Sciences); McBain and Trush; and EDAW, Inc.—and a scientific advisory team. The Team has extensive experience in ecological, geomorphic, and environmental management issues in the San Joaquin Basin spanning over ten years. Projects completed or underway by team members include: a comprehensive, ten-year analysis of chinook salmon population dynamics and factors limiting production in the Tuolumne River (see Appendix B); an analysis of geomorphic conditions in the Merced River (Vick 1995; Kondolf et al. 1996); a large-scale, process-based restoration plan for the Tuolumne River; planning and design for site-specific restoration projects on the Tuolumne and Merced rivers; and monitoring and evaluation of implemented restoration projects on the Tuolumne, Stanislaus, and Merced rivers.

The Team will be led by Stillwater Sciences, who will direct and manage the project. A lead management team will be composed of members of the three firms: Frank Ligon (Stillwater Sciences), Jennifer Vick (Stillwater Sciences), Scott McBain (McBain and Trush), and Bruce DiGennaro (EDAW). Individual study components will be led by staff from each of the firms, as identified in the biographical sketches. The team leaders will be supported by experienced staff members, many of whom have extensive experience in the San Joaquin Basin. Not all staff members who will be participating in this project are identified in this proposal. Biographical sketches for team leaders are provided below. Resumes for team leaders and selected staff members are provided in Appendix C.

The scientific advisory team, which consists of internationally recognized experts in the fields of geomorphology, hydrology, aquatic and riparian ecology, and statistics, will provide input to study design, data analysis, and development of the restoration strategy.

**STILLWATER SCIENCES:** Stillwater Sciences is a recently established firm of biological and geological scientists. The company specializes in developing new scientific approaches and technologies for environmental problem-solving in aquatic and terrestrial systems and has extensive experience and in-house ability in GIS applications to environmental analyses. Its founding members have over fifty years of experience in freshwater ecology, fisheries and wildlife biology, riparian and wetland ecology, entomology, botany, and hillslope and fluvial geomorphology. Recent projects include impact assessment and restoration of rivers affected by hydroelectric dams, timber harvest, and irrigation in California and the Pacific Northwest. Stillwater Sciences will provide project direction and management and will lead in Tasks 1, 3, 4.1, and 10; co-lead with McBain and Trush in Tasks 4.2, 5, and 7; and participate in Tasks 2, 6, and 9.

**Frank Ligon (Project Director, Aquatic Habitat Assessment Team Leader):** Mr. Ligon is an aquatic ecologist and geomorphologist specializing in investigations of the role of fluvial processes and morphology in the ecology of stream fish, invertebrates, and plant communities. He has successfully managed several complex, long-term projects, including projects involving watershed analysis, salmon ecology and restoration, geomorphology and riverine ecosystem restoration. His Central Valley experience includes managing a ten-year chinook salmon ecology and restoration project on the Tuolumne River below New Don Pedro Dam (see Appendix B).  
**Jennifer Vick (Project Manager, Geomorphic Analysis and Floodplain Assessment Team Co-leader):** Ms. Vick is an aquatic ecologist and geomorphologist. Her experience ranges from microhabitat partitioning of fishes to geomorphic and hydrologic impacts of dams. She

conducted her masters research on the Merced River, including extensive field surveys and coordination with state and local agencies, MID, and local landowners in the Merced River corridor.

**Matthew O'Connor (Assessment of Fine Sediment Supply Team Leader):** Dr. O'Connor is a geomorphologist and hydrologist with broad technical expertise in wildlands and forested mountain environments. He has conducted analyses of watershed conditions in eight drainages in Washington state and has performed site-specific analyses of sediment transport in large rivers. Dr. O'Connor has also studied the influence and input rate of large organic debris on fish habitat in northern California, and is currently involved in restoration and monitoring planning on the Garcia River.

**Rafael Real de Asua (GIS Team Leader):** Mr. Real de Asua is a GIS analyst with more than 10 years of experience in computerized mapping and environmental modeling using GIS. He specializes in watershed and stream channel analysis and modeling. He developed a GIS for the Tuolumne River for Turlock Irrigation District, as well as for several streams in the El Dorado National Forest. Currently he is conducting stream channel analysis for the North Umpqua River (in Oregon) and several northern California coastal streams.

**MCBAIN AND TRUSH:** McBain and Trush is a professional consulting partnership applying fluvial geomorphic and ecological research to river preservation, management, and restoration. Their primary goals are maintaining or attaining river ecosystem health in regulated rivers, nationally and internationally; assessing impacts of land use activities on stream ecosystems; and recommending management strategies to minimize or eliminate negative impacts to those ecosystems. McBain and Trush has considerable experience in river corridor restoration, including: Mono Basin Stream Restoration Work Plan, Maintenance Flow Study on the Trinity River, and the Tuolumne River Corridor Restoration Plan. McBain and Trush will lead in Tasks 2, 6, and 11; co-lead with Stillwater Sciences in Tasks 4.2, 5, and 7; and participate in Tasks 1, 3, 4.1, 9, and 10.

**William Trush (Riparian and Wetland Assessment and Restoration Design Team Leader):** Dr. Trush is an experienced geomorphologist and ecologist. In addition to his work with McBain and Trush, Dr. Trush is an adjunct professor in the Humboldt State University Fisheries Department, where he teaches stream ecology and coastal stream management, and is Director of the Humboldt State University Institute for River Ecosystems. His specialties include anadromous fish ecology, anadromous fish interactions with fluvial geomorphology and hydrology, channel maintenance flows, riparian ecology, macrobenthic invertebrate ecology, and stream restoration.

**Scott McBain (Geomorphic Analysis and Floodplain Assessment Team Co-leader):** Mr. McBain is an assistant hydraulic engineer/fluvial geomorphologist whose special interests include bed mobility, bedload transport, effects of high flows on channel morphology, watershed sediment yields, and stream restoration. He has worked extensively on the Tuolumne River, including the development of the Tuolumne River Corridor Restoration Plan.

**EDAW, INC.:** EDAW is an international consulting firm specializing in environmental compliance and land use planning. EDAW has directed and managed numerous large-scale watershed planning and resource management assignments in California and is recognized for its ability to integrate technical information into effective policy planning. Recent river restoration projects include: the Lower Mokelumne River Management Plan; the Salinas Basin Management Plan; CEQA/NEPA compliance for the Upper Truckee River Restoration Project; and

preparation of a programmatic EIR/EIS involving restoration of the lower American River. EDAW will lead in Tasks 8 and 9, and will participate in Task 10.

**Bruce DiGennaro (Public Coordination Social/Institutional Opportunities and Constraints Team Leader):** Mr. DiGennaro is an environmental planner with over 12 years of experience developing river management plans. He has been involved in studies on the Tuolumne, Mokelumne, and Stanislaus rivers in central California and the Sacramento, Klamath, Feather, and Trinity rivers in northern California. He is currently working with several agricultural and urban water agencies in on anadromous fish restoration planning activities in the Sacramento-San Joaquin Delta.

#### SCIENTIFIC ADVISORY TEAM

**William Dietrich (fluvial geomorphology):** Dr. Dietrich is a professor in the Department of Geology and Geophysics, University of California, Berkeley. Dr. Dietrich's research has been instrumental in the development of the watershed analysis methodologies that are now being used to guide much of the planning effort for the restoration of Pacific salmon. Much of his recent work has focused on the downstream effects dams and land use on fluvial systems, including the linkages between physical processes and aquatic biota and the development of methods for restoring degraded rivers.

**Richard Harris (riparian ecology):** Dr. Harris is an extension forestry specialist in the Department of Environmental Science, Policy and Management, University of California, Berkeley. His primary areas of research expertise are the ecology, monitoring, and restoration of riparian communities and indigenous (American Indian) natural resource management. His dissertation research focused on the relationships between riparian vegetation and fluvial geomorphology in the Central Valley.

**G. M. Kondolf (fluvial geomorphology):** Dr. Kondolf is a professor of Environmental Planning and Geography at the University of California, Berkeley, where he teaches hydrology, geology, and restoration of rivers and streams. His research includes river management, specializing in technical and policy issues regarding management of gravel in regulated rivers, and geomorphic influences in river and stream restoration. Recent projects include evaluation of flushing flow requirements for spawning gravels on the Trinity River, evaluation of spawning riffle restoration projects in California and other stream restoration projects in North America and Europe, and assessment of factors influencing the success of vegetation establishment on former gravel pits.

**Mary Power (aquatic ecology):** Dr. Power is a professor in the Department of Integrative Biology, University of California, Berkeley with over 40 published articles on freshwater ecology, food web analysis, and fish biology. Much of her recent work focuses on the effects of disturbances, including both natural and human events or actions, on aquatic biodiversity and food web interactions. Dr. Power is the senior author of a paper on sustaining aquatic food webs that is included in a recent report to the Western Water Policy Review Presidential Advisory Commission.

**Terence Speed (statistics):** Dr. Speed is a professor, and former chair, in the Department of Statistics, University of California, Berkeley. He has published over 100 papers, including papers on the influence of temperature on the survival of chinook salmon smolts and modeling and managing a salmon population, which were based on work conducted in the Tuolumne River. Dr. Speed has contributed his expertise to a wide range of applied statistics problems, ranging from interpretation of DNA fingerprinting to models of fisheries population dynamics.

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## COMPLIANCE WITH STANDARD TERMS AND CONDITIONS

The applicants have reviewed and are able to comply with the terms and conditions set forth in Attachment D of the Request for Proposals.

Stillwater Sciences finds acceptable the standard terms and conditions listed in Attachment D of the request for proposals, with the following clarification:

Payment shall be in arrears on a monthly basis. Stillwater Sciences will invoice on a monthly basis, according to percentage of work completed by task.

Forms covering items 8 (Non-Discrimination Compliance) and 12 (Small Business Preference) are attached in Appendix D, as indicated by Table D-1 of the request for private firms submitting proposals for "Services/Consulting/Preconstruction/Research."

MERCED RIVER CORRIDOR  
RESTORATION PLAN

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**LIST OF APPENDICES:**

- A. LITERATURE CITED
- B. TUOLUMNE RIVER STUDY BIBLIOGRAPHY
- C. RESUMES
- D. FORMS
- E. MERCED COUNTY PLANNING DEPARTMENT  
LETTER OF SUPPORT

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MERCED RIVER CORRIDOR  
RESTORATION PLAN

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**APPENDIX A.**  
LITERATURE CITED

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## LITERATURE CITED

- CDWR (California Department of Water Resources). 1994. San Joaquin River tributaries spawning gravel assessment: Stanislaus, Tuolumne, and Merced rivers. Memorandum Report. CDWR, Northern District, Red Bluff.
- JSA (Jones and Stokes Associates, Inc.). 1995. Temperature and gravel investigations for fisheries enhancement on the lower Merced River, Merced County, California. Prepared for California Department of Fish and Game, Environmental Services Division, Sacramento.
- Kondolf, G. M., J. C. Vick, and T. M. Ramirez. 1996a. Salmon spawning habitat rehabilitation in the Merced, Tuolumne, and Stanislaus rivers, California: an evaluation of project planning and performance. Water Resources Center Report No. 90. University of California, Davis.
- Kondolf, G. M., J. C. Vick, and T. M. Ramirez. 1996b. Salmon spawning habitat rehabilitation on the Merced River, California: an evaluation of project planning and performance. Transactions of the American Fisheries Society 125: 899-912.
- Parker, G., and P. C. Klingeman. 1982. On why gravel bed streams are paved. Water Resources Research 18: 1409-1423.
- Reynolds, F. L., T. J. Mills, R. Benthin, and A. Low. 1993. Restoring Central Valley streams: a plan for action. California Department of Fish and Game, Inland Fisheries Division, Sacramento.
- USFWS (U. S. Fish and Wildlife Service). 1997. Identification of the instream flow requirements for fall-run chinook salmon spawning in the Merced River. USFWS, Instream Flow Assessments Branch, Ecological Services Office, Sacramento, California.
- Vick, J. C. 1995. Habitat rehabilitation in the lower Merced River: a geomorphological perspective. Master's thesis. Center for Environmental Design Research Report Nos. CEDR-03-95 and CEDR-04-95. University of California, Berkeley.
- WEST Consultants, Inc. 1995. Sedimentation and fish habitat—Merced River. Draft report. Seattle, Washington.

MERCED RIVER CORRIDOR  
RESTORATION PLAN

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**APPENDIX B.**  
TUOLUMNE RIVER STUDY BIBLIOGRAPHY

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July 28, 1997

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## TUOLUMNE RIVER STUDY BIBLIOGRAPHY

Reports prepared in whole or in part by Frank Ligon while employed at EA Engineering and managing the Tuolumne River chinook salmon ecology and restoration project. All are appendices to: Don Pedro Project Fisheries Studies Report (FERC Article 39, Project No. 2299). *In* Report of Turlock Irrigation District and Modesto Irrigation District Pursuant to Article 39 of the License for the Don Pedro Project, No. 2299. EA, Lafayette, California.

- Appendix 1: San Joaquin River system chinook salmon population model documentation and validation. 1991.
- Appendix 2: Stock-recruitment analysis of the population dynamics of San Joaquin River system chinook salmon. 1992.
- Appendix 3: Tuolumne River salmon spawning surveys 1971-1988. 1991.
- Appendix 5: Analysis of 1981 lower Tuolumne River IFIM data. 1991.
- Appendix 6: Lower Tuolumne River spawning gravel availability and superimposition. 1992.
- Appendix 7: Lower Tuolumne River chinook salmon redd excavation report. 1991.
- Appendix 8: Lower Tuolumne River spawning gravel studies report. 1991.
- Appendix 9: Spawning gravel cleaning methodologies. 1991.
- Appendix 10: 1987 Juvenile chinook salmon mark-recapture study. 1991.
- Appendix 11: An evaluation of the effect of gravel ripping on redd distribution in the lower Tuolumne River. 1991.
- Appendix 12: Data reports: seining of juvenile chinook salmon in the Tuolumne, San Joaquin, and Stanislaus rivers, 1986-1989. 1991.
- Appendix 13: Preliminary juvenile salmon study: Report on sampling of chinook salmon fry and smolts by fyke net and seine in the lower Tuolumne River 1973-1986. 1991.
- Appendix 14: Tuolumne River fluctuation flow study report. 1991.
- Appendix 15: Tuolumne River fluctuation flow study plan: Draft. 1992.
- Appendix 16: Aquatic invertebrate studies report. 1991.
- Appendix 17: Preliminary Tuolumne River water temperature report. 1991.
- Appendix 18: Lower Tuolumne River instream temperature model documentation: Description and calibration. 1991.
- Appendix 19: Modeled effects of La Grange releases on instream temperatures in the lower Tuolumne River. 1991.
- Appendix 20: Juvenile salmon pilot temperature observation experiments. 1991.
- Appendix 21: Possible effects of high water temperature on migrating chinook salmon (*Oncorhynchus tshawytscha*) smolts in the San Joaquin River. 1991.
- Appendix 22: Lower Tuolumne River predation study report. 1992.
- Appendix 23: Effects of turbidity on bass predation efficiency. 1991.
- Appendix 24: Effects of introduced species of fish in the San Joaquin River system. 1991.
- Appendix 26: Export mortality fraction submodel. 1992.
- Appendix 27: Tuolumne River summer flow study report 1988-1990. 1991.
- Appendix 28: Tuolumne River summer flow invertebrate study. 1991.

MERCED RIVER CORRIDOR  
RESTORATION PLAN

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APPENDIX C.  
RESUMES

TEAM LEADERS

Bruce DiGennaro  
Frank Ligon  
Scott McBain  
Matthew O'Connor, PhD  
Rafael Real de Asua  
William Trush, PhD  
Jennifer Vick

SCIENTIFIC ADVISORY TEAM

William Dietrich, PhD  
Richard Harris, PhD  
G. M. Kondolf, PhD  
Mary Power, PhD  
Terence Speed, PhD

ADDITIONAL KEY STAFF

Curtis Alling  
John Bair  
Christine Champe  
Roberts Coats, PhD  
Bruce Orr, PhD

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July 28, 1997

**RESUMES**  
TEAM LEADERS

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July 28, 1997

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**Bruce DiGennaro**  
*Senior Associate, EDAW, Inc.*

Bruce DiGennaro is an environmental planner with over 12 years of experience in natural resource management planning and environmental analyses. He has extensive experience dealing with riverine resource issues, having conducted studies and prepared management plans for sections of the Feather, Klamath, Mokelumne, Sacramento, Stanislaus, and Tuolumne rivers in California. He has worked extensively on water policy issues involving the Sacramento-San Joaquin River Delta and plans to restore anadromous fish populations in the Central Valley.

**Education**                    **B.S., Environmental Planning and Management, University of California Davis, 1986**

**Professional Experience**                    **CUWA CVPIA Oversight** - Project Manager responsible for tracking and participating in the implementation of the Central Valley Project Improvement Act (CVPIA) for the California Urban Water Agencies (CUWA). Efforts have focused on the development and review of the PEIS and the draft Anadromous Fish Restoration Plan (AFRP). Working closely with agency staff and CUWA member agencies in proposed analyses and suggesting appropriate modifications. Intimately familiar with the CVPIA and other activities influencing water supply and water quality, including recent activities regarding the Sacramento-San Joaquin Bay-Delta.

**Bay-Delta Proceedings** - Project Manager responsible for assisting the East Bay Municipal Utility District (EBMUD) prepare for upcoming State Water Resources Control Board (SWRCB) hearings regarding implementation of the 1995 Water Resource Control Plan (WQCP) for the Sacramento-San Joaquin Bay-Delta. EDAW is assisting with development of testimony and exhibits on allocation methodologies, hydrodynamic and hydrologic modeling, fisheries, water supply, and economics.

**Mokelumne Aquifer Recharge and Storage Project (MARS)** - Project Manager responsible for environmental review of Phase 1 of a major conjunctive use effort in San Joaquin County that would provide additional water supplies to EBMUD while also helping to restore the groundwater basin in San Joaquin County. Responsible for alternatives development and screening and environmental review for the project.

**Arkansas River Recreation Study** - Worked collaboratively with a multi-agency task force commissioned by the U.S. Bureau of Land Management, U.S. Forest Service, Colorado Division of Parks and Outdoor Recreation, and U.S. Bureau of Reclamation to develop an overall strategy and specific assessment techniques for quantifying recreational needs for 150 miles of the Arkansas River and three large reservoirs in Colorado. Designed and directed recreation user surveys specifically to assess the effects of changing river flows and lake levels on recreation opportunities.

**North Fork Stanislaus River Hydroelectric Project** - Provided technical assistance to the Northern California Power Agency regarding recreation/streamflow issues associated with the North Fork Stanislaus River Hydroelectric Project. Issues included modified temperature and flow regimes at several heavily used recreation sites (including Calaveras Big Trees State Park), recreational safety, and mitigation for lost recreation opportunities.

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**Mokelumne River Hydroelectric Project** - Project manager responsible for assisting the Pacific Gas and Electric Company respond to additional information requests regarding recreation and whitewater boating below the Mokelumne River Hydroelectric Project in California. Worked closely with PG&E, the resource agencies, and the FERC in developing and conducting recreation and fisheries studies on the river, including an instream flow study for whitewater boating.

