

4.5 PSP Cover Sheet (Attach to the front of each proposal)

Proposal Title: Douglas/Long Canyon Paired-Watershed Project  
 Applicant Name: Placer County Water Agency - PCWA  
 Mailing Address: P.O. Box 6570 Auburn, CA 95604  
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 Email: \_\_\_\_\_

Amount of funding requested: \$ 83,600 for 1 years

Indicate the Topic for which you are applying (check only one box).

- Fish Passage/Fish Screens
- Habitat Restoration
- Local Watershed Stewardship
- Water Quality
- Introduced Species
- Fish Management/Hatchery
- Environmental Education

Does the proposal address a specified Focused Action? X yes \_\_\_\_\_ no

What county or counties is the project located in? Placer County

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

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

Indicate the primary species which the proposal addresses (check all that apply): N/A

- San Joaquin and East-side Delta tributaries fall-run chinook salmon
- Winter-run chinook salmon
- Late-fall run chinook salmon
- Delta smelt
- Splittail
- Green sturgeon
- Migratory birds
- Other: \_\_\_\_\_
- Spring-run chinook salmon
- Fall-run chinook salmon
- Longfin smelt
- Steelhead trout
- Striped bass
- All chinook species
- All anadromous salmonids

Specify the ERP strategic objective and target (s) that the project addresses. Include page numbers from January 1999 version of ERP Volume I and II:

'to improve upper watershed health by implementing practices'  
(Volume II, p. 325)

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

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

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

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

By signing below, the applicant declares the following:

- 1.) The truthfulness of all representations in their proposal;
- 2.) The individual signing the form is entitled to submit the application on behalf of the applicant (if the applicant is an entity or organization); and
- 3.) The person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section 2.4) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.

Mal Toy  
Printed name of applicant

Mal Toy  
Signature of applicant

**1999 Category III  
Ecosystem Restoration Projects and Programs  
Proposal Title Page**

**DUNCAN/LONG CANYON, PAIRED-WATERSHED STUDY**

**Submitted by Placer County Water Agency  
on behalf of  
The American River Watershed CRMP**

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**Special District - exempt  
Fed: 49-1552786  
State: 800-7013-9**

**Participants and Collaborators  
Placer County  
American River Watershed CRMP Committee  
US Forest Service  
Resource Conservation District, Placer County  
Natural Resources Conservation Service**

## EXECUTIVE SUMMARY

This project proposal is submitted by the Placer County Water Agency (PCWA) on behalf of the American River Watershed Group CRMP (ARWG). The ARWG is a group of about 26 entities including landowners, business sector interests, environmental groups, special districts, and local, state, and federal agencies interested in addressing and resolving watershed related issues in the watershed of the North, Middle, and South Forks of the American River.

The proposed project is to conduct a paired-watershed evaluation of watershed process and function and of the influences of land use and resource management activities on watershed yield and flow in the very important high elevation headwater areas of the Sierra Nevada. Little information is currently available on the functional processes of these high elevation watershed areas. Recent watershed research has indicated that of the many paired-watershed studies concerning the relationships between land uses and watershed response, essentially none are appropriately applicable to the headwater areas of the Sierra Nevada. This is due to unique seasonal climatic pattern, total annual precipitation, annual variability of total precipitation, and the snowmelt dominated hydrology of the high elevation, physiographic-climatic region of the Sierra Nevada. The objective is to develop important watershed process/function information for watershed stewardship decision-making throughout the target physiographic-climatic region.

The project is located in Placer County in the headwaters area of the MF American River at elevations ranging from approximately 4000 ft. to 7200 ft. It is in portions of the Tahoe and Eldorado National Forests. The paired-watershed to be evaluated are Duncan Canyon (9.9 sq.mi.) and Long Canyon (18.0 sq.mi.), located about six miles apart. Both watersheds have approximately 30 years of stream gage data and an initial review of the gage data indicates that flows in the relatively undisturbed watershed are greater than those in the highly disturbed watershed by as much as 60% during the snowmelt period and 500% greater in the summer baseflow period. The gage data spans a period of record that includes multi-year low and high wateryear cycles and a full range of intermediate wateryears. These climatic conditions will facilitate the applicability the project results.

The primary ecological/biological objectives of the project is 'to improve upper American River watershed health by implementing improved practices' (ERP Vol2. p.325). Third party impacts are all positive in that progressive implementation of project result will lead to improved watershed practices in the Sierra watersheds tributary to Central Valley streams and the Bay-Delta system. Improved flows, water temperature, and water quality parameters will result in improved background conditions as well as improved success potential and effectiveness of other restoration actions. The project is compatible with CALFED objectives and will make contributions to overall CALFED success.