**Washington Water Power Relicensing** - Providing recreation planning advice and expertise to a Land Use, Recreation and Aesthetics Working Group (LURAWG) as part of a collaborative planning process for relicensing of the Noxon and Cabinet Gorge Hydroelectric Projects on the Clark Fork River in Montana and Idaho. The assignment involves reviewing existing recreation information, conducting a recreation demand analysis and needs assessment, and assisting the Work Group in developing an appropriate Recreation Plan for two large reservoirs along over 50 miles of the Clark Fork River. Issues include private versus public use, permitting and potential future development, shoreline access, and long-term monitoring and management. The assignment also involves assistance in the development of a settlement agreement and appropriate protection, mitigation, and enhancement measures (PM&E's).

**Angels Creek Hydroelectric Project**- Evaluated potential impacts of alternative flow releases on recreation opportunities and public safety in Angels Creek, California. The recreation/streamflow assessment was conducted for the Northern California Power Agency in connection with relicensing of the Angels Creek Hydroelectric Project. Techniques used included an evaluation of IFIM transept data and professional judgment based on on-site observations of several flows.

**Urban Water Use Efficiency.** Providing staff level assistance to the California Urban Water Agencies (CUWA) in developing a unified urban position on water use efficiency for the purposes of the CalFED Bay-Delta Program. Involved in reviewing water conservation programs and policies for all 10 CUWA member agencies and developing a unified urban position paper. Participate in CalFED workgroup on Water Use Efficiency.

**Vaqueros Farms Condemnation Trial** - Project Manager for the Vaqueros Farms Condemnation Trial. EDAW is supporting the Contra Costa Water District by providing expert witness testimony and courtroom exhibits for a condemnation trial involving a 6,000 acre parcel in the Los Vaqueros watershed. Issues include the suitability of the property for development, protection of endangered species, and existing rights and easements.

**Clavey River Hydroelectric Project** - Environmental analyst and recreation planner for the Clavey River Hydroelectric Project, a major project proposed in Tuolumne County, California. Responsible for overseeing a wide range of licensing activities and environmental analyses from preparation of the license application to assisting the FERC with NEPA scoping and documentation. Responded to several additional information requests and coordinated meetings with FERC staff in Washington, D.C.

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**Arkansas River Water Needs Assessment** - Directed recreation studies and user surveys for the Arkansas River Water Needs Assessment commissioned by the U.S. Bureau of Land Management, U.S. Forest Service, Colorado Division of Parks and Outdoor Recreation, and U.S. Bureau of Reclamation. The project involved determining instream flow needs for 150 miles of the Arkansas River in Colorado and assessing the effects of lake level drawdowns on recreation opportunities and experiences at Turquoise, Twin Lakes and Pueblo reservoirs. Worked closely with the cooperating agencies to develop an overall strategy and specific assessment techniques for quantifying recreational needs for water and balancing those needs with other resource values and demands.

**Professional  
Societies**

National Recreation and Parks Association  
The River Management Society



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fluvial geomorphology and stream ecology on the Noyo River, Clavey River, San Pablo Creek, and many other northern California streams, and has managed the fluvial geomorphology component of a hydroelectric relicensing project on the Oconee River in Georgia.

*Watershed Analysis*

Mr. Ligon is responsible for the fish habitat, stream channel, and riparian components of the watershed analysis conducted by Louisiana-Pacific and the California Department of Forestry for their sustained yield plans (SYPs) and habitat conservation plans (HCPs) in northern California. As part of this project, he is developing models for assessing channel sensitivity in the field that can be extrapolated over large areas using digital terrain modeling (DTM). He is project manager for a 1,000,000-acre watershed analysis in the North Umpqua River basin. This project is incorporating hydroelectric dams and facilities into a watershed analysis and is developing a reference model of stream channel morphology and aquatic habitat to aid in channel assessment and the development of management and mitigation strategies for ecosystem restoration and salmon and trout enhancement. Mr. Ligon managed a project for the El Dorado National Forest in California to develop a stream channel assessment procedure that would facilitate interpretation of changes in geomorphic processes and morphology in terms of their implications for aquatic biota.

*Aquatic Invertebrate  
and Algal Ecology*

Mr. Ligon used aquatic invertebrates to monitor the effects of timber harvesting, post-fire management, and cattle grazing on stream ecology for the US Forest Service. He designed and conducted a study for the California Department of Forestry on the effects of timber harvest activities on stream algal ecology. He participated in a study examining the effects of stream flow regulation on invertebrate drift and benthic communities and their relation to fish populations and feeding preferences. He has assessed food limitations of juvenile salmon using drift and benthic sampling of aquatic invertebrates, stomach content analysis, juvenile salmon growth rates, and bioenergetic modeling.

**Professional  
Affiliations**

American Fisheries Society  
North American Benthological Society

**Selected  
Publications and  
Presentations**

Ligon, F.K., A.L. Percival, and T.P. Speed. Submitted. The effects of turbidity on largemouth bass feeding rate and implications for salmon management.

Ligon, F.K., W.E. Dietrich, and W.J. Trush. 1995. Downstream ecological effects of dams: A geomorphic perspective. *BioScience*.

Baker, P.F., T.P. Speed, and F.K. Ligon. 1995. The influence of temperature on the survival of chinook salmon smolts (*Oncorhynchus tshawytscha*) migrating through the Sacramento - San Joaquin River Delta of California. *Canadian Journal of Fisheries and Aquatic Sciences*.

Ligon, F.K. and W.E. Dietrich. 1991. River management for floodplain development and salmon—are they compatible? A geomorphological analysis of a cobble-bedded alluvial river ecosystem. Presented at the Fifth International Symposium on Regulated Streams.

Ligon, F.K. 1990. The effects of predation on salmon population dynamics. Presented at the Pacific Fisheries Biologists Annual Meeting.

Erman, D.C. and F.K. Ligon. 1988. Effects of flow fluctuations and fine sediment

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additions on stream fish and invertebrates below a water filtration plant.  
*Environmental Management 12:85-97.*

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**Scott McBain**

*General Partner/McBain & Trush*

*Assistant Hydraulic Engineer/Fluvial Geomorphologist*

Scott McBain is an assistant hydraulic engineer/fluvial geomorphologist whose special interests include bed mobility, bedload transport, effects of high flows on channel morphology, watershed sediment yields, and stream restoration.

**Education**

**MS**, Master of Science, Department of Civil Engineering, Hydraulic Engineering/Geomorphology emphasis. University of California at Berkeley, Berkeley, CA 94720 9/92-12/93

Studied river engineering and geomorphology. Coursework included Fluvial Geomorphology, Geomorphology, Analysis of Environmental Data, Mechanics of Sediment Transport, River Engineering, Surface Water Hydrology, and Technical Communication. Major professors: H.W. Shen and W. E. Dietrich

**BS**, Environmental Resources Engineering, Water Quality/Fisheries emphasis, Humboldt State University, Arcata, CA 95521 8/84-12/89

Program included environmental monitoring, water quality analysis, water and waste water treatment, applied hydraulics, limnology, reservoir management, in addition to core engineering courses.

**Certifications**

Engineer in Training, State of California, April 1989

**Professional Experience**

1/95 -Present

General Partner, McBain & Trush

Development of river corridor restoration plans, including:  
Mono Basin Stream Restoration Work Plan  
Maintenance flow study on the Trinity River  
Tuolumne River, California Corridor Restoration Plan

4/92-4/95

*Assistant Hydraulic Engineer*

Private Consultant

Clients included:  
Bureau of Reclamation- Sacramento River, California channel reconstruction design review  
Bureau of Land Management- John Day River total station surveying and channel restoration design review  
EA Engineering- Oconee River, Georgia bedload modeling; Tuolumne River, California channel restoration  
Humboldt State University Institute for River Ecosystems- Geomorphic and hydraulic analysis of Clavey River and Cherry Creek, California, as part of a pilot maintenance flow project.  
Trinity Associates- Kidder Creek, California channel restoration design;  
Trinity River channel reconstruction design  
SHN Geologists and Engineers-Kidder Creek, California channel restoration construction oversight

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Dr. Luna B. Leopold-Garcia River, California estuary data collection, analysis, and restoration design

8/93-7/94  
Assistant Hydraulic  
Engineer

Center for Environmental Design & Research, U.C. Berkeley, 390 Wurster Hall, Berkeley, CA 94720

Designed channel geometry and planform for restoration project on Jamison Creek within Plumas-Eureka State Park, California. Duties included historical analysis of geomorphic conditions, establishing field data collection program, designing geomorphically stable channel and riparian community, and establishing a long term field monitoring program.

8/89-4/92  
Assistant  
Environmental  
Engineer

Trinity Restoration Associates, Inc., P.O. Box 820, Arcata, CA 95521

Design and project management of chinook spawning habitat restoration projects on the lower Tuolumne River. Work consisted of spawning channel relocation, flood plain and riparian restoration design, and historic channel analysis. Tasks included surveying, field stakeout, construction supervision, hydraulic analysis, hydrological analysis, air photo analysis, and interpretation of riparian association and channel morphology adjustments due to pre- and post- dam hydrological changes.

Performed historic channel analysis of the lower Tuolumne and Merced Rivers by researching historical maps, surveys, and government records for analysis of channel migration from 1854 to the present time. Analyzed channel migration and land/water use changes, and prepared documentation of channel evolution to be used for boundary determination for State owned lands.

Assisted in project development, sampling design, report writing, and field work for maintenance flow study on the Trinity River. Monitored morphological changes associated with controlled releases, such as bed scour, bed mobility (incipient motion), bedload transport, bed surface morphology, and 3-dimensional structure of alluvial features. Supervised field crews and assisted in sampling design and layout. Assisted in report exhibit preparation and technical writing.

Assisted in aggregate mining reclamation plan designs on the lower Tuolumne and Merced Rivers, consisting of waterfowl and warm water fish habitat design, riparian restoration design, and incorporation of designs into AutoCAD for documentation and presentational use. Utilized AutoCAD and DCA software for 3-dimensional modeling and volumetric analysis of reclamation design alternatives.

5/89-8/89  
Assistant Engineer

Engineering Science, Inc., 9404 Genesee Ave. Suite 140, LaJolla, CA 92037

Land use planning, design, and computer modeling of the waste water system for the City of Escondido; design and modeling of water and waste water systems for Padre Dam Municipal Water District.

5/88-9/88  
Internship, Senior  
Project

The Nature Conservancy-McCloud River Preserve, P.O. Box 409, McCloud, CA 96064

Developed a database of trout spawning gravel quality on the McCloud River, including experimental design, substrate sampling using a cryogenic probe, and analysis of trout spawning gravel quality. Co-developed and calibrated an improved substrate sampling device that measures local gravel permeability and cryogenically extracts substrate for particle size analysis.

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**Published Material  
and Speaking  
Engagements**

FHR Currents, a Forest Service technical bulletin, paper titled "Standpipe to Determine Permeability, Dissolved Oxygen, and Vertical Particle Size Distribution in Salmonid Spawning Gravels", April 1994.

Invited speaker to Western Division American Fisheries Society Conference in Flagstaff, AZ, June 1994. Presented "Maintaining Dynamics of Steep Bedrock Rivers: Implications for Channel Morphology and Biological Communities" in Ecosystem Management in Regulated Rivers session.

American Society of Civil Engineers Waterpower '95 Conference in San Francisco, CA, July 1995. Published and presented "Bed Mobility and Scour on a Regulated, Gravel-Bed River" in Environmental session.

American Society of Civil Engineers Waterpower '95 Conference in San Francisco, CA, July 1995. Published "Assessing Downstream Variation of Fluvial Processes for Recommending Maintenance Flows in Regulated Rivers" in Environmental session.

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**Matthew D. O'Connor, Ph.D.**  
*Geomorphologist, Stillwater Sciences*

Dr. O'Connor is a geomorphologist and hydrologist with broad technical expertise in wildlands and forested mountain environments. He has over 11 years of experience analyzing stream, watershed, and wetland resources as a professional consultant and in academic research.

**Education**

**Ph.D.**, *Forest Hydrology*, University of Washington, Seattle, 1994

**M.S.**, *Wildland Resource Sciences*, University of California, Berkeley, 1986

**B.S.**, *Environmental Earth Sciences*, Stanford University, 1981

**Certifications**

Certified by Washington Department of Natural Resources to conduct Level 2 Watershed Analysis for Mass Wasting, Surface Erosion, Hydrology, Riparian Function, and Channel Condition modules.

**Professional Experience**

*Fluvial Geomorphology*

Conducted field research and modeling of sediment transport in headwater streams as a major element of research for doctoral dissertation. Has performed site-specific analyses of sediment transport in large stream channels, including prediction of transport thresholds and assessment of bed stability. Was project manager of an investigation of hydraulics and sediment transport for an Army Corps of Engineers floodway for Marin County, California. Conducted an analysis of sediment flushing-flow requirements in a Sierran stream for a large utility.

*Wildland Hydrology*

Has maintained stream gaging sites and records for various periods in Washington and California. Have modeled rainfall-runoff relationships at dissertation research field sites during the past two years. Assisted in the development of a water budget for a coastal California community. Analyzed potential erosion associated with a transmission line project in north-central California.

*Wetland Delineation and Mitigation*

Has participated in several wetland projects in central California. Prepared wetland maps based on field investigations and obtained formal consent of delineations from the Army Corps of Engineers. Designed and planned a wetland mitigation project and obtained Section 404 permits from the Army Corps to fill wetlands.

*Watershed Analysis*

Has conducted analyses of watershed conditions in 8 drainages in Washington state over the past 3 years as an independent consultant for teams employed by private timber companies. Study areas included portions of the Olympic Mountains, east and west sides of the Cascade Range, the upper Columbia River, and the Puget Sound Lowlands. Washington DNR watershed analysis methodology was used in these studies to assess stream channel conditions, riparian conditions, and watershed geomorphology. The methodology was also used as the basis of an analysis of hydrologic conditions. Conducted a detailed, quantitative analysis of mass wasting and stream channel response under contract to the Olympic National Forest. This analysis quantified sediment

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production over a 40-year period. Channel response was linked to sediment production using historic aerial photographs to measure sediment storage in stream channels.

*Fish Habitat and  
Stream Ecology*

Quantified the influence and supply rate of large organic debris on fish habitat in a north-coastal California stream as an employee of the Forest Service Experiment Station. Conducted field research on large organic debris in headwater streams and the effects of logging on debris as research for a Master's degree.

**Professional  
Affiliations**

American Geophysical Union, Hydrology Section

**Selected  
Publications and  
Research Reports**

O'Connor, Matthew D. 1994. Sediment transport in steep tributary streams and the influence of large organic debris. Doctoral dissertation. University of Washington, Seattle.

O'Connor, Matthew D., and R. Dennis Harr. 1994. Bedload transport and large organic debris in steep mountain streams in forested watersheds on the Olympic Peninsula, Washington. Research Report TFW-SH-94-001. Prepared for Washington Department of Natural Resources and Timber/Fish/Wildlife, Sediment, Hydrology, and Mass Wasting Steering Committee.

O'Connor, Matthew D., and Terrance W. Cundy. 1993. North Fork Calawah River watershed condition survey. Part I: Landslide inventory and geomorphic analysis of mass erosion; Part II: Channel condition and cumulative effects of mass wasting in headwater tributaries. Technical reports prepared for USDA Forest Service, Olympic National Forest.

O'Connor, Matthew D. 1993. Bedload transport processes in steep tributary streams, Olympic Peninsula, Washington, U.S.A. Pages 243-250 in Wang, S. Y., editor. Advances in hydro-science and engineering. Volume 1. Center for Computational Hydrosience and Engineering, University of Mississippi.

[several co-authors]. 1992. Fundamental elements of ecologically healthy watersheds in the Pacific Northwest Coastal Ecoregion. Pages 127-188 in Watershed management: Balancing sustainability and environmental change. Springer-Verlag, New York.

O'Connor, Matthew D., and Robert R. Ziemer. 1988. Coarse woody debris ecology in a second-growth *Sequoia sempervirens* forest stream. Pages 165-171 in Proceedings of the California riparian systems conference. General Technical Report PSW-110. USDA Forest Service, Davis, California.

O'Connor, Matthew D. 1986. Effects of logging on organic debris dams in first order streams in northern California. Master's thesis. University of California, Berkeley.

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**Rafael Real deAsua**  
*GIS and Image Processing Analyst, Stillwater Sciences*

Mr. Real de Asua is a GIS and Image Processing analyst and programmer with 9 years of experience in computerized mapping and GIS and 3 years in image processing. He participates in the analysis, modeling, and execution of the GIS and image processing elements of all projects, using the ESRI ARC/INFO, ERDAS, and Intergraph/Microstation software systems. Mr. Real de Asua designs and codes programs to automate GIS processes on the ARC/INFO platform. He has served as an analyst and programmer for GIS projects for county, state, and federal agencies, including the analysis of land use impacts, forest health, fisheries, ground water pollution, and suitability for residential development.

**Education** M.L.A., University of Pennsylvania; Landscape Architecture (GIS specialization); 1990  
B.A., Universidad de Zaragoza, Departamento de Geografia, Spain; Physical Geography, with emphasis in Geomorphology; 1983

**Professional Experience** *Environmental Assessment and Investigation*—In support of a Sustained Yield Plan for forests owned by Louisiana-Pacific in California, generated GIS data at a planning watershed level to be used in ecological models of soil erosion, stream channel sensitivity, fish distribution, and hydrology. Tasks included the automation of the production process using ARC/INFO AML language and the determination of a method to automatically calculate stream channel slopes from existing digital data to help in the prediction of fish habitat.

Prepared a GIS for the evaluation of stream channel conditions of various watersheds in Klamath and Eldorado National Forests. Tasks included designing the GIS; transferring data from MOSS to ARC/INFO; generating lattices and contour line maps from USGS 7.5' Digital Elevation Models; supervising data input and performing quality control; and writing software to calculate longitudinal slopes of streams and to automate plotting.

In support of a regional watershed plan, built a regional spatial database at several scales and executed database queries for economic and water quality consultants charged with impact assessments. Wrote software to check and display minimum distances from tax parcels to water bodies to facilitate automating the data entry and reformatting of more than 40,000 records from tax parcel information into the ARC/INFO format, to automate the generation of different buffers for hydrologic elements; to locate land parcels subject to future development; to develop templates for plotting different maps; and to automate the scaling of plots from A size to E size.

For a Remedial Investigation and Feasibility Study of the Passaic River, New Jersey, generated outfall location, bathymetric changes, and chemical sample location maps. Tasks included incorporating all digital and non-digital data, ranging from databases to aerial photographs and surveying maps, into a GIS; generating bathymetric models for 1989 and 1949; map setup; and cartographic production.

To support the development of an environmental plan to locate areas for timber harvesting in the Shasta-Trinity National Forest, developed a GIS; imported MOSS data from 8 mm tape into ARC/INFO format; participated in the determination of sample plots; and coded, queried, analyzed, and plotted point.

line, and polygon features for field maps and final reports.

For the Bureau of Indian Affairs, performed quality control on digitized data, queried and generated reports based on vector and raster queries performed in ARC/INFO to be incorporated in hydrologic models.

For the Los Angeles Department of Water and Power, set up a GIS of the Owens River between Crawley Dam and Pleasant Valley Reservoir to define stream channel conditions for use in different sedimentation analyses. Wrote macros to automate plotting.

For the monitoring of carbon monoxide in the Amazon Basin, proposed a program and an accompanying GIS to be used by several Native American peoples and nongovernmental organizations (NOGS) in Peru, Bolivia, and Ecuador. Traveled to the sites, interviewed the local authorities, assessed existing materials and needs, discussed the possible solutions, and wrote a report with recommendations.

To evaluate the impacts of air pollution, created a model to estimate the number of people and land use properties affected by high, medium, and low concentrations of plutonium and several other contaminants in the air between 1950 and 1990. Wrote software to automate the importation of data from TIGER files (Digital Census Information) into ARC/INFO, to determine the population affected, and to generate the plots. For the siting of residential developments for a science city in Taiwan, built a demonstration in ARC/INFO showing several scenarios using development indexes based on transportation, location, and natural factors.

For the development of a GIS prototype for the island of St. John (U.S. Virgin Islands), participated in the development of a potential erosion test model in ARC/INFO.

For the creation of a regional ground water assessment program, participated in the creation of a land use map based on the Anderson Class II classification, made from aerial photographs; helped in data processing and cleaning coverages. Wrote software to translate data from ARC/INFO to Intergraph/Microstation and vice versa and for data quality control.

*Land Cover and Vegetation Classification*—For the Georgia Power Company, participated in the image processing and classification of bottomland hardwoods. Advised in the selection of training sites and performed supervised and unsupervised classifications with ERDAS; transferred data between ERDAS and ARC/INFO, and in ARC/INFO between raster and vector modules; processed data in ARC/INFO both in the raster module (GRID) as in the vector module (ARC).

For the Bureau of Indian Affairs, conducted supervised and unsupervised classifications of different types of wetland areas in ERDAS IMAGINE (v. 8.1); transferred data between ERDAS and ARC/INFO, and overlaid the results with other layers from the GIS.

Helped in the classification of 24 types of vegetation cover in Central Spain. Generated a classification of the existing vegetation; advised on the number and types of classes to be classified; selected training areas; and participated in the classification of Thematic Mapper and SPOT images.

Participated in the classification of 22 types of land cover in the Basque Country (Spain). Designed the classification; classified stereoscopic pairs of aerial photographs; ground-truthed the classification; and wrote a report and documentation.

*GIS Inventory*—For the East Bay Utility Municipal District (EBMUD), participated in the creation of a natural factor GIS. Participated in the design of the GIS, supervised and performed quality control on different layers of the GIS, analyzed and queried the data, plotted maps at different scales and paper sizes, and backed up, documented, and prepared the information for delivery on 8 mm or 4 mm tapes.

For Robins AFB, Georgia, participated in the incorporation of all available environmental data into an Interstation GIS running on an Intergraph workstation. Prepared data input and analysis modules for all categories of information collected in ARC/INFO.

For the City of Newark, New Jersey, and for West Philadelphia, Pennsylvania, developed a GIS of natural factors. Tasks included database design and building, data input, transfer, processing and analyses, and documentation.

*Ecological Planning and Design*—For Randolph AFB developed a grounds maintenance plan to be included in the Integrated Natural Resources Management Plan. Tasks included a site visit, discussions with the client to focus on the most viable plan, development of the outline, and report writing.

For Robins AFB participated in the Natural Resources Development Plan. Tasks included the preparation of opportunities and constraints matrix for six proposed alternatives on non-active military areas within the base, and participation in the discussions for the weighting of alternatives.

For the Basque Autonomous Government, at the request of the Department of Agriculture wrote a report criticizing the Proposed General Land Use Plan.

Participated in the ecological design of several zoo exhibits for different zoos in the United States and Canada: Savanna/Waterhole Exhibit in Brookfield Zoo, Chicago; Great Ape Exhibit in Denver; Taiga/Northern Forests Exhibit, Seattle; General Master Plan, Toronto Zoo, Toronto. Participated in the design and preparation of the construction documents for the zoos.

*Software Application Development*—Programming for conversion of data from IGDS to ARC/INFO format and vice versa. Import and formatting of data from tape (ASCII, EBCDIC, DLG, TIGER) files into ARC/INFO. Created templates for plotting and for re-scaling plots. Programming to check visually the distances between geographic elements. Development of window interfaces in ARC/INFO.

**List of Skills**

GIS applications: ESRI ARC/INFO in UNIX environment; Intergraph SPAN/SPED in VMS environment and Microstation PC/workstation.

Computer Programming: ESRI Arc Macro language (AML); Intergraph User Commands; AWK; C.

Image Processing and Aerial Photointerpretation: ERDAS; Infrared and True color photointerpretation (orthophotos or stereoscopic).

GIS System Management: Workstation and microcomputer system management and customization in Unix environment.

Fluent in French and Spanish.

**Professional Societies**

Bay Area Automatic Mapping Association (BAAMA), the Bay Area chapter of the Urban and Regional Information Systems Association (URISA)

California Geographic Information Association (CGIA)

**Selected Publications**

Leven, A. and R. Real de Asua. 1996. Effective GIS Display for Public Involvement Meetings. Poster. 1996 Soil and Water Conservation Society, Keystone Resort, Colorado.

Real de Asua, R. 1996. Predicting Fish Habitat Using Geographic Information Systems. Poster. 1996 ESRI Users Conference. Palm Springs, California.

Real de Asua, R. 1996. Hayfork AMA Forest Health Analysis. Presentation. 1996 California GIS Conference. San Francisco, California.

Real de Asua, R. and J. Zabltney. 1995. Hayfork AMA Forest Health Analysis. Poster. 1995 ESRI Users Conference, Palm Springs, California. Published in the ESRI Map Book, Volume 11 (1995).

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**William Trush, PhD**  
*General Partner/McBain & Trush*  
*Director, Institute for River Ecosystems*

Dr. William Trush is an experienced geomorphologist and ecologist. In addition to his work with McBain and Trush, Dr. Trush is an adjunct professor in the Humboldt State University Fisheries Department, where he teaches courses in stream ecology and coastal stream management, and Director of the Humboldt State University Institute for River Ecosystems. His specialties include anadromous fish ecology, anadromous fish interactions with fluvial geomorphology and hydrology, channel maintenance flows, riparian ecology, macrobenthic invertebrate ecology, and stream restoration.

**Education**

Ph.D. Wildland Resource Science (1991). Department of Forestry and Natural Resources, University of California, Berkeley, CA 94720. Dissertation Title: *The Influence of Channel Morphology on Spawning Steelhead Trout in South Fork Eel River Tributaries.*

MS, Zoology (1979). Center for Environmental Studies, Virginia Polytechnic Institute and State University, Blacksburg, VA. Thesis Title: *The Effects of Area and Surface Complexity on the Structure and Formation of Stream Benthic Communities.*

BA, Zoology (1974). Pennsylvania State University, University Park, PA.

**Professional  
Research  
Employment**

Director (1991-present). Humboldt State University Institute for River Ecosystems. The Institute mission is to further our understanding, preservation, and management of river ecosystems. My duties include fiscal management, proposal development, and research. The River Institute manages the following on-going projects:

Development of a new assessment procedure and handbook for designing culvert systems on logging roads,  
Evaluation of geomorphic indices for detecting cumulative impacts to Northern California streams,  
Maintenance flow recommendation procedures for a Sierra Nevada river,  
Facilitate review of a proposed USFS maintenance flow methodology.

Research projects (with Dr. Terry Roelofs as co-principal investigator) with the Fisheries Department of Humboldt State University include:  
an assessment of Benbow Dam effects on anadromous fish populations in the South Fork Eel River,  
a limnological and fisheries investigation of Stone Lagoon, California, cutthroat trout restoration program for McDonald Creek, Humboldt County (for the Department of Parks and Recreation),  
Salmon fisheries investigation for the lower Smith River, CA.

Partner in McBain and Trush (1995) and Private Consultant (1990-present). Recently completed and ongoing projects include:

Court-appointed member to the Mono Lake Restoration Technical Committee to advise restoration strategies and biological sampling programs for several tributaries entering Mono Lake (1993-1995). Developing restoration plan for LADWP,

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Examining influence of the Sinclair Project, Oconee River, Georgia on channel morphology (1993-1994),  
Geomorphic and anadromous fish evaluation of instream gravel mining on the Mad River, Humboldt County. I serve on the Scientific Design and Restoration Committee (1992-ongoing),  
Developing restoration designs for the Tuolumne River, CA. (1989-ongoing),  
  
Maintenance flow and river channel restoration recommendations for the Trinity River (1992-ongoing),  
Fluvial-geomorphic assessment of the Klamath River Basin for the National Biological Survey (1995),  
Developing a stream channel monitoring program for Simpson Timber Co. (1995-ongoing).  
  
Senior Scientist (1989-1991). Trinity Restoration Associates, P.O. Box 820, Arcata, CA 95521. Design of wetlands as part of aggregate mining reclamation planning. Design and construction of alluvial channels for spawning and riparian habitat restoration in the Tuolumne River.  
  
Fishery Biologist (1988-1989). EA Engineering, 41A Lafayette Circle, Lafayette, CA 94549. Analysis of smolt migration runs of the Tuolumne River. Development of a maintenance flow recommendation for the Clavey River, California.

**Teaching Experience**

*Adjunct Professor* (1989-present). Fisheries Department, HSU, Arcata, CA 95521. Instructor for the following courses: Coastal Stream Management, Technical Writing for Fisheries, Restoration of Aquatic Ecosystems, Watershed Dynamics and Restoration, Conflict Resolution in Natural Resources Management, Marsh Ecology, Stream Ecology, Graduate Fisheries Seminar, and Fisheries Techniques.  
  
*Instructor* (1990-present). Teton Science School, Kelly, Wyoming. Teaching a three day workshop on fluvial processes and stream restoration with Dr. Luna Leopold.  
  
*Instructor* (1987-1988). Landscape Architecture Department, University of California, Berkeley, CA 94720. Instructor for: Hydrology for Environmental Planners and Ecological Analysis.  
  
*U.C. Berkeley Graduate Teaching Assistant* (1982-1986). Assistant for the following courses: Environmental Policy, Recreation Management, Sociology of Natural Resources, Forest Soils, and Forest Hydrology.

**Committee Membership**

Lee Vining and Rush Creek Restoration Technical Committee (1993-1994)  
Mad River Scientific Design and Restoration Committee (1993-present)  
Fishery Biologist for the California Advisory Committee on Salmon and Steelhead Trout (1990-1994)  
Director for the Salmonid Restoration Federation (1990-1995)  
Stone Lagoon Action Committee (1991-1994)  
Smith River Advisory Council (1992-1994)

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**Recent  
Publications and  
Proceedings**

- Ridenhour, R.L., Hunter, C., and W.J. Trush. 1995. *Draft Mono Basin stream restoration work plan*, prepared for Los Angeles Department of Water and Power, October 4, 1995 228 p.
- Trush, W.J., Franklin, R., and S. McBain. 1995. *Assessing downstream variation of fluvial processes for recommending maintenance flows in regulated rivers*. pp. 122-131, in Cassidy, J.J.(ed.), *Waterpower'95 Volume 1, Proceedings of the International Conference on Hydropower*, American Society of Civil Engineering, San Francisco, CA.
- McBain, S. and W.J. Trush. 1995. *Channel bed mobility and scour on a regulated, gravel-bed river*. pp. 1941-1950, in Cassidy, J.J. (ed.), *Waterpower'95 Volume 3, Proceedings of the International Conference on Hydropower*, American Society of Civil Engineering, San Francisco, CA.
- Ligon, F.K., Dietrich, W.E., and W.J. Trush. 1995. *Downstream ecological effects of dams: A geomorphic perspective*. *Bioscience* 45(3):183-192.
- McBain, S. and W.J. Trush. 1995. *River channel morphological and sediment changes in the Klamath Basin, Oregon and California*, prepared for the Technical Working Group, Klamath Fisheries Task Force, May 1995, 13p. and appendices.
- Trush, W.J. and S. McBain. 1995. *Preliminary channel maintenance flow recommendations for the mainstem Trinity River below Lewiston Dam*. pp. 8-13, in Ridenhour, R.L. (ed.) *Proceedings of the Trinity River Restoration Colloquium*, Humboldt Chapter of the American Fisheries Society, funded by the U.S. Bureau of Reclamation, 36p.
- Trush, W.J. 1994. *A review of the Mt. Hood National Forest Fish Habitat Restoration Program for Mt. Hood National Forest*, USFS, October 15, 1994.
- McBain, S., Trush, W., and W. Smith. 1994. *Developing a maintenance flow methodology: A sample plan for steep bedrock-controlled Sierra rivers*. Humboldt State University Institute for River Ecosystems, IRE-08-94-01, 95p.
- Trush, W.J. 1994. *Should the primary goal for anadromous salmonid restoration in the Klamath Basin be geomorphic?* pp.38-42, in Hassler, T.J. (ed.) *Klamath Basin Fisheries Symposium, Proceedings of a symposium held in Eureka, California, 23-24 March 1994*, California Cooperative Fishery Research Unit, 237p.
- Trush, W.J. 1994. *Understanding riparian dynamics: A management imperative*. pp. 7-8, in *Interdisciplinary Perspectives of Riparian Ecosystems*, Humboldt State University, Arcata, CA September 24, 1994.
- Ligon, F., Dietrich, W.E., Power, M., and W.J. Trush. 1993. *Variable ecological responses of large rivers to dams*, presented at the Ecological Society of America Annual Meeting, Symposium for Ecological Approaches to the Study of Large Rivers, Univ. Wisc., Madison, August, 1993.

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**Recent Speaking  
Engagements**

- Can We Successfully Manage or Restore Riverine Ecosystems?*  
California Riparian River Ecosystems Conference IV, Sponsored by  
University of California Davis, Sacramento, CA November 16, 1995.
- Can You Restore A River Without Water?*  
River Recovery and Restoration, Western Regional Instream Flow  
Conference III, Park City, UT November 4, 1995.
- One Land Ethic for Everyone.*  
Luna Leopold Essays on Ethics in Academia and Consulting, University  
of California, Berkeley, CA October 28, 1995.
- Assessing Cumulative Impacts in Stream Channels.*  
Watershed Academy, California Department of Forestry, Humboldt State  
University, Arcata CA August 16-18, 1995.
- Stream Channel Treatments.*  
Watershed Resoration and Assessment, National Advanced Resource  
Technology Center, USFS, Marana, AZ April 6, 1995.
- Preliminary Channel Maintenance Flow Recommendations for the Mainstem Trinity  
River Below Lewiston Dam.*  
Trinity River Restoration Colloquium, Humboldt Chapter of the American  
Fisheries Society, sponsored by the U.S. Bureau of Reclamation, Weaverville,  
CA April, 1995.
- A Primer on Stream Channel Dynamics.*  
California Licensed Foresters Association, Sacramento, CA March 2, 1995.
- Methods for Restoring Channel Form and Function.*  
Thirteenth Annual Salmonid Restoration Federation Conference, Sonoma  
State University, Santa Rosa, CA February 26, 1995.
- Understanding Riparian Dynamics: A Management Imperative.*  
Interdisciplinary Perspectives of Riparian Ecosystems, College of Natural  
Resources, Humboldt State University, Arcata, CA September 24, 1994.
- Ecological Health of Rivers Below Dams.*  
Western Division American Fisheries Society, Northern Arizona State  
University, Flagstaff, AZ June 21, 1994
- Should the Primary Goal for Anadromous Salmonid Restoration in the Klamath Basin be  
Geomorphic?*  
Klamath Basin Fisheries Symposium, California Cooperative Fishery  
Research Unit, Eureka, CA March 23, 1994.

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**Jennifer C. Vick**  
*Ecologist/Geomorphologist, Stillwater Sciences*

Ms. Vick has more than ten years experience in ecology and geomorphology. Her areas of expertise include geomorphology, hydrology, sediment transport, and riparian and aquatic ecology. She is experienced in historic geomorphic assessment, geomorphic and hydraulic field surveying methods, sediment transport analysis, hydraulic and hydrologic analysis, as well as invertebrate and fish sampling, vegetation analysis, and environmental assessment. Ms. Vick is also experienced in project planning and management and has worked on restoration plans for several California streams and rivers.

**Education**

M.L.A., Environmental Planning, University of California at Berkeley 1995  
Graduate Studies in Marine Biology and Marine Sciences, University of Oregon and University of California at Santa Cruz (1988-1989)  
B.S., Zoology, University of Georgia, Athens, Georgia, 1988  
Magna Cum Laude  
Phi Beta Kappa

**Professional Experience**

*Geomorphology and Hydrology*

Ms. Vick has conducted geomorphic, hydraulic, and hydrologic analyses on the Merced, Tuolumne, and Stanislaus Rivers. She completed an extensive analysis of geomorphic trends in the Merced River, including assessment of the hydrologic and geomorphic impacts of dams and instream and floodplain mining. Her work included field surveys and interpretation, aerial photograph interpretation, digital mapping and analysis, and extensive application of statistical methods to hydrologic data. From her analysis, she proposed three restoration approaches that could be developed for the Merced River. Ms. Vick presented the results of her research at a meeting of the American Geophysical Union in 1995. The University of California Water Resources Center published a summary of her thesis in 1996. This study was the first extensive geomorphic study conducted in this river corridor.

In 1995, Ms. Vick (with Dr. G.M. Kondolf and Timothy Ramirez) evaluated the performance of three reconstructed spawning riffles on the Merced, Tuolumne, and Stanislaus Rivers. She conducted field surveys and hydraulic and sediment transport analyses which documented actual and predicted bed mobility thresholds at the riffle reconstruction sites. The results of this research were published by the University of California Water Resources Center and in the Transactions of the American Fisheries Society.

On the Cosumnes River, Ms. Vick conducted the geomorphic component of a large-scale floodplain restoration plan developed for The Nature Conservancy. She assessed historic changes in channel planform and cross section, changes in sediment transport capacity caused by channel incision and floodplain constriction (due to levees), floodplain sedimentation at restored sites, and hydrology and flood attenuation. Her work included interpretation of historic maps and surveys, planning and interpretation of current channel surveys, interpretation and assessment of watershed geology, sediment transport modeling, and hydrologic analysis.

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Ms. Vick has also conducted geomorphic assessments and developed management or restoration recommendations on urban and rural streams in Alameda, Contra Costa, and Santa Cruz Counties. She has also worked extensively on the application of geomorphic, hydraulic, and hydrologic information to the planning and design of ecological restoration projects.

*Ecology*

At the University of Georgia, Ms. Vick participated an ecological evaluation of microhabitat partitioning of native fishes in cold-water streams. Her work included invertebrate and fish sampling and identification and processing of benthic macroinvertebrate samples.

Ms. Vick spent four years as an ecologist at the Corps of Engineers. During this time, she evaluated the environmental impacts of a variety of projects and provided technical input to the development of wetland and riparian mitigation and monitoring plans. She developed guidelines for monitoring vegetation and channel morphology at riparian habitat mitigation sites. These guidelines are used by the Corps of Engineers San Francisco District and were adopted by the Texas Department of Parks and Wildlife. She also served on or chaired several technical advisory committees which were developing restoration plans for the Salinas River, Russian River, and Carmel River lagoons; Bolinas Lagoon; and Muir Beach (Big Lagoon).

Ms. Vick participated in an analysis of the ecological values of floodplain and terrace aggregate mining pits in central California. With research assistants from the University of California, she sampled riparian vegetation established at these pits and developed relationships between surface slope, soil quality, and vegetation vigor and extent. Results of this research were presented at a meeting of the Society for Ecological Restoration.