As this is a research, information development, and outreach project there are three main aspects that will be subjected to monitoring; research, application, and outreach. The PRMS design and the hydrologic and climatic data, and hydrologic attribute findings will be reviewed by

the USFS and the USGS for technical competence before the application of the PRMS will commence and structural development of the HRUs will be reviewed for attribute adequacy by the USFS and the NRCS and reviewed for scale and refinement suitability to stewardship applications by the USFS, NRCS, PCRCD, and the landowner and business sector interests in the ARWG. To facilitate an appropriate watershed assessment and information types that will meeting the needs of various entities there will formal workshop secessions early in the PRMS application phase in which all potential user entities (USFS, NRCS, RCD, county planning/public works, landowners, business interests, etc.) will assist in developing application targets. To ensure that the project products are usable and useful a formal workshop will be held with probably applicants of project results (USFS, NRCS, RCD, county planning/public works, landowners, business interests, etc.) to develop an overall framework for the outreach and information dissemination vehicles.

To ensure that these monitoring and input mechanisms guide and direct the structure and execution of the project these review and workshop milestones will be scheduled at the commencement of the appropriate project phases.

Project costs are \$109,600. Requested CALFED funding is \$83,600. Pending project approval, the following in kind labor contributions have been committed to the project: PCWA, \$10,000; USFS \$8,000; NRCS, \$2,000, and; PCRCD, \$2,000.

The ARWG is currently initiating a "NF/MF American River Watershed Plan and Stewardship" planning program for those two forks of the American River funded by CALFED. Due to the large area of assessment for the on-going NF/MF American effort and budget limitations, that effort is limited to the coordination and use of existing resource information and non-modeling analytic approaches to watershed assessment. The ARWG has identified a need and an opportunity to conduct the Duncan/Long Canyon paired-watershed project using more detailed resource information and hydrologic/watershed modeling to both facilitate the larger scale watershed planning effort by assisting in identifying the types of watershed resource attributes to consider and to provide a detailed understanding of headwater watershed process for direct on the ground application toward watershed planning, stewardship, and land use decision-making. The ARWG and the above mentioned specific agencies have submitted letters of support for this project.

The project will be managed by PCWA, as the applicant, but will be executed by PCWA, the Tahoe and Eldorado National Forests, local Resource Conservation Districts, the NRCS, landowner representatives on the ARWG, and watershed planning and engineering specialists. The design approach to engage these entities throughout the project is to ensure that the project is directed toward results that are useful to watershed stewardship decision-making at all levels and the project results are structured to applicable to the needs and responsibilities of these entities throughout the target physiographic-climatic region.

## PROJECT DESCRIPTION

### A) Proposed Scope of Work

The proposed project is to conduct a paired-watershed evaluation using the US Geological Survey's Precipitation-Runoff Modeling System (PRMS) to evaluate the watershed processes in a mid to high elevation, high precipitation Sierra Nevada setting. The project will address two distinct but related research objectives; 1) identify the influences on watershed yield and streamflows due to land uses, and 2) develop an understanding of headwater watershed process/function and flow generation of the various watershed hydrologic attributes and their spatial distribution. The following are the project tasks.

**Task 1: Precipitation-Runoff Modeling System set-up:** The PRMS will be set up for the Duncan/Long Canyon study area using watershed Hydrologic Response Units (HRUs) defined by stream channel networks, watershed hydrologic attributes, elevation zones, and aspect, etc. The model will be constructed and calibrated to time periods having the most reliable precipitation and streamflow records. Statistics of model fit will be given for daily, monthly and annual flow and compared for the paired-watershed. Major sub-tasks required for the development of the PRMS are as follows:

**Stream gage and streamflow evaluation.** This a multi-phased task that will have relevance at various points in the project. Primary task components include verifying the stream gage information for model development, identification of time intervals for watershed disturbance and model assessment, model varification, and in-basin synoptic streamflow gaging. These tasks are designed to assist in HRU development and fostering a better understanding of watershed process and function. A technical review will be conducted of the existing gage information and of the sampling and stage discharge relationships developed for the gages. The gage sites will be evaluated and, as needed, surveyed to verify the rating-curves. The flow records to be used in the project will be corrected and verified. The corrected flow records will be reviewed to identify potential issues and causes of watershed yield differences and to structure the project components and the details of the PRMS, using standard methods of gage-record analysis and general principles of watershed hydrology. Synoptic in-basin flow measurements will be conducted at two time sets (spring snowmelt, summer baseflow) and two aerial-photo over-flights will be flown during the main snowmelt period to assist in determining the spatial distribution and flow-source areas and watershed yield in the two watersheds, assist in identifying the roles of HRUs in watershed process/function, and identifying the influences of land use disturbance on flows.