*Environmental Compliance*

Ms. Vick has four years experience in environmental regulation. She has prepared more than fifty environmental assessments and has managed the preparation of three Environmental Impact Reports/Statements. She has also participated in formal and informal endangered species consultations with the U.S. Fish and Wildlife Service and in formal coordination with the California Department of Fish and Game, National Marine Fisheries Service, Environmental Protection Agency, and Regional Water Quality Control Board

**Professional Affiliations**

American Geophysical Union  
Ecological Society of America  
Society for Ecological Restoration  
Society of Wetland Scientists  
California Native Plant Society

**Selected Reports and Publications**

Kondolf, G.M., J.C. Vick, and T.M. Ramirez. 1996. Salmon Spawning Habitat Rehabilitation in the Merced, Tuolumne, and Stanislaus Rivers, California: An Evaluation of Project Planning and Performance. University of California Water Resources Center Report No. 90, Davis, CA.

Kondolf, G.M., J.C. Vick, and T.M. Ramirez. 1996. Salmon Spawning Habitat Rehabilitation in the San Joaquin Valley, California: An Evaluation of Project Planning and Performance. Transactions of the American Fisheries Society 125:899-912.

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Vick, J.C. 1995. Channel Change from Dam Construction and Instream Gravel Mining in the Lower Merced River, California: Implications for Restoration of Native Salmonid Populations, EOS Trans AGU, 76(17), Spring Meeting Supplement, S152.

Vick, J.C. 1995. Codornices Creek Restoration Project: Channel Hydraulics and Sediment Transport. Prepared for Andrea Lucas Associates, Berkeley, CA.

Vick, J.C. 1995. Habitat Rehabilitation in the Lower Merced River: A Geomorphological Perspective (Masters Thesis). Center for Environmental Design Research Report Numbers CEDR-03-95 and CEDR-04-95, University of California at Berkeley, Berkeley, CA.

Vick, J.C.. 1994. Guidelines for Monitoring Riparian Mitigation Projects. U.S. Army Corps of Engineers, San Francisco District, San Francisco, CA.

Kendall, T.R., J.C. Vick and L. Forsman. 1991. Sand as a Resource - Managing and Mining the Northern California Coast. Proceedings of the Seventh Symposium on Coastal and Ocean Management, ASCE, NY, NY.

**Presentations to  
Professional  
Meetings and  
University Classes**

"Habitat Rehabilitation in the Lower Merced River: A Geomorphological Perspective" - Guest lecture in Geomorphology in River and Stream Restoration, University of California Extension, (April 1995, 1996, 1997) and Hydrology for Planners (LA 222), University of California, April 1996.

"Wetland Regulatory Process and the Role of Compensatory Mitigation" - Guest lecture in Hydrology for Planners (LA 222), University of California, March 1995 and April 1996.

"Channel Change from Dam Construction and Instream Gravel Mining in the Lower Merced River, California: Implications for Restoration of Native Salmonid Populations" - Presentation to the American Geophysical Union Special Session to Honor the Career of M. Gordon Wolman, June 1995.

"Wetland Mitigation: Policy or Poker Chip?" - Guest lecture in Landscape Architecture and Environmental Planning Colloquium (LA 253), University of California, October 1994.

"Wetland Mitigation - Projects and Policy" - Guest lecture in Restoration of Rivers and Streams (LA 254), University of California, October 1993.

MERCED RIVER CORRIDOR  
RESTORATION PLAN

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**RESUMES**  
SCIENTIFIC ADVISORY TEAM

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July 28, 1997

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**William Eric Dietrich — Vita**

*Education:*

B.A., Occidental College, 1972  
M.S., University of Washington, 1975  
Ph.D., University of Washington, 1982

*Present Position:*

Professor, University of California, Berkeley, Department of Geology and Geophysics

*Experience:*

Summer intern, Water Resources Technical Division, Washington, State Department of Ecology, 1974  
Research Assistant, University of Washington, 1978-1981  
Assistant Professor, University of California, Berkeley, 1981-1986  
Associate Professor, University of California, Berkeley, 1986-1990  
Occasional consultant on hydrology, fluvial and hillslope  
geomorphology

*Academic Responsibilities:*

Graduate Advisor, 1982-1985; 1990-1992  
Undergraduate Advisor, 1986-1988; 1989-1990  
Member of Group in Soil Science, 1983-1991  
Affiliated Faculty of Energy and Resources Group, 1989-

*Professional Societies:*

American Geophysical Union  
British Geomorphological Research Group  
Japanese Geomorphological Union  
Geological Society of America  
American Geomorphological Field Group

*Professional Responsibilities:*

Member, American Geophysical Union Hydrology Section Unsaturated Zone Committee, 1984-1992  
and Erosion and Sedimentation Committee, 1984-  
Chairman, Erosion and Sedimentation Committee of the American Geophysical Union Hydrology  
Section, 1988-1990  
Member, Editorial Board, *Geology*, 1986-1988; 1990-1993  
Member, National Science Foundation sponsored Japan-U.S. Cooperative Science Program on  
Mechanics of River Meanders, 1985-1987  
Member, the Commission on Measurement, Theory and Application in Geomorphology, International  
Geographical Union, 1984-1988  
Member, the Erosion Studies Scientific Advisory Committee of the California Department of Forestry  
and Fire Protection, 1986  
Member, Editorial Board, *Catena*, 1986-1992  
Editorial Board, Annual Reviews of Earth and Planetary Sciences 1992-1996  
Deputy Editor, Water Resources Research, 1993-1996

*Honors:*

National Science Foundation, Presidential Young Investigator, 1985-1990  
Gordon Warwick Award, British Geomorphological Research Group, 1986  
Fellow, American Geophysical Union, 1992  
Fellow, Geological Society of America, 1992  
Wiley Award for paper published in *Earth Surface Processes and Landforms* in 1991 (with Steve  
Reneau) (given by the British Geomorphological Research Group)  
Crosby Lecturer, MIT, 1994  
Horton Award, American Geophysical Union, 1995

### William E. Dietrich — Publications

1. Dietrich, W.E., 1975, Surface water resources of San Juan County, *in*, Geology and Water Resources of the San Juans, R.H. Russel (ed.), Water Supply Bulletin No. 46, Washington Department of Ecology, p. 59-125.
2. Dietrich, W.E. and T. Dunne, 1978, Sediment budget for a small catchment in mountainous terrain: *Zeit. für Geomorph., Suppl. Bd. 29*, p. 191-206.
3. Dunne, T., W.E. Dietrich and M. Brunengo, 1978, Recent and past erosion rates in semi-arid Kenya: *Zeit. für Geomorph., Suppl. Bd. 29*, p. 130-140.
4. Dunne, T., W.E. Dietrich and M. Brunengo, 1979, Rapid evaluation of soil erosion and soil lifespan in the grazing lands of Kenya: *Proc. Internatl. Assoc. Hydrol. Sci., Canberra Symposium on the Hydrology of Areas of Low Precipitation*, p. 421-428.
5. Dietrich, W.E., J.D. Smith and T. Dunne, 1979, Flow and sediment transport in a sand bedded meander: *Jour. of Geol.*, v. 87, p. 305-315.
6. Dunne, T., W.E. Dietrich and M. Brunengo, 1980, Simple, portable equipment for erosion experiments under artificial rainfall: *Jour. Agric. Engineer. Res.*, v. 25, p. 1-8.
7. Dunne, T. and W.E. Dietrich, 1980, Experimental study of Horton overland flow on tropical hillslopes: I. Soil condition, infiltration and frequency of runoff: *Zeit. für Geomorph., Suppl. Bd. 35*, p. 40-59.
8. Dunne, T. and W.E. Dietrich, 1980, Experimental study of Horton overland flow on tropical hillslopes: II. Hydraulic characteristics and hillslope hydrographs: *Zeit. für Geomorph., Suppl. Bd. 35*, p. 60-80.
9. Dunne, T., W.E. Dietrich, N. Humphrey and D. Tubbs, 1981, Geologic and geomorphic aspects of gravel supply in western Washington, *in*, *Proc. on Salmon-spawning Gravels*, J.J. Cassidy (ed.), Wash. State Water Res. Center, Report No. 39, p. 75-100.
10. Dietrich, W.E., T. Dunne, N.F. Humphrey and L.M. Reid, 1982, Construction of sediment budgets for drainage basins: *in* *Sediment Budgets and Routing in Forested Drainage Basins*, F.J. Swanson, R.J. Janda, T. Dunne, and D.N. Swanson (eds.), U.S.D.A. Forest Service General Technical Report PNW-141, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon, p. 5-23.
11. Dunne, T. and W.E. Dietrich, 1982, Sediment sources in tropical catchments: *Proc. Soil Erosion and Conservation in the Tropics*, Amer. Soc. of Agronomy Symp., Colorado State University, August 1979, Spec. Publ., no. 43, p. 41-55.
12. Dietrich, W.E., 1982, Settling velocity of natural particles: *Water Resources Research*, v. 18, no. 6, p. 1615-1626.
13. Dietrich, W.E., 1982, Mechanics of a river meander: *in*, *Field Trip Guidebook 1982 Conference of the American Geomorphological Field Group*, Pinedale, Wyoming, L.B. Leopold (ed.), p. 18-29.
14. Dietrich, W.E., D. Windsor and T. Dunne, 1982, Geology, climate, and hydrology of Barro Colorado Island: *in*, *Seasonal Rhythms and the Ecology of a Tropical Forest: Seasonal Rhythms and Long-term Changes*, E.G. Leigh, Jr., A.S. Rand and D.M. Windsor (eds.), Smithsonian Institution Press, Washington, D.C., p. 21-46.
15. Dietrich, W.E. and J.D. Smith, 1983, Influence of the point bar on flow through curved channels, *Water Resources Research* v. 19, no. 5, p. 1173-1192.
16. Dietrich, W.E. and R. Dorn, 1984, Significance of thick deposits of colluvium on hillslopes: a case study involving the use of pollen analysis in the coastal mountains of Northern California, *Jour. Geol.*, v. 92, p. 147-158.
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  20. Reneau, S.L., W.E. Dietrich, C.J. Wilson, and J.D. Rogers, 1984, Colluvial deposits and associated landslides in the northern S.F. Bay Area, California, USA, *Proceedings IV International Symposium on Landslides*, Toronto, 1984, pp. 425-430.
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  22. Dietrich, W.E., C.J. Wilson and S.L. Reneau, 1986, Hollows, colluvium and landslides in soil-mantled landscapes, in: *Hillslope Processes, Sixteenth Annual Geomorphology Symposium*, A. Abrahams (ed.), Allen and Unwin, Ltd., p. 361-388.
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52. Dietrich, W.E., C.J. Wilson, D.R. Montgomery, J. McKean, and R. Bauer, 1992, Erosion thresholds and land surface morphology, *Geology*, v. 20, p. 675-679.
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54. Seidl, M.A. and W.E. Dietrich, 1992, The problem of channel erosion into bedrock, in K.H. Schmidt and J. de Ploey (Editors), *Functional geomorphology: landform analysis and models*, *Catena Supplement* 23, p. 101-124.
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58. Montgomery, D. R. and W.E. Dietrich, 1994, A physically-based model for topographic control on shallow landsliding, *Water Resources Research*, vol.30,no.4, p.1153-1171.
59. Booker, F.A., W.E. Dietrich and L.M. Collins, 1993, Runoff and erosion after the Oakland Firestorm: expectations and observations, *California Geology*, volume 46, number 6, p.159-173.
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62. Day, G.M., W.E. Dietrich, S.C. Apte, G.E. Batley, and A. J. Markham, 1993, The fate of mine-derived sediments deposited on the middle Fly River flood-plain of Papua New Guinea, in R. J. Allan and J.O. Nriagu (Editors), *International Conference on Heavy Metals in the Environment*, Volume I, CEP Consultants, Ltd., Edinburgh, UK, p. 423-426.
63. Montgomery, D.R. and W.E. Dietrich, 1994, Landscape dissection and drainage area-slope thresholds, in *Process Models and Theoretical Geomorphology*, edited by M.J. Kirkby, John Wiley and Sons, p.221-246.
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74. Power, M. E., W. E. Dietrich, and K. O. Sullivan, in press, Experiment, observation and inference in river and watershed investigations, in Reseratis, W.J. and J. Berando, Editor, *Issues and perspectives in experimental ecology*, Oxford University Press
75. Dietrich, W.E., G. Day and G. Parker, in press, The Fly River, Papua New Guinea: inferences about river dynamics, floodplain sedimentation and fate of sediment, in A. Miller and A. Gupta (ed), *Varieties of Fluvial Form*, J. Wiley.
76. Anderson, S. A. , W. E. Dietrich, R. Torres, D.R. Montgomery and K. M. Loague ,1997, Concentration-discharge relationships in runoff from a steep, unchanneled catchment, *Water Resources Research*, vol. 33, no. 1, p. 211-225.
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78. Montgomery, D.R., W. E. Dietrich, R. Torres, S. P. Anderson and J. T. Heffner, 1997, Hydrologic response of a steep unchanneled valley to natural and applied rainfall, *Water Resources Research*, vol. 33, no.1, p. 91-109.
79. Montgomery, D. R. W. E. Dietrich and K. Sullivan, in press, *The role of GIS in watershed Analysis*
80. Dietrich, W. E. and D. R. Montgomery, in press, Hillslopes, Channels and landscape Scale, In G. Sposito (ed) *Scale dependence and Scale Invariance in Hydrology*, Cambridge University Press.
81. MacDonald, L.H., D. M. Anderson,, and W. E. Dietrich, in press, *Paradise Threatened: Land use and erosion on St. John, U.S. Virgin Islands*, *Environmental Management*.
82. Heimsath, A. H., W. E. Dietrich, K. Nishiizumi, and R. C. Finkel, 1997, The soil production function and landscape equilibrium, *Nature* - July 24 issue.

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*Education:*

B.S., University of California, Berkeley, 1974 (Forest Resource Management)  
M.L.A., University of California, Berkeley, 1976 (Landscape Architecture)  
Ph.D., University of California, Berkeley, 1985 (Wildland Resource Science)

*Experience:*

Associate Cooperative Extension Forestry Specialist (Forestry Program Leader), University of California, Berkeley, Department of Environmental Science, Policy and Management, 1991-present  
Associate Cooperative Extension Forestry Advisor, University of California Cooperative Extension, Humboldt/Del Norte Counties, 1988-1991  
Independent Consulting Ecologist, 1987-1988  
Post Doctoral Research Ecologist, Oregon State University, Department of Forest Science, Corvallis, 1986-1987  
Assistant Professor of Land Use, University of Wisconsin, Department of Plant and Earth Science, River Falls, 1984-1986  
Vice President and Manager of Northern California Operations, LSA Inc., Consulting Environmental Planners, Berkeley, CA, 1977-1984  
Lecturer, University of California, Departments of Conservation and Resource Studies and Landscape Architecture, Berkeley, 1977-1979, 1983-1984  
Planner, County of Marin, CA and City of Novato, CA, 1973-1977

*Recent Professional Highlights:*

President-elect, Watershed Management Council; 1997  
Development and presentation of workshops on forest monitoring, forest management and stewardship; development of life-long learning curriculum; Forest Stewardship Program, State of California; 1996-present  
Development of basic curriculum for ecosystem science and management, tailored for natural resource workers on Indian Reservations; content of the curriculum blends traditional American Indian ecological knowledge with western scientific knowledge; 1995  
Development and testing of a multi-scale, quantitative decision analysis procedure for selecting sites for riparian restoration; funded by U.S. Environmental Protection Agency, Wetlands Research Program; 1991-1994  
Chair, Watershed Management Council Symposium on Watershed Restoration, Ashland, OR; 1994  
Manager, Hoopa Valley Tribal Forestry Program (under cooperative agreement between the Hoopa Valley Tribe and the University of California); 1993  
Member, California Board of Forestry team preparing a Habitat Conservation Plan for the northern spotted owl on private lands in California; 1991-1992

**RICHARD R. HARRIS**

**PUBLICATIONS (1985-PRESENT)**

CODES:     A Refereed Research Articles  
          B Book Chapters and Reviews  
          C Non-refereed Research Articles  
          D Abstracts for Oral Presentations and Posters  
          E Books  
          F Popular and Miscellaneous

F 1. 1985 Harris, R.R. 1985. Relationships between vegetation and fluvial geomorphology at Cottonwood Creek, California. Ph.D. Dissertation, Department of Forestry and Resource Management, University of California, Berkeley, CA. 329 p.

A 2. 1985 Harris, R.R., R.J. Risser and C.A. Fox. 1985. A method for evaluating streamflow discharge-plant species occurrence patterns of headwater streams. p. 97-90. In: Riparian Ecosystems and their Management; Reconciling Conflicting Uses. Proceedings of the First North American Riparian Conference, 16-18 April, 1985, Tucson, AZ. USDA-Forest Service Gen. Tech. Rep. RM-120.

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A 4. 1986 Harris, R. R. 1986. Occurrence patterns of riparian plants and their significance to water resource development. *Biological Conservation* 38:273-286.

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A 6. 1987 Harris, R.R. 1987. Impacts of hydroelectric development on montane riparian forests of California. pp. 21-30 In: T. Fujimori and M. Kimura (eds.). Human impacts and management of mountain forests. Forestry and Forest Products Research Institute, Ibaraki, Japan.

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A 9. 1988 Harris, R.R. 1988. Associations between stream valley geomorphology and riparian vegetation as a basis for landscape analysis in the eastern Sierra Nevada, California, USA. *Environmental Management* 12:219-228.

F 10. 1989 Harris, R.R. 1989. Summary of the workshop on assessing cumulative impacts of timber operations. 30 January-3 February, 1989, Fort Bragg, CA. University of California Cooperative Extension. Eureka, CA. 13 pp.+ app.

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F 11.1989 Harris, R.R. (ed.). 1989. Harvesting trees while retaining our fish: a challenge we can meet. Proceedings of the fifteenth annual conference of the Humboldt Chapter, American Fisheries Society, Scotia, CA 22 April, 1989. University of California Cooperative Extension, Eureka, CA. 14 pp.+ app.

A 12.1989 Harris, R.R. 1989. Riparian communities of the Sierra Nevada, CA and their environmental relationships. p. 393-399. In: Proceedings of the California Riparian Systems Conference: Protection, Management and Restoration for the 1990s. Davis, CA. 22-24 September, 1988. USDA-Forest Service Gen. Tech. Rep. PSW 110.

B 13.1990 Risser, R.J. and R.R. Harris. 1990. Mitigating impacts to riparian vegetation on western montane streams. Chapter 9 In: J.A. Gore (ed.). Alternatives in regulated flow management. CRC Press, Inc., Boca Raton, FLA.

D 14.1990 Harris, R.R., G. Nakamura, G. Blomstrom, P. Abbott, J. Biondini and R. Vigil. 1990. Status report: integrated resource management planning on the Hoopa Valley Reservation, CA. p. 239-260. In: Proceedings of the 14th Annual National Indian Timber Symposium. Cherokee, NC. 3-6 April 1990. Intertribal Timber Council, Vancouver, WA.

D 15.1991 Harris, R.R. 1991. Integrated resource management on the Hoopa Valley Indian Reservation: a case study in collaboration and self-determination. Poster presented at the Society of American Foresters National Convention. San Francisco, CA. 4-7 August, 1991.

C 16.1991 Harris, R.R. 1991. Hoopa Valley Indian Reservation timber inventory analysis. Report to the Hoopa Valley Tribal Council. Dept. of Forestry and Resource Management. University of California, Berkeley. 48 p.+ app.

F 17.1991 Harris, R.R. 1988-91. North coast forest echoes. Quarterly newsletter of the Extension Forestry Program, Humboldt-Del Norte Counties. Vol. 1-3.

F 18.1992 Harris, R.R. 1991-92. North coast biodiversity news. Quarterly newsletter of the Extension Forestry Program. Dept. of Forestry and Resource Management. University of California, Berkeley. Issues 1-9.

E 19.1992 Harris, R.R. and D.E. Erman (Technical Coordinators) and H.M. Kerner (Editor). 1992. Proceedings of symposium on biodiversity of northwestern California, October 28-30, 1991, Santa Rosa, CA University of California, Wildland Resources Center Report No. 29, Berkeley, CA. 316 p.

F 20.1992 Tuazon, R., J. DePree, J. Gaffin, R.R. Harris, R. Johnson, G. Murray, L. Roush, W. Whitlock and R. Zwanziger. 1992. Northern spotted owl habitat conservation plan for private forestlands in California. Report to California Board of Forestry, Sacramento, CA. 61 p. + app.

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D 22.1994 Harris, R.R. 1994. Selecting stream reaches for evaluation of riparian restoration potential. Paper presented at 15th Annual Meeting, Society of Wetland Scientists, May 30-June 3, 1994, Portland, OR.

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- C 23.1994 LeBlanc, J. and R.R. Harris. 1994. Selecting sites for riparian restoration: summary of the process developed under cooperative agreement between the University of California and US Environmental Protection Agency. Final Report to US Environmental Protection Agency, Cooperative Agreement CR 819510-01-0. 12 p.
- C 24.1994 Harris, R.R., L. Huntsinger, S. McCaffrey and P. Hopkinson. 1994. Use of geographical information systems versus manual techniques for map analysis in riparian restoration projects: a comparison. Final Report to US Environmental Protection Agency, Research Cooperative Agreement CR 819510-01-0. 26 p. + app.
- F 25.1994 Harris, R.R. 1994. Sustainable forestry in Mexico. *Natural Resources News* 2 (1):1,3,8.
- F 26.1994 Harris, R.R., and L. Huntsinger. 1994. Lessons on stewardship from the past and present. *Natural Resources News* 2 (2):1,3-4.
- C 27.1994 Harris, R.R. 1994. Strategies for protecting, enhancing and restoring the riparian communities of the Noguera Ribagorçana natural area, Catalonia, Spain. Published by the Department of the Environment, Natural Heritage Program, Government of Catalonia, Barcelona, Spain. 25 p. + maps (in Catalan).
- F 28.1994 Harris, R.R. and F. Giro. 1994. A land without wild rivers: comments on a trip to the Catalonian region of Spain. Published by the Department of the Environment, Natural Heritage Program, Government of Catalonia, Barcelona, Spain. 9 p (in Catalan).
- C 29.1994 Harris, R.R. 1994. Riparian restoration in the context of conservation planning at the watershed scale. Paper presented at a Workshop on Riparian Restoration in the Upper Arkansas Basin, US Environmental Protection Agency, Denver, CO. 10 p.
- F 30.1994 Harris, R.R. 1994. Silvicultura sostenible en Mexico. *Foro Forestal* 1 (2):8 (in Spanish).
- A 31.1995 Harris, R.R., Blomstrom, G. and G. Nakamura. 1995. Tribal self-governance and forest management at the Hoopa Valley Indian Reservation, Humboldt County, CA. *American Indian Culture and Research Journal* 19:1-38.
- A 32.1995 Harris, R.R. 1995. Drainage basin analysis and conservation planning for riparian vegetation. P. 27-36 IN: Harris, R.R., R. Kattelmann, H. Kerner and J. Woled (editors). 1995. *Watersheds '94 Respect, Rethink and Restore*, Proceedings of the Fifth Biennial Watershed Management Conference, Ashland, OR, 16-18 November, 1994 University of California, Water Resources Center Report No. 86, Davis, CA.
- E 33.1995 Harris, R.R., R. Kattelmann, H. Kerner and J. Woled (editors). 1995. *Watersheds '94 Respect, Rethink and Restore*, Proceedings of the Fifth Biennial Watershed Management Conference, Ashland, OR, 16-18 November, 1994, University of California, Water Resources Center Report No. 86, Davis, CA. 150 p.
- E 34.1995 Harris, R.R. 1995. Ecosystems and Indian people: a curriculum on ecosystem science and management for Indian people working in natural resource management. Volume 1: Syllabus and Lecture Notes. Department of Environmental Science, Policy, and Management, Cooperative Extension Forestry, University of California, Berkeley. 160 p.

Richard R. Harris

E 35.1995 Harris, R.R. (editor) 1995. Ecosystems and Indian people: a curriculum on ecosystem science and management for Indian people working in natural resource management. Volume 2: Assigned Readings. Department of Environmental Science, Policy, and Management, Cooperative Extension Forestry, University of California, Berkeley. 667 p.

D 36.1995 Harris, R.R. and C. Olson. 1995. Multiscale planning for riparian restoration on streams of the western US. Paper presented at Annual Conference, Society for Ecological Restoration, 14-16 September, 1995, Seattle, WA.

D 37.1995 Harris, R.R. 1995. An ecosystem science curriculum for Indian natural resource workers. Paper presented at the Eleventh Annual California Indian Conference, 6-8 October, 1995, University of California, Los Angeles, CA.

D 38.1995 Nakamura, G.M. and R.R. Harris. 1995. Natural resource inventory of Indian-owned public domain allotments in California. Paper presented at the Eleventh Annual California Indian Conference, 6-8 October, 1995, University of California, Los Angeles CA.

A 39. 1995 Harris, R.R. 1996. Forest management in a resource-dependent American Indian community. P. 97-111 IN: Sokolow, A.D. (ed.). 1996. Community and university: case studies and commentary on University of California Cooperative Extension interventions. California Communities Program, University of California, Davis, CA; University of California Division of Agricultural and Natural Resources Publication 3371.

A 40. Means, J.E., R.R. Harris, T.E. Sabin and C.N. McCain. 1996. Spatial variation in productivity of Douglas-fir stands on a valley floor in the western Cascades range, Oregon. Northwest Science 70:201-211.

A 41. Harris, R.R., P. Hopkinson, S. McCaffrey and L. Huntsinger. 1997. Use of geographical information systems versus manual techniques for map analysis in riparian restoration projects: a comparison. Journal of Soil and Water Conservation 52:140-145.

D 42. Harris, R.R., J. Martin and E. Sam. 1997. Tribal visions: the Navajo Nation forest management plan. Paper presented at the 21st Annual Intertribal Timber Symposium, 2-6 June, 1997, Menominee Nation, Keshena, WI.

A 43. Olson, C. and R.R. Harris. In press. Applying a two-stage system to prioritize riparian restoration at the San Luis Rey River, San Diego County, California. Restoration Ecology.

A 44. Harris, R.R. and C. Olson. In press. Two-stage system for prioritizing riparian restoration at the stream reach and community scales. Restoration Ecology.

A 45. Harris, R.R. In press. No wild rivers. Wild Earth

A 46. Harris, R.R. and R. Cox. In press. Curriculum on ecology and natural resource management for Indian natural resource workers. American Indian Culture and Research Journal 21(3).

A 47. Nakamura, G.M. and R.R. Harris. In press. Natural resource inventory of Indian-owned public domain allotments in California. American Indian Culture and Research Journal 21(3).

Richard R. Harris

F 48. Harris, R.R., T.E. Lisle and R. Ziemer (compilers). In press. Aftermath of the 1997 flood: summary of a workshop. USDA-Forest Service, Watershed Analysis Center, 8-9 April, 1997, McKinleyville, CA. Watershed Management Council Networker 7(2):

A 49. Harris, R.R. and C. Olson. Submitted. Vegetation analysis for riparian community restoration. Biological Conservation.

A 50. Harris, R.R., Nakamura, G.M. and G. Blomstrom. Submitted. Computerized forest planning in Indian Country: the Hoopa Valley case study. Journal of Forestry.

Curriculum Vitae

**G. MATHIAS KONDOLF**  
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*kondolf@ced.berkeley.edu*

**EDUCATION**

THE JOHNS HOPKINS UNIVERSITY - PhD, Geography and Environmental Engineering 1988.

UNIVERSITY OF CALIFORNIA AT SANTA CRUZ - MS, Earth Sciences 1982

PRINCETON UNIVERSITY - AB *cum laude*, Geology 1978.

**PROFESSIONAL EXPERIENCE**

**UNIVERSITY OF CALIFORNIA AT BERKELEY**

*Associate Professor of Environmental Planning, 1994 to present, and Associate Professor of Geography, 1996-present. Assistant Professor of Environmental Planning, 1988-1994. Courses: Environmental Geology for Planners, Hydrology for Planners, Restoration of Rivers and Streams, Ecological Analysis in Urban Design, Introduction to Environmental Sciences.*

**WHITE MOUNTAIN RESEARCH STATION**

*Research Scientist, 1989-1993 (33% appointment).*

**OAK RIDGE NATIONAL LABORATORY**

*Graduate Research Participant, Environmental Sciences Division, 1985-1987.*

**US GEOLOGICAL SURVEY**

*Hydrologic Field Assistant, 1985.*

**THE JOHNS HOPKINS UNIVERSITY**

*Teaching Assistant in Geomorphology, 1984.*

**UNIVERSITY OF CALIFORNIA AT SANTA CRUZ**

*Teaching Assistant in Environmental Geology, 1979; Geomorphology, 1980, 1981; and Alternative Energy and Appropriate Technology, 1980; Research Assistant in EPA-supported hydrologic studies, 1980.*

**PRINCETON UNIVERSITY**

*Research Assistant in NSF-supported study developed oceanographic laboratory exercises, 1978-1979.*

**PROFESSIONAL AFFILIATIONS**

*American Fisheries Society  
American Geophysical Union  
American Water Resources Association  
Council of Educators in Landscape Architecture  
International Association for Scientific Hydrology  
Watershed Management Council*

**AWARDS AND FELLOWSHIPS**

*Pacific Gas and Electric Company-UC Wildlands Research Center,  
"Award for Excellence in Wildlands Research, 1993. (for studies on Trinity River)"*

*Oak Ridge Associated Universities, Graduate Research  
Participation Fellowship, 1985-1986; 1986-1987.  
The Johns Hopkins University Fellowship, 1982-1983.  
Middle Atlantic Division, American Assn. of Geographers,  
"Outstanding Graduate Student of the Year," 1983.  
Sigma Xi, elected to membership, June 1978.  
New Jersey Assn. of Broadcasters, First place in Public Affairs  
1979 for radio documentary, "Einstein, the Man Behind the Mind," co-produced with Judi Muller, WHWH,  
Princeton, N.J.*

**SERVICE AS PEER-REVIEWER**

*National Science Foundation  
Foundation for Research, Science, and Technology, New Zealand  
Council of Educators in Landscape Architecture  
University of California Press  
California Water Resources Center  
Utah Water Resources Center  
Aquatic Conservation  
Biological Conservation  
Canadian Journal of Fisheries and Aquatic Sciences  
Conservation Biology  
Environmental Management  
Journal of Hydraulic Engineering  
North American Journal of Fisheries Management  
Water Resources Research*

### FUNDED RESEARCH PROJECTS AT UNIVERSITY OF CALIFORNIA

- Assessment of Geomorphic and Sediment-Related Issues in Jamison Creek, Plumas-Eureka State Park.* (\$24,000 study funded by the California Department of Parks and Recreation, 1988-1990)
- Management of Coarse Sediment in Regulated Rivers.* (\$35,000 study funded by University of California Water Resources Center, 1989-1991)
- Development of Debris Management Plan for General Creek, Sugar Pine Point State Park.* (\$8,000 study funded by the California Department of Parks and Recreation, 1989-1990)
- Initial studies - Upper Truckee River Marsh Wildlife Enhancement and SEZ (Stream Environment Zone) Restoration.* (responsible for hydrologic and geomorphic aspects of \$150,000 study funded by the California Tahoe Conservancy, 1989-1991)
- Empirically-Verified Flushing Flow Recommendations for the Trinity River below Lewiston Dam.* (\$87,000 study funded by the US Fish and Wildlife Service, 1991-1994)
- Evaluation of Impacts of a Hydroelectric Project on the Riparian, Aquatic, and Recreational Resources of the North Fork Stanislaus River within Calaveras-Big Trees State Park.* (\$48,000 study funded by the California Department of Parks and Recreation, 1990-1992)
- Debris Flow Hazards along the Paparoa Range Front, West Coast, South Island, New Zealand.* (\$10,000 study funded by the University of California at Berkeley Faculty Senate Committee on Research, 1990-1991)
- Analysis of Sedimentation in Hat Creek Wild Trout Reach.* (\$40,000 study funded by the California Department of Fish and Game, 1991-1993)
- Hydrological and Geomorphologic Investigations on Coyote Creek, Anza Borrego Desert State Park.* (\$25,000 study funded by the California Department of Parks and Recreation, 1992-1993)
- Hydrological and Geomorphologic Analysis for Restoration Design, Jamison Creek, Plumas-Eureka State Park.* (\$65,000 study funded by the California Department of Parks and Recreation, 1993-1994)
- Assessment of restoration success and restoration potential in floodplain gravel pits.* (\$37,000 study funded by California Water Resources Center, 1994-1996)

#### UNIVERSITY COMMITTEE SERVICE

- Chancellor's Advisory Committee on Strawberry Creek, University of California, Berkeley. Chair, 1990-present.
- Environmental Health and Safety Policy Committee, University of California, Berkeley. Ex-Officio Member, 1993-present.
- Campus Environmental Coordinating Group. Member, 1992-1994.
- Environmental Sciences Advisory Committee, University of California, Berkeley. Member, 1994-present.
- Environmental Council, University of California, Berkeley. Member of Executive Committee, 1994-present.
- Energy and Resources Group, University of California, Berkeley. Affiliated faculty, 1993 to present. Member Executive Committee, 1994-1996.
- White Mountain Research Station Advisory Committee, member, 1995-present.

#### OTHER COMMITTEE SERVICE

- Scott's Creek Technical Advisory Committee, Lake County Planning Department, Lakeport, California. Member, 1994-1995.
- Trinity River Fisheries Restoration Technical Advisory Committee, US Fish and Wildlife Service, Weaverville, California, member 1995-present.
- Los Vaqueros Watershed Technical Advisory Committee, Contra Costa Water District, member 1996.

## CONSULTANCIES

- 1980-1983. Monterey Peninsula Water Management District, Monterey, California. Conducted studies of historical channel changes and downstream changes in baseflow in the Carmel River; designed and implemented data collection program in surface water hydrology, suspended and bedload sediment transport in Carmel River and seven tributaries.
1983. Office of Surface Mining, US Department of Interior. Mapped alluvial valley floors in Powder River Basin of Montana and Wyoming. (Subconsultant to Earth Resources Associates, Helena, Montana)
- 1986-1988. California Department of Fish and Game. Conducted analysis of historical channel stability and of spawning gravels on the Lower Yuba River. (Subconsultant to Philip Williams and Associates, San Francisco, and Beak Consultants, Sacramento)
1986. Oak Ridge National Laboratory, Oak Ridge, Tennessee. Conducted hydrologic and sediment-related studies on the Merced River for FERC Environmental Impact Study of El Portal hydroelectric project.
1986. Oroville-Wyandotte Irrigation District, California. Conducted studies of sediment-related problems on the South Fork Feather River and Slate Creek. (Subconsultant to EBASCO Environmental, Sacramento)
- 1986-1989. Yuba County Water Agency, Marysville, California. Conducted studies on characteristics and downstream transport of sediment sluiced from Our House Dam, Middle Yuba River. (Subconsultant to EBASCO Environmental, Sacramento)
- 1987-1991. California Department of Fish and Game. Conducted hydrologic, historical, channel stability, and spawning gravel analyses on Rush and Lee Vining Creeks, Mono County, and Battle Creek, Lassen County.
1988. Government of West Germany, GTZ (German Technical Cooperation Unit, Frankfurt). Developed terms of reference for environmental impact assessment of major water storage project on Nile River, under consideration for funding and construction by the Government of West Germany. (Subconsultant to Dr. Ing Peter Geldner, Karlsruhe)
- 1989-1990. California Department of Justice, Office of the Attorney General, Sacramento. Provided expert testimony regarding probable impacts of proposed instream gravel mine on Cottonwood Creek and provided expert testimony on coastal changes along the southern shore of Lake Tahoe.
- 1989-1990. Monterey Peninsula Water Management District, Monterey, California. Analyzed probable effects of reservoir alternatives on downstream channel geometry.
- 1990-1991. California State Water Resources Control Board. Provided evaluation of hydrologic issues relating to riparian vegetation management and enhancement in the Mono Basin for development of an EIR on water rights allocation in the basin. (Subconsultant to Jones and Stokes, Inc., Sacramento)
- 1990-1992. California Department of Transportation, Division of Structures. Conducted geomorphic analysis of channel processes and channel change on Stony Creek, Glenn County, to determine causes of bridge scour and for evaluation of countermeasures. (Subconsultant to San Diego State University Foundation)
1991. District Attorney, County of Monterey, California. Analyzed probable residence time in Wildcat Creek, Big Sur, for sediment eroded from illegal road.
- 1992-1993. California Department of Water Resources, Reclamation Board. Analyzed channel changes in the Sacramento River between Deer Creek and Stony Creek, provided geomorphic input into selection of solutions for repair of fish screens at intake structure for Glenn-Colusa Irrigation District. (Subconsultant to

HDR Engineering, El Dorado Hills, California)

- 1992-1993. Department of Planning, County of Humboldt, California. Provided guidance regarding evaluation of geomorphic and environmental impacts of instream aggregate extraction in the Mad and Eel Rivers and development of a comprehensive management plan.
1993. Oak Ridge National Laboratory, Oak Ridge, Tennessee. Conducted hydrologic, vegetative, and sediment-related studies on the Lower Mokelumne River for FERC Environmental Impact Study of Camanche Dam hydroelectric project.
- 1993-1994. California Department of Fish and Game, Sacramento. Provided expert testimony concerning flushing flow requirements for Rush Creek, Mono County, before the State Water Resources Control Board.
1994. Dun & Martinek, Eureka, California. Provided third-party review of technical documents concerning sediment transport, channel change, and management of gravel mining in the Russian River, Sonoma County.
- 1994-1995. Department of Planning, County of Yolo, California. Conducted geomorphic and historical channel analyses, provided guidance on management of instream and off-channel mining. (Subconsultant to Northwest Hydraulic Consultants, West Sacramento, California)
- 1994-1995. Oak Ridge National Laboratory, Oak Ridge, Tennessee. Evaluated geomorphic issues relevant to spawning gravels on the Lower Tuolumne River, California.
1995. California Environmental Law Project, San Francisco. Evaluated flood control project proposed for Murietta Creek, Riverside County, California. (with W.V.G Matthews)
1995. Monterey Peninsula Water Management District. Reviewed geomorphic and hydrologic analysis conducted for proposed wetland mitigation site at San Clemente Reservoir, Carmel River.
1996. Placer County Water Agency, Foresthill, California. Provided geomorphic analysis of flushing sediments released from South Fork Long Canyon Dam.
1996. Bureau of Land Management, Coeur d'Alene, Idaho. Provided reconnaissance-level geomorphic assessment and guidance for planning restoration projects on Pine Creek.