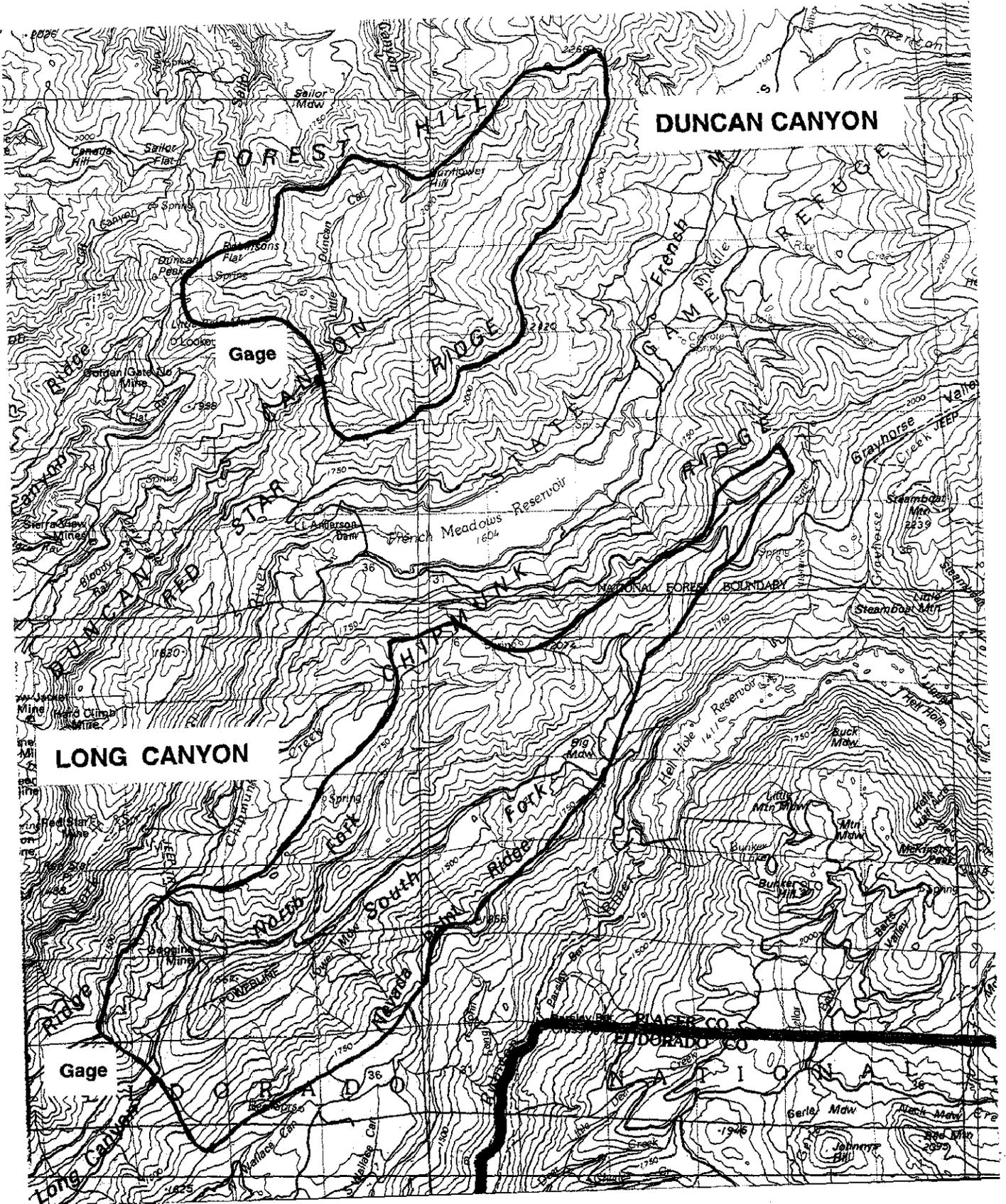
**Climatic data evaluation:** Annual, monthly and daily climatic data, daily total precipitation, maximum and minimum temperature, and solar radiation drive the PRMS and parameter/elevation/aspect relationships will be important variables in the two study watersheds. This task will include the review and evaluation of climate data developed and used in two recent applications of the PRMS in, or adjacent to, the American River watershed (Jetson etal. 1995, McCurk etal. 1996), and the review of other published temperature, precipitation, and snow

course data from the National Climatic Data Center, public utility districts, BUREC, USCOE, NRCS, USFS, California DWR. Unpublished climatic data sources on file in our offices will also be used. This task will develop appropriate elevation and aspect parameters for these climatic attributes to be applied in the PRMS for the study watersheds.