#### PEER-REVIEWED PUBLICATIONS

- Kondolf, G.M., and W.V.G. Matthews. 1986. Transport of tracer gravels on a coastal California river. *Journal of Hydrology*, 85:265-280.
- Kondolf, G.M., and R.R. Curry. 1986. Channel erosion along the Carmel River, Monterey County, California. *Earth Surface Processes and Landforms*, 11:307-319.
- Kondolf, G.M., L.M. Maloney and J.G. Williams. 1987. Effect of bank storage, and well pumping on base flow, Carmel River, California. *Journal of Hydrology*, 91:351-369.
- Kondolf, G.M., G.F. Cada and M.J. Sale. 1987. Assessment of flushing flow requirements for brown trout spawning gravels in steep streams. *Water Resources Bulletin*, 23:927-935.
- Kondolf, G.M., J.W. Webb, M.J. Sale and T. Felando. 1987. Basic hydrologic studies for assessing impacts of flow diversions on riparian vegetation: examples from streams of the eastern Sierra Nevada, California. *Environmental Management*, 11:757-769.
- Swanson, M.L., G.M. Kondolf and P.J. Boison. 1989. An example of rapid gully initiation and extension by subsurface soil erosion: coastal San Mateo County, California. *Geomorphology*, 2:393-403.
- Kondolf, G.M., S.S. Cook, H.R. Maddux and W.R. Persons. 1989. Spawning gravels of rainbow trout in the Grand Canyon, Arizona. *Journal of the Arizona-Nevada Academy of Science*, 23:19-28.
- Keller, E.A., and G.M. Kondolf. 1990. Groundwater and fluvial processes: selected observations. *Geological Society of America Special Paper*, 252:319-340.
- Kondolf, G.M. 1990. Case history: Bank erosion from water table drawdown, coastal California. in Keller, E.A. and G.M. Kondolf. 1990. Groundwater and fluvial processes: selected observations. *Geological Society of America Special Paper*, 252:334-338.
- Kondolf, G.M., G.F. Cada, M.J. Sale and T. Felando. 1991. Distribution of potential salmonid spawning gravels in steep, boulder-bed streams of the eastern Sierra Nevada. *Transactions of the American Fisheries Society*, 120:177-186.
- Kondolf, G.M., and W.V.G. Matthews. 1991. Unmeasured residuals in sediment budgets: a cautionary note. *Water Resources Research*, 27:2483-2486.
- Kondolf, G.M., and S. Li. 1992. The pebble count technique for quantifying surface bed material size in stream flow studies. *Rivers*, 3:80-87.
- Charbonneau, R., and G.M. Kondolf. 1993. Land use change in California: Nonpoint source water quality impacts. *Environmental Management*, 17:453-460.
- Kondolf, G.M., and M.G. Wolman. 1993. The sizes of salmonid spawning gravels. *Water Resources Research*, 29:2275-2285.
- Kondolf, G.M., M.J. Sale and M.G. Wolman. 1993. Modification of gravel size by spawning salmonids. *Water Resources Research*, 29:2265-2274.
- Kondolf, G.M., and Swanson, M.L. 1993. Channel adjustments to reservoir construction and instream gravel mining, Stony Creek, California. *Environmental Geology and Water Science*, 21:256-269.

- Kondolf, G.M. 1993. The reclamation concept in regulation of gravel mining in California. *Journal of Environmental Planning and Management*, 36:397-409.
- Kondolf, G.M., and P. Vorster. 1993. Changing water balance over time in Rush Creek, eastern California, 1860-1992. *Water Resources Bulletin*, 29:823-832.
- Kondolf, G.M. 1993. Lag in stream channel adjustment to livestock exclosure in the White Mountains of California. *Restoration Ecology*, 1:226-230.
- Kondolf, G.M. 1994. Livestock grazing and habitat for a threatened species: land-use decisions under scientific uncertainty in the White Mountains of California. *Environmental Management*, 18(4):501-509.
- Kondolf, G.M. 1994. Geomorphic and environmental effects of instream gravel mining. *Landscape and Urban Planning* 28:225-243.
- Kondolf, G.M. 1994. Environmental planning in the regulation and management of instream gravel mining in California. *Landscape and Urban Planning*. 29:185-199.
- Kondolf, G.M., and E.M. Micheli. 1995. Evaluating stream restoration projects. *Environmental Management*. 19:1-15.
- Kondolf, G.M. 1995. Five elements for effective evaluation of stream restoration. *Restoration Ecology*. 3(2):133-136.
- Kondolf, G.M., and M. Larson. 1995. Historical channel analysis and its application to riparian and aquatic habitat restoration. *Aquatic Conservation*. 5:109-126.
- Kondolf, G.M. 1995. Geomorphological stream channel classification in aquatic habitat restoration: uses and limitations. *Aquatic Conservation*. 5:127-141.
- Kondolf, G.M. 1995. Managing bedload sediments in regulated rivers: examples from California, USA. *Geophysical Monograph*. 89:165-176.
- Kondolf, G.M., 1995. Discussion: Use of pebble counts to evaluate fine sediment increase in stream channels by John P. Potyondy and Terry Hardy. *Water Resources Bulletin*. 31(3):537-538.
- Kondolf, G.M. 1996. A cross section of stream channel restoration. *Journal of Soil and Water Conservation*. March-April 1996:119-125.
- Kondolf, G.M. Environmental effects of aggregate extraction from river channels and floodplains. in *Aggregate Resources: A Global Perspective*, P. Bobrowsky (ed.) (in press)
- Castleberry, D.T., J.J. Czech, D.C. Erman, D. Hankin, M. Healey, G.M. Kondolf, M. Mangel, M. Mohr, P.B. Moyle, J. Nielsen, T.P. Speed, and J.G. Williams. 1996. Uncertainty and instream flow standards. *Fisheries*. 21(8):20-21.
- Kondolf, G.M., and P.R. Wilcock. 1996. The flushing flow problem: defining and evaluating objectives. *Water Resources Research*. 32(8):2589-2599.
- Kondolf, G.M. Large-scale extraction of alluvial deposits from rivers in California: geomorphic effects and regulatory strategies. in *Proceedings of the Fourth International Workshop on Gravel Bed Rivers*, P. Klingeman, ed. (in press)

- Wilcock, P.R., G.M. Kondolf, W.V. Matthews, and A.F. Barta. 1996. Specification of sediment maintenance flows for a large gravel-bed river. *Water Resources Research*. 32(9):2911-2921.
- Wilcock, P.R., A.F. Barta, C.C. Shea, G.M. Kondolf, W.V. Matthews, and J. Pitlick. 1996. Observations of flow and sediment entrainment on a large gravel-bed river. *Water Resources Research*. 32(9):2897-2909.
- Kondolf, G.M., R. Kattelman, M. Embury, and D.C. Erman. 1996. Status of riparian habitat. Chapter 36 in *Sierra Nevada Ecosystem Project: Final Report to Congress*, Vol. II, Assessments and scientific basis for management options. Report No. 88, Centers for Water and Wildland Resources, University of California, Davis, p.36-1 - 36-22.
- Kondolf, G.M., J.C. Vick, and T.M. Ramirez. 1996. Salmon spawning habitat rehabilitation on the Merced River, California: an evaluation of project planning and performance. *Transactions of the American Fisheries Society*. 125:899-912.
- Kondolf, G.M. 1997. Application of the pebble count: reflections on purpose, method, and variants. *Journal of the American Water Resources Association (formerly Water Resources Bulletin)*. 33(1):79-87.
- Kondolf, G.M. 1997. Hungry water: effects of dams and gravel mining on river channels. *Environmental Management*. 21: (in press)
- Kondolf, G.M. Lessons learned from river restoration projects in California. *Aquatic Conservation*. (in review)

**Mary Eleanor Power**  
Department of Integrative Biology  
University of California  
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(510) 643-7776  
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Social Security Number: 026 42 2356

#### **Education**

B.A., Brown University (Biology), Providence, Rhode Island, 1971  
M.S., Boston University Marine Program (Biology), Woods Hole, Massachusetts, 1974  
PhD., University of Washington (Zoology), Seattle, Washington, Dec. 1981  
"The grazing ecology of armored catfish in a Panamanian stream"

#### **Professional Experience**

Visiting Assistant Professor, Division of Entomology and Parasitology, University of California, Berkeley, 1986-1987  
Assistant Professor, Department of Zoology, and Integrative Biology, University of California, Berkeley, 1987-1992  
Associate Professor, Department of Integrative Biology, University of California, Berkeley, 1992 - 1996  
Professor, Department of Integrative Biology, University of California, Berkeley, 1996 - present

Faculty Manager, Angelo Coast Range Reserve, 1989 - present  
Chair, Aquatic Ecology Section, Ecological Society of America, 1995-1996  
Chair, University-Wide Natural Reserve System Advisory Committee, 1995-1998

#### **Honors and Awards**

Sigma Xi, 1971  
Phi Beta Kappa, 1971  
B.A., magna cum laude 1971  
Summer student fellowships, Woods Hole Oceanographic Inst., 1972, 1973  
Nobel summer fellowship, Smithsonian Tropical Res. Inst., 1976  
Walter Rathbone Bacon Fellowship for Field Biology, Smithsonian Institution, 1978-80  
National Science Foundation Dissertation Improvement award 1978-80 (\$3300)  
National Science Foundation award (Ecology panel), 1983-85: "Multi-level effects of an algae-grazing minnow (*Camptostoma anomalum*) on north temperate streams (with Drs. W.J. Matthews and A.J. Stewart, Univ. Oklahoma (\$60,000))  
National Science Foundation supplementary award (Ecology panel), 1983-85: "Predators and algae-grazing minnows in north temperate streams: Does the kind of predator matter?" (with Drs. Matthews, Stewart, and R. Cashner) (\$10,848)  
Jasper Loftus-Hills Prize for Young Investigators, from the American Society of Naturalists, 1985  
National Science Foundation Visiting Professorship for Women, 1986-1988: "The role of primary consumers in structuring communities of northern Californian streams (\$145,265)  
Junior Faculty Award, University of California, Berkeley, 1988  
Water Resources Center (California) Award: 1988-90: "Seasonal and hydrologic controls of algal blooms in northern California rivers." (\$52,600)

- National Science Foundation award (Ecology panel), 1991-1993: "Productivity, plant biomass, and trophic interactions in rivers." (\$192,097)
- National Science Foundation award (Conservation Biology panel), 1991-1993: "Food web analysis of biodiversity: Application to algal-based river systems." (\$100,000)
- National Science Foundation award (Ecology panel) (1994-1996): "Disturbance and the structure of river food webs" (with J.T. Wootton and M.S. Parker, \$300,000)
- Water Resources Center (California) Award: 1993-1995. Effects of stream flow regulation and reduction of scouring floods on trophic transfer of biomass to fish in northern California rivers. (\$37,220)
- Fulbright Scholar 1994-1995

**Teaching Interests**

Community ecology, grazing, fish biology, freshwater ecology, food webs

## Publications

- Power, M.E. 1997. Estimating impacts of a dominant detritivore in a neotropical stream. *Review for Trends in Ecology and Systematics* 12: 47-49.
- Wootton, J.T., M.E. Power, R.T. Paine and C. Pfister. 1997. Nutrients, El Nino Events, and Food Chain Processes in the Rocky Intertidal. *Proc. National Academy of Sciences*, in press.
- Power, M.E., S.J. Kupferberg, G.W. Minshall, M.C. Molles and M.S. Parker. 1997. Sustaining Western Aquatic Food Webs. pp. 45-61 in W.C. Minckley (ed.) *Aquatic Ecosystems Symposium*, Tempe AZ. Report to the Western Water Policy Review Presidential Advisory Commission.
- Power, M.E., W.E. Dietrich, and K.O. Sullivan. Experiment, observation, and inference in river and watershed investigations. In W.J. Reseratis and J. Bernardo, eds. *Issues and perspectives in experimental ecology*. Oxford Univ. Press, Oxford, UK, in press.
- Carpenter, S., T. Frost, L. Persson, M. Power and D. Soto. 1996. Freshwater ecosystems: Linkages of complexity and processes. pp. 299-325 in Mooney, H.A., Cushman, J.H., Sala O.E. and Schulze, E-D. (eds.) *Functional Roles of Biodiversity: A Global Perspective*. Wiley, N.Y.
- Power, M.E., W.E. Dietrich, and J.C. Finlay. 1996. Dams and downstream aquatic biodiversity: Potential food web consequences of hydrologic and geomorphic change. *Environmental Management* 20: 887-895.
- Power, M.E., D. Tilman, J. A. Estes, B.A. Menge, W.J. Bond, L.S. Mills, G. Daily, J.C. Castilla, J. Lubchenco, and R.T. Paine. 1996. Challenges in the quest for keystones. *BioScience* 46: 609-620.
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## Curriculum Vitae

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Australian citizen; US Permanent Resident  
Date of Birth: March 14, 1943  
Education: BSc(Hons) Melbourne 1965, PhD DipEd Monash 1969

### Appointments:

- 1965-69 Tutor, Senior Tutor and Lecturer  
Department of Mathematics, Monash University
- 1969-73 Lecturer, Department of Probability and  
Statistics, University of Sheffield
- 1974-75 Associate Professor, Department of Mathematics  
University of Western Australia
- 1975-82 Professor, Department of Mathematics  
University of Western Australia  
(Head of Department 1980-82)
- 1983-87 Chief, Division of Mathematics and Statistics  
Commonwealth Scientific and Industrial Research  
Organization (Australia)
- 1987- Professor, Department of Statistics,  
University of California, Berkeley  
(Chair, 1989-93)
- 1996- Adjunct Professor, School of Mathematical Sciences,  
Australian National University

**Membership of Professional Bodies:**

Australian Mathematical Society  
Statistical Society of Australia  
Royal Statistical Society  
American Statistical Association (Fellow)  
Institute of Mathematical Statistics (Fellow)  
Biometric Society  
International Statistical Institute (Member)  
Genetics Society of America  
American Society of Human Genetics  
Society of Molecular Biology and Evolution  
American Association for the Advancement of Science (Fellow)

**Current/Previous Memberships:**

Australian Statistics Advisory Council (1983-87)  
Board of Management, Australian Institute of  
Criminology (1983-87)  
Board of Directors, SIROMATH Pty Ltd (1983-87)  
Genome Study Section, National Institutes of Health (1995-1998)

**Recent offices held in professional bodies:**

Western Northern American Region of Biometrics Society President-  
Elect (1991-92); President (1992-3); Past President (1993-4)  
Institute of Mathematical Statistics: Council Member (1993-1996)

**Editorial responsibilities:**

Associate Editor: Annals of Statistics (1986-1992); Journal of the  
American Statistical Association (1988- 1992); International Sta-  
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- [115] The influence of temperature on the survival of chinook salmon smolts (*Oncorhynchus tshawtscha*) migrating through the Sacramento-San Joaquin river delta of California (with P.F. Baker and F. Ligon) *Can. J. Fish & Aquat. Sci.* (1995) 52 855-864.
- [116] Statistical issues in constructing high-resolution physical maps (with D.O. Nelson) *Statistical Science* **9** (1994) 334-354.
- [117] Modelling interference in genetic recombination (with MS McPeck) *Genetics* **139** (1995) 1031-1044.

- [118] Statistical analysis of chromatid interference (with Hongyu Zhao and MS McPeck) *Genetics* **139** (1995) 1057-1065.
- [119] Statistical analysis of genetical interference using the chi-square model (with Hongyu Zhao and MS McPeck) *Genetics* **139** (1995) 1045-1056.
- [120] Tests of random mating for a highly polymorphic locus (with K. Jin, G. Thomson) *Biometrics* **51** (1995) 1064-1076.
- [121] On a shared allele test of random mating (with S. Zhou and R. A. Maller) *Austral. J. Statist.* **37** (1995) 61-72.
- [122] What is a genetic map function? In *Genetic Mapping and DNA Sequencing*, eds T. Speed and M.S. Waterman, Springer Verlag, New York, 1996.
- [123] REML. *Encyclopedia of Statistical Sciences*, Update volume. (Ed. C. B. Read) Wiley, New York.
- [124] Relative efficiencies of chi-square models of recombination for exclusion mapping and gene ordering (with D.R. Goldstein and H. Zhao) *Genomics* **27** (1995) 265-273.
- [125] Reproductive failure and the major histocompatibility complex (with K. Jin, H-N Ho and T.J. Gill III) *Amer. J. Hum. Genet.* **56** (1995) 1456-1467.
- [126] On genetic map functions (with H Zhao) *Genetics* **142** (1996) 1369-1377
- [127] Alveolar lining layer liquid is thin and continuous: Low temperature scanning electron microscopy of normal rat lung (with Jacob Bastacky, Charles Y.C. Lee, Jon Goerke, Homayoon Koushafar, Deborah Yager, Leah Kenaga, and John A. Clements) *Journal of Applied Physiology* **79** (1995) 1615-1620.
- [128] Statistical issues arising in the analysis of DNA-DNA hybridization experiments (with R. Guerra) *Systematic Biology*. In press.
- [129] Incorporating crossover interference into pedigree analysis using the chi-square model (with Shili Lin) *Human Heredity*. In press.

- [130] Summarizing and combining gene maps (with S Lin). *Annals of Human Genetics*. (1996) **60** 251-257.
- [131] Information and the physical mapping of chromosomes (with B. Yu). *Annals of Statistics*. In press.
- [132] Estimating antigen-responsive T-cell frequencies in PBMC from human subjects (with K Broman and M Tigges) *J Immunol Methods*. In press.
- [133] Over and under representation of short oligonucleotides in herpes virus genomes (with M-Y Leung and G Marsh) *J Computational Biology*. In press.
- [134] The effects of genotyping errors and interference on estimation of genetic distance (with D R Goldstein and H Zhao) *Human Heredity*
- [135] *Genetic Mapping and DNA Sequencing* jointly edited with M.S. Waterman. IMA Volumes in Mathematics and its Applications, vol. 81, Springer-Verlag, New York, 1996.

#### Manuscripts Submitted

1. Comparing DNA-DNA hybridization curves by rates of decay (with R. Guerra) *Molecular Biology and Evolution*.
2. A decision problem in physical mapping (with B. Yu and D.O. Nelson)
3. Modelling crossover interference using the Poisson skip model (with H. Zhao and K Lange).
4. An algorithm for haplotype analysis (with Shili Lin).

MERCED RIVER CORRIDOR  
RESTORATION PLAN

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**RESUMES**  
ADDITIONAL KEY STAFF

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July 28, 1997

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I-005376

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**Curtis Alling**  
*Senior Associate, EDAW, Inc.*

Mr. Alling is a specialist in environmental impact assessment and complex program management with more than 20 years of experience. He has managed more than 500 EISs, EIRs, EAs, and other studies for federal, state, and local agencies, private industry, and land developers. He has focused on complex, litigious projects with typical contract sizes of \$100,000 to over \$2 million. His project specialties include water resource projects, water treatment plants, flood control projects, community planning, and interagency environmental consultation programs. He is an expert in the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA), and has been a member of the American Institute of Certified Planners since 1984. Mr. Alling has personally managed or directed ten CEQA documents which have been the subject of litigation. None of those reports has been found inadequate by the courts at the conclusion of litigation. Mr. Alling has also regularly instructed for the Association of Environmental Professionals, American Planning Association, UC Davis Extension, and UCLA Extension on CEQA and NEPA practice.

<b>Education</b>	<p>M.A., Coastal Resources Planning and Development, Texas A&amp;M University, 1978 B.S., Wildlife Science, Cornell University, 1975</p>
<b>Awards</b>	<p>American Planning Association (APA) Association of Environmental Professionals (AEP) APA/AEP CEQA Reform Task Force, Co-Chair</p>
<b>Professional Experience</b>	<p>Managed the EIR preparation for the <b>Sacramento Area Water Forum's Regional Water Plan</b> for the Sacramento City-County Office of Metropolitan Water Planning. The Water Plan is the product of a consensus process among water agencies, business leaders, environmentalists, agricultural leaders, local governments, and public interest groups to provide a reliable water supply to Sacramento, El Dorado, and Placer counties while protecting the fisheries and other sensitive natural resources of the American River. Key issues included fisheries, flood control, recreation, vegetation and wildlife, and growth inducement impacts.</p> <p>Managed EIR preparation for the 100-mgd <b>Santa Teresa Drinking Water Treatment Plant</b> for the Santa Clara Valley Water District. This project was the primary treatment facility for water received from the U. S. Bureau of Reclamation's San Felipe Project. The EIR assessed the impacts of the plant operation on surrounding residences, transport of chemicals, construction of water pipelines, sludge drying and disposal, and plant compatibility with the neighborhood.</p> <p>Directed the combined EIR/EA for the United Water District water release/groundwater recharge program for water from <b>Pyramid Lake</b> in Ventura County. The project involved a joint CEQA/NEPA process with Federal agency involvement including the U. S. Forest Service, U. S. Fish and Wildlife Service, and the Federal Energy Regulatory Commission. Key issues included the water release schedule and instream flow impacts to fisheries (salmon, native and stocked trout), endangered species (arroyo toad), and river recreation (camping, fishing).</p>

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Directed the **EIR for the Lower Laguna Drainage Master Plan** for the County of Sacramento, a CEQA document which is also designed to support the preparation of a NEPA EA by the Corps of Engineers. The project involves drainage, water quality, flood control, and wetland mitigation/enhancement for the lower reaches of the Laguna Creek watershed in southern Sacramento County. Key issues include endangered species (giant garter snake, vernal pool-inhabiting fairy shrimp), wetlands impacts, and recreation (bicycle/equestrian trail issues).

Provided expert CEQA compliance counsel related to the **Salinas River Basin Management Plan in Monterey County**. CEQA issues related to the proper use of a program EIR, completeness of the project description, definition of alternatives, scoping of environmental issues, and NOP process were addressed. The BMP is intended to resolve sea water intrusion problems while balancing issues related to providing adequate agricultural and municipal/industrial water supply and protecting the sensitive natural resources of the river.

Managed or directed EIR preparation for five new state prisons which included analyses of water supply and water resource constraints. Each new prison is similar to establishing a new community of up to 4,000 people in a variety of rural, agricultural, or urban settings. State prison projects were evaluated in Coalinga, Susanville, Madera County, Los Angeles, and San Quentin. Water supply analysis in the EIR ranged from the assessing availability of water from existing municipal systems to establishment of new on-site groundwater extraction and treatment facilities.

Managed EIR preparation and 404 permit compliance for the **San Marcos Creek Flood Control Project** in San Diego County. The City proposed establishing a combined natural and engineered channel approach to controlling the flooding in San Marcos Creek, the major watercourse through the planned Civic Center of San Marcos. The EIR evaluated several alternatives ranging from concrete trapezoidal channel to protection of the floodplain.

Directed preparation of the **Roseville 2010 General Plan Update EIR**, involving a comprehensive update of planning policies in this rapidly growing city in Placer County. Policies related to water supply, habitat protection and enhancement, floodplain management, and population growth were among the key issue areas in the EIR.

Directed the Master Environmental Assessment, citywide habitat inventory, and **Draft EIR for the Chico General Plan Update** and EIR, serving as the basis for environmental and natural resources policy formulation. Key issues included fishery resources in area streams, water supply, open space and recreation resources, and habitat protection.

Managed the alternatives analysis and EIR preparation for the **Gilroy/Morgan Hill Long-Term Wastewater Management Program DEIR**, involving decisions on disposal approaches for treated wastewater. This program EIR examined the expansion of wastewater treatment and disposal capacity to accommodate growth in the rapidly growing southern Santa Clara County region for the next twenty years. River discharge to the Pajaro River, a new ocean outfall, land disposal, and combinations of land and river disposal were evaluated as alternatives.

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Managed the **North Monterey County Wastewater Planning Study** for the Monterey Regional Water Pollution Control Agency. The study involved establishing 20-year land use and population projections for communities in northern Monterey County. The projections were used as the basis for determining interceptor sewer and wastewater treatment capacity needs for the region.

Served as **Co-Chair of the American Planning Association/Association of Environmental Professionals CEQA Task Force**, an action committee of 20 CEQA practitioners who developed legislative proposals for effectively streamlining CEQA without sacrificing its basic policy purpose.

Actively participates in legislative review for the Association of Environmental Professionals and American Planning Association, including review of bills, review of State CEQA Guidelines changes, recommendation of amendments, and coordination with legislators and their staff.

Technical reviewer for the **Advisory Memoranda series on CEQA prepared by the Governor's Office of Planning and Research**, including advisories on Master EIRs, Mitigated Negative Declarations, and Thresholds of Significance.

Directed and/or managed the preparation of ten CEQA documents that have been successfully defended against litigation, including the EIR for the proposed **San Marcos Landfill Expansion Project** in San Diego County; **Tasman Corridor Project Recirculated Alternatives Analysis/Draft and Final EIS/EIR** in Santa Clara County, a \$450-million extension of the **Guadalupe Corridor Light Rail Transit system**; major EIR program for the Disney Development Company and City of Anaheim regarding the **Disneyland Resort Project DEIR**; **Trabuco Hills High School Stadium EIR** involving the construction of a lighted stadium which was opposed by surrounding residents; and the California Reception Center - Los Angeles County EIR, a prison reception center opposed by residents of nearby East Los Angeles.

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**John Hamilton Bair**  
*Botanist, McBain and Trush*

Mr. Bair is an ecologist whose expertise includes the physical and ecological relationships between river geomorphology and riparian vegetation communities. He applies his field experience with riparian and wetland restoration and his horticultural skills to riverine restoration planning projects.

**Education**

M.A., Biology, emphasis in Plant Ecology, Humboldt State University, Arcata, California 1996

B.S., Biology, Humboldt State University, Arcata, California 1994

B.S., Botany, Humboldt State University, Arcata, California 1994

**Professional Experience**

*Fluvial Riparian Ecologist*

1995–Present. McBain and Trush Arcata, California.

As a botanist with the Trinity River Maintenance Flow Project, Mr. Bair analyzes the relationships between physical channel dynamics and riparian vegetation, describing the relationships of vegetation to river hydrology and geomorphology. Responsibilities include site mapping, discharge measurements, sediment transport data collection and evaluation, and plant sampling. Also responsible for the development of plant sampling methods and experimental design.

*Teaching Associate*

1994–1996. Humboldt State University, Arcata, California.

Taught introductory botany laboratory lecturing on many fundamental yet complex topics in the course. Tutored, wrote lab exercises, gave lectures, and held reviews. Provided assistance in course development. Graded tests, essays, lab reports and notebooks.

*GS-7 Professional Series Botanist*

Jun. 1994–Aug. 1994. USDA Forest Service, Corvallis, Oregon.

Mr. Bair worked for the forest health monitoring project. He recorded and collected all the vegetation quadrat data; identifying all plant species from the ground to the canopy, collecting all species of lichen found at each plot, and assigning cover values.

*Restorationist*

1993–1994. Redwood Community Action Agency, Eureka, California.

Implemented plans for restoration and mitigation of riparian and wetland projects. These large-scale wetland mitigation projects required the use of excavators, backhoes, tractors, graders, and other major equipment as well as hand tools.

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*Project Coordinator  
and Nursery  
Manager*

1991-1993. Freshwater Farms, Freshwater, California

Mr. Bair was hired to start a wetland nursery. He studied underlying principles in the ecology of salt water marshes, freshwater marshes, estuaries and riparian stand in order to develop the project. Mr. Bair collected native plant species that were primary and secondary riparian and wetland indicators. He prepared the nursery and developed plans for seed collection and propagation. He developed a large collection of wetland grasses and riparian trees and developed a database and accession system for the nursery. Mr. Bair hired and managed eight employees. He also managed client consultation and over saw production from propagation to transportation, and in some cases installation.

**Professional  
Societies**

Society for Ecological Restoration  
California Native Plant Society

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**Christine M. Champe**  
*Wildlife Ecologist, Stillwater Sciences*

Ms. Champe is a wildlife biologist who conducts ecological research, wildlife habitat planning, and environmental impact assessment. She has studied populations of birds, amphibians, and other wildlife in several regions of the US and the tropics. She has particular experience surveying and estimating the size of migrant bird populations and has worked with many endangered or sensitive wildlife species. Her current work involves sustained yield forest planning; habitat conservation planning; sampling design for birds, mammals, amphibians, and plants; statistical analysis; and project management.

**Education**

MS, Wildlife and Range Sciences, University of Florida, 1993  
BS, Biology and Environmental Studies, Tufts University, 1987

**Training**

Wildlife Habitat Relationships System Training (CDFG), 1995-1997  
Distance Sampling and DISTANCE Software, 1993  
Population Estimation (University of Florida), 1992  
Hunter Safety, 1994

**Experience**

*Riparian Wildlife  
Community Studies*

Ms. Champe has led wildlife investigations for several projects involving the management and restoration of riparian areas for wildlife. She led the wildlife team in a watershed analysis in southern Oregon, focusing on the effects of a hydroelectric development on riparian-dependent amphibians, small mammals, and birds. In the San Francisco Bay Area, Ms. Champe surveyed riparian forests for migrant and resident birds and helped to develop a watershed management plan that established landscape-level corridors for wildlife habitat connectivity. In the Central Valley, she surveyed wetlands for the endangered giant garter snake and recommended mitigation strategies for its protection.

*Threatened,  
Endangered, and  
Sensitive Species  
Research*

Ms. Champe has led field teams and participated in surveys for many threatened, endangered, and sensitive species of birds (various migratory songbirds, marbled murrelet, northern goshawk, bald eagle, osprey, spotted owl, Puerto Rican parrot, and yellow-shouldered blackbird), amphibians (several species of frogs and salamanders), reptiles (giant garter snake), and fish (chinook salmon).

*Wildlife Habitat and  
Population Modeling*

Ms. Champe has studied the habitat associations of migrant and resident birds, analyzing their densities and seasonal use of various habitat types. She has received training in the California Department of Fish and Game Wildlife Habitat Relationships database system and has used the system to model habitat suitability and predict species presence for many projects. She adapted the WHR system for Louisiana-Pacific's sustained yield plans (SYPs) and habitat conservation plans (HCPs), by establishing linkages from WHR habitat projection data to the habitat suitability matrix in the WHR database, ultimately creating graphs depicting projected long-term trends in biodiversity and habitat suitability. For a project in Oregon's Klamath Marsh, she used USFWS Habitat Suitability Index (HSI) models to evaluate habitat for waterfowl and furbearers, and helped to develop new models for waterfowl. She has used the US Forest Service Snag Recruitment Simulator model to estimate required densities of snags for cavity-excavating birds in California forestlands. Ms. Champe has modeling experience with DISTANCE population density estimation software

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and mark-recapture models.

*Forest Management  
and Watershed  
Planning*

Ms. Champe has been responsible for wildlife analyses on several forest management projects for the US Forest Service and private industrial clients. She has developed the wildlife portions of sustained yield plans (SYPs) for Louisiana-Pacific's California forestlands and is currently heading the wildlife team for habitat conservation plans (HCPs) for Louisiana-Pacific and California Department of Forestry's Jackson Demonstration State Forest, working with a watershed assessment team to provide long-term protection guidelines for sensitive wildlife species and habitat. In Shasta-Trinity National Forest, she led the wildlife studies for a forest health environmental assessment in an Option 9 Adaptive Management Area. She supervised extensive field surveys for snags and downed logs, evaluated potential impacts of management alternatives, and wrote the biological assessment/evaluation (BA/BE) for threatened, endangered, and sensitive species. For a timber sale in Tongass National Forest, Alaska, she led field surveys for marbled murrelet, northern goshawk, and spotted frog, and coauthored the wildlife resources inventory report and evaluation of impacts for the environmental impact statement. In the San Francisco Bay Area, Ms. Champe helped to coordinate a natural resource inventory and watershed management plan for the East Bay Municipal Utility District, focusing on issues of biodiversity and water quality. She guided field efforts to survey birds, mammals, reptiles, and amphibians, and to evaluate habitat conditions and potential for habitat restoration.

*Wildlife Field Survey  
Techniques*

Ms. Champe has extensive training in the theory and methodology of survey techniques, including variable-distance point-count and transect methods. She is experienced in mist-netting, banding, nest searching, and calling birds; trapping mammals; and conducting time- and area-constrained surveys for amphibians and reptiles. She is familiar by sight and sound with avifaunas of the western and southeastern US and of several tropical areas.

*Resource  
Conservation and  
Interpretation*

As a stewardship intern for the Nature Conservancy, Ms. Champe assisted in the management of Ring Mountain Preserve in the San Francisco Bay Area. She also gave visitor tours and staffed a visitor interpretation center for the Mono Lake Committee in eastern California, discussing sustainable resource use with tourists from around the world.

**Professional  
Societies**

The Wildlife Society  
Society of Conservation Biology  
Cooper Ornithological Society  
Ecological Society of America

**Selected  
Publications and  
Presentations**

Champe, C.M., D.J. Levey, and E. Van der Werf. 1993. Life history traits do not provide a simple explanation for population declines of Nearctic-Neotropical migrant birds. Presented at the Annual Meeting of the Ecological Society of America. Madison, Wisconsin. August.

Champe, C.M. 1993. Bird communities in native and agricultural habitats in south-central Florida. Presented at the Annual Meeting of the Cooper Ornithological Society, Sacramento, California. March.

Champe, C.M. 1994. Book review: Ecology and conservation of neotropical migrant landbirds (D.W. Johnston and J.M. Hagan, eds.). Florida Field Naturalist.

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**Robert Coats, PhD**  
*Senior Scientist, Stillwater Sciences*

Dr. Coats has over 20 years of experience focusing on the hydrologic and ecological effects of land management on aquatic ecosystems. This work has concentrated in two areas: forested watersheds and wetlands. In both areas, he has drawn on his background in hydrology, ecology, and soil science. His long-term research interests are focused on nitrogen cycling and biogeochemistry at the watershed level.

In the area of forested watersheds, his experience includes: research on the effects of land disturbance on water quality; evaluation of the effects of silvicultural activities on both site quality and water quality; review of proposed timber harvest plans and National Forest plans; reclamation and hydrologic aspects of strip mining; and testimony as an expert witness on causes of debris torrents and floods in steep forested watersheds.

Dr. Coats' work with wetlands has included: the design of numerous wetland restoration and enhancement projects; analysis and testimony as an expert witness in cases involving wetland jurisdiction and spread of contamination in wetlands; and preparation of management plans for endangered plant habitat.

Much of Dr. Coats' work has involved management of large projects involving major resource conflicts and institutional complexity. In addition to project management, Dr. Coats' experience includes personnel management and directing a professional development program.

<b>Education</b>	<b>Ph.D.</b> , Wildland Resource Science, specializing in watershed management and water quality, University of California School of Forestry and Conservation, Berkeley, and Division of Environmental Studies, Davis, 1975
	<b>M.S.</b> , Forestry, specializing in soils and plant ecology, University of Minnesota, 1967
	<b>B.S.</b> , Forestry, University of California School of Forestry, Berkeley, 1965
<b>Awards</b>	1978-1979 Rockefeller Foundation Fellowship in Environmental Affairs
	1969-1971 The National Science Foundation Traineeship
	1965 Faculty Citation, University of California School of Forestry
<b>Professional Experience</b>	1997-present Senior Scientist Stillwater Ecosystem, Watershed & Riverine Sciences, Inc. Berkeley, CA
	1986-1997 Principal Philip Williams & Associates, Ltd., San Francisco, CA
	1983-1986 Senior Associate Philip Williams & Associates, San Francisco, CA
	1982 Visiting Lecturer, Department of Soil and Plant Biology University of California, Berkeley
	1978-1983 Staff Scientist, The John Muir Institute, Berkeley, CA

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1978-1983 Staff Scientist, The John Muir Institute, Berkeley, CA  
1974-1978 Teaching Associate, Department of Conservation and Resource  
Studies University of California, Berkeley  
1972-1974 Research Associate, University of California, Davis.

**Professional  
Societies**

American Geophysical Union  
American Association for the Advancement of Science  
California Forest Soils Council  
Society for Ecological Restoration  
Watershed Management Council

**Selected  
Publications**

Coats, R.N., 1997. Evaporation, Evapotranspiration. In: Encyclopedia of Environmental Science, van Nostrand-Reinhold, (in press).

Coats, R.N., 1997. The Riparian Zone. In: Encyclopedia of Environmental Science, van Nostrand-Reinhold (in press).

Coats, R.N., and C.R. Goldman, 1993. Nitrate transport in subalpine streams, Lake Tahoe Basin, California-Nevada, USA. Supplementary Issue No. 2:17-21, Applied Geochemistry, Presented at the Second International Symposium on Environmental Geochemistry, Uppsala, Sweden, September, 1991.

Coats, R.N., M.A. Showers, and B. Pavlik, 1993. Management plan for an alkali sink and its endangered plant *Cordylanthus palmatus*. *Environmental Management*, 17(1):115-127.

Coats, R.N., and L.H. MacDonald, 1989. Use of hydrologic criteria in wetland delineation. *Urban Wetlands: Proceedings of the National Wetland Symposium*, Association of Wetland Managers, Inc., Berne, NY, pp. 164-172.

Coats, R.N., M.A. Showers, and B. Pavlik, 1989. The Springtown alkali sink: An endangered ecosystem. *Fremontia*, 17(1):20-23.

Coats, R.N., M.L. Swanson, and P.B. Williams, 1989. Hydrologic analysis for coastal wetland restoration. *Environmental Management*, 13(6):715-727.

Coats, R.N., 1987. Cumulative watershed effects: A historical perspective. *Proceedings: California Watershed Management Conference, Wildland Resource Center, University of California, Berkeley*, pp. 107-111.

Coats, R.N., C. Farrington, and P.B. Williams, 1987. Enhancing diked wetlands in coastal California. *Proceedings: Coastal Zone '87 Conference, Seattle, WA, ASCE, New York*, pp. 3688-3700.

Coats, R.N., L. Collins, J.L. Florsheim, and D. Kaufman, 1985. Channel change, sediment transport and fish habitat in a coastal stream: Effects of an extreme event. *Environmental Management*, 9(1):35-48.

Coats, R.N., 1984. The Colorado River: River of controversy. *Environment*, 26(2):7-13, 36-40.

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Coats, R.N., and L. Collins, 1984. Landsliding, channel change and sediment transport in a suburban forested watershed: Effects of an extreme event. Proceedings: Symposium on the Effects of Forest Land Use on Erosion and Slope Stability, East-West Center, Honolulu, HI, pp. 165-175.

Coats, R.N. (ed.), 1982. Proceedings: Symposium on watershed rehabilitation in Redwood National Park and other Pacific coastal areas. The John Muir Institute, Napa, CA, 360 pp.

Coats, R.N., and L. Collins, 1981. Effects of silvicultural activities on site quality: A cautionary review. California Department of Forestry, Sacramento, CA, 39 pp.

Coats, R.N., and T.O. Miller, 1981. Cumulative silvicultural impacts on watersheds: A hydrologic and regulatory dilemma. *Environmental Management*, 5(2):147-160.

Coats, R.N., and T.O. Miller, 1981. Developing best management practices for California forests: A 208 progress report. *Journal of Soil and Water Conservation*, 36(4):205-208.

Leonard, R.L., L.A. Kaplan, J.F. Elder, R.N. Coats, and C.R. Goldman, 1980. Nutrient transport in surface runoff from a subalpine watershed, Lake Tahoe, California. *Ecological Monographs*, 49(3):281-310.

Coats, R.N., 1978. The road to erosion. *Environment*, 20(1):16-20, 37-39.

Coats, R.N., R. Leonard, and C.R. Goldman, 1976. Nitrogen uptake and release in a forested watershed, Lake Tahoe Basin, California. *Ecology*, 57:995-1104.

Coats, R.N., R.L. Leonard, and S.L. Loeb, 1975. Removal of nitrogen from snowmelt water by the soil-vegetation system, Lake Tahoe, California. Proceedings: 43rd Annual Western Snow Conference, San Diego, CA.

Coats, R.N., 1971. Indonesian timber. *Pacific Research*, Pacific Studies Center, Palo Alto, CA, 2(4):9-16.

Coats, R.N., 1970. The California coast - 900 miles of "Tahoe-by-the-sea". *San Francisco Bay Guardian*, 5(1):4-5.

Coats, R.N., W.A. Geyer, and E.I. Sucoff, 1968. Synecological light coordinates: A verification by light measurements. *Minnesota Forestry Research Notes* 199.

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**Bruce Orr, PhD***Senior Ecologist, Principal, Stillwater Sciences*

Dr. Orr has 19 years of experience in population and community ecology of aquatic, terrestrial, and wetland environments in the western United States. His areas of technical expertise include natural resources inventory and management planning, wetlands and freshwater ecology, aquatic entomology, and flora and vegetation of the western United States. He is experienced in wetland delineation and functional assessment; threatened and endangered species surveys; plant community classification and mapping; mitigation planning; and environmental impact assessment. Dr. Orr has managed a number of complex, multi-year projects involving interdisciplinary teams conducting natural resource inventories, assessments, and watershed analysis in a variety of habitats; developing natural resource management plans; and producing environmental impact assessment documents. Dr. Orr is a co-founder and principal of Stillwater Ecosystem, Watershed & Riverine Sciences.

**Education**

**Ph.D.**, Entomology (Ecology / Aquatic Entomology), University of California at Berkeley, 1991

Graduate Studies in Ecology (Aquatic and Population Biology), University of California at Santa Barbara, 1979-1982

**BA**, Biological Sciences and Environmental Studies, University of California at Santa Barbara (high honors), 1979

**Training**

CDFG certification in California Wildlife Habitat Relationships (WHR) system, 1995

Applied Fluvial Geomorphology Course, taught by David Rosgen and Luna Leopold, 1993

National Wetlands Science Training Cooperative Certification in Jurisdictional Delineation of Wetlands, 1993

USFWS Habitat Evaluation Procedures (HEP), 1992

**Experience***Integrated Natural Resource Analysis and Management Planning*

Dr. Orr is an experienced project manager and interdisciplinary team leader for projects involving natural resource inventories and integrated natural resource management plan development. He currently serves as project manager for Louisiana-Pacific's multi-species Habitat Conservation Plans (HCPs) and the watershed, fisheries, and wildlife assessment components of sustained yield plans (SYPs) in northern California. This 3-year project involves the development of SYPs and HCPs covering over 300,000 acres of industrial forestlands owned by Louisiana-Pacific, with a total watershed and wildlife assessment area exceeding one million acres. He is also project manager for development of a multi-species HCP, SYP, and programmatic timberland EIR for the California Department of Forestry and Fire Protection's 50,000 acre Jackson Demonstration State Forest. He recently served as technical manager for a multidisciplinary effort involving natural resource inventories and development of biodiversity and ecosystem management plans for a 28,000-acre watershed master plan project in the San Francisco Bay Area.

*Aquatic Ecology*

Dr. Orr has a broad background in general limnology and stream ecology. He has sampled aquatic invertebrates in a wide variety of freshwater and brackish-water habitats; conducted limnological surveys to determine physical and chemical characteristics of lakes and wetlands; conducted experimental studies on interactions among predators, zooplankton, and phytoplankton in lentic systems; applied EPA's Rapid Bioassessment Protocols to examine impacts of hydropower

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development on stream macroinvertebrates in Southern California; and served as co-manager for a long-term study examining the effects of different summer flow regimes on fish and benthic macroinvertebrate communities in the lower Tuolumne River and experimental studies of the influence of turbidity on the predation of juvenile salmonids by black bass. He has conducted studies of the effects of stream flow on riparian vegetation in the Sierra Nevada and is involved in instream and riparian habitat restoration efforts on the lower Tuolumne River.

*Wetlands Biology*

Experienced in jurisdictional delineation of wetlands. Designed and conducted field surveys, laboratory experiments, and field experiments on interactions among aquatic vegetation, predators, and macroinvertebrates in freshwater wetlands of California. Conducted investigations of historical changes in geomorphology and salt marsh vegetation, and field surveys of plant distributions, in the San Francisco Bay Area. Expertise in biological control of mosquitoes in wetlands. Experienced in the use of wetland assessment techniques, including WET. Recent involvement in studies of palustrine, lacustrine, and riparian wetlands in California, Oregon, and Montana, including studies of ecological relationships among hydrology, vegetation, and wildlife for over 100 square miles of freshwater wetlands in southern Oregon.

*Terrestrial Ecology*

Dr. Orr is experienced in field survey techniques and identification of terrestrial plants, insects, and vertebrates. Dr. Orr served as task leader or project manager on a variety of studies assessing project impacts on terrestrial vegetation and wildlife, including plant and wildlife surveys in a variety of habitats in California, Oregon, and Montana. He has 6 years of experience teaching college laboratory and field courses in terrestrial ecology and natural history. His recent experience as project manager or technical task leader includes wildlife habitat assessment using HEP and other techniques for extensive studies of riparian and freshwater marsh habitats in southern Oregon; development of an integrated natural resource management plan for Robins AFB, Georgia; vegetation management environmental assessments and ecological unit inventories for the Angeles and Cleveland national forests; and impact assessments for a variety of projects in California. He is currently a member of the California Native Plant Society statewide Vegetation Committee charged with developing and implementing a new vegetation classification system and standardized sampling protocols for California plant communities.

*Surveys for Rare,  
Threatened, and  
Endangered Species*

Dr. Orr conducted surveys for rare, threatened, and endangered (RTE) plants and animals in various wetland and terrestrial habitats in the Central Valley and San Francisco Bay regions of California and in riparian habitats in Montana. He conducted rare plant and general floristic and faunal surveys in coastal foredune, backdune, and salt marsh habitats in northern Santa Barbara County and in a variety of habitats in the Sierra Nevada and Southern California. He was recently involved in inventory and mitigation studies of RTE species for projects in the western Sierra Nevada, central California, and habitat planning for RTE species in northern California forestlands. Dr. Orr was senior technical advisor for an endangered dragonfly study, involving field surveys, metapopulation analysis, and mitochondrial DNA studies in support of environmental impact, habitat restoration, and regulatory permitting project in Ohio wetlands.

**Professional  
Affiliations**

American Institute of Biological Sciences  
California Native Plant Society  
Ecological Society of America  
North American Benthological Society  
Society for Ecological Restoration  
Watershed Management Council

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**Selected  
Publications  
and  
Presentations**

Orr, B.K. 1997 (*in press*). Ecosystem health and salmon restoration: a broader perspective. Invited paper prepared for a special session on "The role of applied ecological research in the management of a regulated river: New Don Pedro Dam and the Tuolumne River," International Association for Hydraulic Research Conference, San Francisco, CA. August 11-15, 1997.

Olson, C. and B. Orr. 1997 (*in press*). Combining tree growth, fish and wildlife habitat, mass wasting, sedimentation, and hydrologic models in decision analysis and long-term forest land planning. Paper presented at First Biennial North American Forest Ecology Workshop, Raleigh, NC. June 23-27, 1997.

Lacey, L. and B.K. Orr. 1994. The role of biological control of mosquitoes in integrated vector control. *American Journal of Tropical Medicine and Hygiene* 50(6) Suppl: 97-115 (invited paper).

Smyth, A.P., B.K. Orr, and R.C. Fleischer. 1993. Electrophoretic variants of egg white transferring indicate a low rate of intraspecific brood parasitism in colonial cliff swallows in the Sierra Nevada, California. *Behavioural Ecology and Sociobiology* 32:79-84.

Orr, B.K. and V.H. Resh. 1992. Influence of *Myriophyllum aquaticum* cover on *Anopheles* mosquito abundance, oviposition, and larval microhabitat. *Oecologia* 90:474-482.

Orr, B.K., S. Morhardt, and R.D. Stone. 1991. Influence of drought on the distribution and abundance of montane riparian plants along a western Sierra Nevada stream. Paper presented at the California Riparian Systems Conference III: Progress in Protection and Restoration, Sacramento, California. 16 November.

Orr, B.K., W.W. Murdoch, and J.R. Bence. 1990. Population regulation, convergence, and cannibalism in *Notonecta* (Hemiptera). *Ecology* 71(1): 68-82.

Orr, B.K. and V.H. Resh. 1989. Experimental test of the influence of aquatic macrophyte cover on the survival of *Anopheles* larvae. *Journal of the American Mosquito Control Assoc.* 5:579-585.

Collins, J.N. and B.K. Orr. 1989. An ecological overview of the Coyote Hills wetlands, in *Talk about Wetlands, Proceedings of the Coyote Hills Wetlands Workshop, 10-11 February 1987, Coyote Hills Regional Park, Fremont, California* (J. Collins and K. Burger, eds.), pp. 34-42.

Collins, J.N., E.P. McElravy, B.K. Orr, and V.H. Resh. 1988. Preliminary observations on the effects of the intersection line upon predation of *Anopheles* mosquito larvae. *Bicovas* (Proceedings of the International Conference on Biological Control of Vectors with Predaceous Arthropods. Loyola College, Madras, India.) 1:1-12.

Orr, B.K. and V.H. Resh. 1987. Interactions among mosquitofish (*Gambusia affinis*), Sago pondweed (*Potamogeton pectinatus*), and the survivorship of *Anopheles* mosquito larvae. *Proceedings of the California Mosquito and Vector Control Association* 55:94-97.

Orr, B.K. and V.H. Resh. 1986. Spatial-scale considerations in predator-prey experiments. *Proceedings of the California Mosquito and Vector Control Association* 54:105-109.

MERCED RIVER CORRIDOR  
RESTORATION PLAN

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**APPENDIX D.**  
FORMS

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July 28, 1997

I - 0 0 5 3 9 0

I-005390

## NONDISCRIMINATION COMPLIANCE STATEMENT

COMPANY NAME

Stillwater Sciences

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

## CERTIFICATION

*I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California*

OFFICIAL'S NAME

Frank Ligon

DATE EXECUTED

26 July 1997

EXECUTED IN THE COUNTY OF

Alameda

PROSPECTIVE CONTRACTOR'S SIGNATURE

PROSPECTIVE CONTRACTOR'S TITLE

President

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

Stillwater Ecosystem, Watershed, &amp; Riverine Sciences

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

Exhibit \_\_\_\_\_

**STANDARD CLAUSES --  
SMALL BUSINESS PREFERENCE AND CONTRACTOR IDENTIFICATION NUMBER****NOTICE TO ALL BIDDERS:**

Section 14835, et. seq. of the California Government Code requires that a five percent preference be given to bidders who qualify as a small business. The rules and regulations of this law, including the definition of a small business for the delivery of service, are contained in Title 2, California Code of Regulations, Section 1896, et. seq. A copy of the regulations is available upon request. Questions regarding the preference approval process should be directed to the Office of Small and Minority Business at (916) 322-5060. To claim the small business preference, you must submit a copy of your certification approval letter with your bid.

Are you claiming preference as a small business?

Yes\*                       No

\*Attach a copy of your certification approval letter.

## DEPARTMENT OF GENERAL SERVICES

Office of Small and Minority Business  
1531 I Street, Second Floor  
Sacramento, CA 95814-2016



May 22, 1996

REF #0014919  
STILLWATER ECOSYSTEM, WATERSHED  
& RIVERINE SCIENCES  
2710 LE CONTE #4  
BERKELEY CA 94709

Dear Businessperson:

The Office of Small and Minority Business (OSMB) conditionally approves your firm's small business certification request effective 05-15-1996 through 05-31-1998. This certification enables your firm to use the five percent bidding preference on state government contracts according to the Small Business Procurement and Contract Act. Status reverification may occur any time the OSMB deems appropriate. The small business certification applies **ONLY** to the following industry group(s) within the designated business type(s):

<u>Business Type(s)</u>	<u>Industry Group(s)</u>	<u>Description</u>
Service:	(v)	Consulting, Management and Public Relations

1. Current small business certification status requires:

A. Annual submission of the following items for the most recently completed tax year:

- The **ENTIRE SIGNED** Federal Tax Returns (FTRs) as submitted to the Internal Revenue Service (IRS) for the applicant and each affiliate.
- An original notarized "Affidavit of Income" (AI) form (enclosed) in lieu of the most recently completed tax year's FTR(s) for the applicant and each affiliate. **The AI must be submitted at the conclusion of each tax year and is only valid for 90 days.** If you are unable to provide the FTR(s) prior to the AI's 90 day expiration, submit a copy of a valid Federal tax filing extension for each required FTR. **The appropriate FTR(s) must be provided prior to the filing extension's expiration.**
- It is the applicant firm's responsibility to submit the above requirements. Non-submittal of the aforementioned will result in your firm's small business certification status suspension, which may lead to status revocation.

B. Written notification of any address change, signed by an owner/officer.

C. **ALL** changes in business name, structure or ownership **require** completion of a new Std. 812 form.

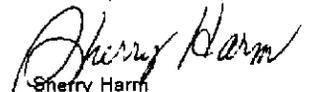
May 22, 1996

2. **Only certified service and commodity small business firms actively working with the state may participate in the Prompt Payment Act Program.** Construction firms compensation on late/unpaid progress payments is addressed in Public Contract Code, Section 10261.5. Eligible firms that properly submit prompt payment stamp requests will receive a rubber stamp with the firm's corresponding OSMB REF (reference) number. The prompt payment stamp will be mailed along with instructions for its proper use. Allow two to three weeks for processing. To receive a prompt payment stamp, the following **three** items **must** be submitted to the OSMB:
  - A. A written rubber stamp request to the OSMB. Include the applicant firm's name, OSMB REF number and current mailing address;
  - B. A copy of a current state contract or purchase order soliciting services from the applicant; and
  - C. A \$15.00 check or money order made payable to the Department of General Services.

Please maintain this original certification approval letter for future business needs. To receive the five percent preference when bidding on a state contract, the awarding agency will require small business certification verification. Include a copy of this letter when submitting your state contract bid. Prior to contract award, agencies will assure the vendor is in compliance with Public Contract Code, Section 10410 et seq. addressing conflict of interest for state officers, state employees or former state employees.

The OSMB will send a renewal application prior to your small business certification expiration. Thank you for doing business with the state.

Sincerely,

  
Sherry Harm  
Programs/Certification Officer  
(916) 322-7120

SH:rci

Enclosures

**APPENDIX E.**  
MERCED COUNTY PLANNING DEPARTMENT  
LETTER OF SUPPORT

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July 28, 1997



PLANNING AND COMMUNITY DEVELOPMENT  
DEPARTMENT  
2222 'M' STREET  
MERCED, CALIFORNIA 95340  
TELEPHONE (209) 385-7654  
FAX (209)726-1710

ROBERT E. SMITH  
Director  
WILLIAM NICHOLSON  
Assistant Director

July 23, 1997

Jennifer Wick  
Still Water Sciences  
2532 Durant Street, Suite 201  
Berkeley, California 94704

SUBJECT: PROPOSED RIVER CORRIDOR PLAN

Dear Ms. Vick:

Thank you for contacting Merced County Planning Department regarding your interest in pursuing CALFED funding for a Merced River Corridor Plan. You requested County support for and cooperation with the proposed plan.

As Desmond Johnston, Environmental Coordinator, discussed with you, the County Board of Supervisors expressed a desire for such a plan several years ago. Then, as now, we were unable to draw staff and resources away from other priorities in order to devote time to the project. Today we have several new Board members, and we cannot provide you with an updated position from the Board in the time frame required to meet the grant application deadline. However, we have attached the Board Agenda Item from May 19, 1992 which clearly indicates the will of the Board at that time, and staff has not seen reason to believe the County's perspective has changed. At the Board's direction, we have been cooperating with the California Department of Fish and Game, mine operators and landowners in seeking development of a River Enhancement Plan for a portion of the Merced River east of the Snelling Highway Bridge. Progress on that concept has been very slow, and your proposed plan may be a solution.

We can request that the Board consider a resolution in support of this renewed effort if it will facilitate the CALFED grant, but again, this could not be accomplished by your July 28, 1997 deadline. In the meantime, the Planning Department encourages your effort to seek grant funding for the plan. We commit to further discussions on how the plan may be utilized by the County and its relationship to the County General Plan.

Please do not hesitate to contact our office if we can be of further assistance.

Sincerely,

William R. Nicholson  
Assistant Director

Attachment

AN AFFIRMATIVE ACTION/EQUAL OPPORTUNITY EMPLOYER

1 - 0 0 5 3 9 6

I-005396

BOARD AGENDA ITEM

TO: BOARD OF SUPERVISORS  
THROUGH: COUNTY ADMINISTRATOR  
FROM: ROBERT E. SMITH, PLANNING DIRECTOR *RES*  
SUBJECT: MERCED RIVER CORRIDOR PROTECTION/ENHANCEMENT PLAN

SUMMARY:

On April 7, 1992, following the public hearing on the Carson surface mine conditional use permit, members of the Board of Supervisors requested that staff consider development of a plan for the protection and enhancement of the Merced River corridor.

Staff has contemplated what may be involved in the preparation of such a plan. An initial step would be the development of a program for the preparation of the plan. The program would specify the probable sequence of major tasks, with corresponding time and cost estimates. Staff also recognizes the need to draft preliminary goals and objectives of the plan which will serve to direct the program and may become the basis of the plan. Following these two preliminary efforts, staff would present the program and draft policies to the Board for further direction.

**STAFFING IMPACT:** Approximately 40 hours for preliminary work (program and draft policies).

**FISCAL IMPACT:** Staff time, approximately \$1,000.00.

**CONTRACT/RESOLUTION/ABSTRACT SUBMITTED** No

**REQUEST REVIEWED BY:**

Co. Counsel RW; Administration JA  
**ADMINISTRATION RECOMMENDATION COMMENT:**

**REQUEST/RECOMMENDATION/ACTION NEEDED:**

The Merced River Corridor Protection/Enhancement Plan is being presented to the Board for information only. No action is necessary unless the Board wishes to provide specific direction to the Planning Commission.

5/19/92

For Board Staff Only:

TO: ADMIN, PLANNING

BOARD ACTION 5/19/92

O'BANION/PETERSON

INFORMATION ONLY

MODIFIED

APPROVED RECOMMENDATION