**Hydrological Response Unit development.** HRUs will be developed based on physical attributes determined to be of significance to watershed process/function and land use/resource management responses such as geology, soils, slope, aspect, vegetation, elevation, topographic situation, etc. Each HRU will be made up of hydrologic attributes that are expected to respond in a unique manner and have varying roles in overall watershed processes. The attributes and parameters to be used will be based on a review of existing, expanded, and new resource information collected during the course of this project, basic understanding of physical-watershed hydrology and hydrologic processes, aerial-photo review and interpretation, and the ground-site review of sample sites to confirm potential hydrologic significance of attributes and parameters. The resulting potential attributes and parameters will be compared against other recently executed PRMS efforts and watershed studies conducted in the region and adjusted as warranted (Jetson et al. 1995, McCurk et al. 1996).

**Task 2: Develop GIS framework:** The Tahoe and Eldorado National Forests will work together to develop a single-site house for the GIS data to be the basis of the mapping watershed resource attributes, the development of the HRUs, the mapping of the chrono-sequence of land use and watershed disturbance, and for the evaluation of watershed process/function. This task will be a subset of the on-going GIS component of the NF/MF American Watershed Plan and Stewardship program and will only involve that increment of additional effort required to organize the data around this pair-watershed study. The watershed attributes and parameters will be mapped as separate data components and/or adjusted from existing map and GIS information from the Tahoe and Eldorado National Forests, new attribute data that is not in the USFS system, aerial-photo interpretation, and ground visits as necessary. The attributes will be entered as separate overlays into the GIS framework and the parameters used to identify and categorize the HRUs in each watershed. All project parties will participate in the development of HRUs to ensure a cost effective project and to ensure the widest application possible for the project.

**Task 3: Develop land use disturbance and watershed condition chrono-sequence:** Within the period of streamflow gage information 1962-1993 to be used in this project, three or four dates will be identified to represent the time-status of land use change, watershed disturbance/recovery, and vegetation condition. Existing aerial-photo coverage dates available for use in this project include 1939, 1963, 1976, 1980, 1991, and 1996. For each of the selected chrono-sequence years, watershed disturbance/condition maps will be prepared as separate overlays on the HRUs and used for the application of the PRMS. Parameters of watershed disturbance/condition status for application to the PRMS and the assessment of watershed process/function will include major vegetation and stand condition typing, road development and maintenance, land use development, timber harvesting, silvicultural treatment, fire history, and vegetation and vegetation recovery status.



(Scale 1:100,000)

**LOCATION MAP**

**Task 4: Run PRMS:** Two major model evaluations will be conducted in this task:

**Identify natural and land use influenced watershed yield and flow:** The PRMS will be used to assess the annual and seasonal yield from the paired-watersheds. Output will be directed toward the evaluation of the influences of watershed disturbance as contrasted within a watershed with limited impacts (Duncan Canyon) and one more typical of well-developed multiple uses/high level of impact (Long Canyon) and to separate the influences of land uses from those associated with natural watershed attributes. Of particular interest will be the influences on annual yields and the alterations to flows during the snowmelt and summer baseflow periods. The modifications in flows will be stratified based on relative wateryear types so that the relative impacts to flow in wet, dry and the more frequently occurring mid-range wateryear types can be discriminated. The results of the model will be subjected to statistical analysis to test the validity of the results.

**Develop natural and land use disturbance and watershed process/function assessment:** The HRU queries and the chrono-sequence of watershed disturbances for the paired-watersheds will be evaluated to isolate the relationships of overall watershed yield response to specific watershed HRU hydrologic attributes, HRU location, watershed configuration, and stream channel network, etc. This will result in a watershed model-based assessment of the spatial variability of watershed process/function and will identify the varying roles of specific HRUs and HRU types in processing and routing water in the watersheds from precipitation through to streamflow, soil and ground water interchange, the source areas of various flow-regime components, and the sensitivity of these various HRUs to land uses and resource management actions. This will be the basis of extending project results to regional applications and use in watershed stewardship decision-making in the target physiographic-climatic region.

**Task 5: Develop project report:** This task is to develop the conclusions concerning the five main objectives of this project, addressed above, but will include: 1) the identification of the influences of land uses and disturbances on annual watershed and seasonal flows in the paired-watersheds; 2) the identification of the various watershed hydrologic roles of the HRUs in watershed processes/function; 3) the development of a generalized understanding watershed process/function and the roles of HRUs in this physiographic setting; 4) the development of a watershed assessment approach that is intended to serve as a guideline or framework for "first-order" assessments of small watersheds for process/function and sensitivities to disturbances and, 5) the identification of critical watershed resource attributes and HRU characteristics important to process/function in the overall NF/MF American River watershed.

#### **B) Location and/or Geographic Boundaries of the Project:**

The project is located in Placer County in the headwaters area of the MF American River at elevations ranging from approximately 4000 ft. to 7200 ft. It is within in portions of Tahoe and Eldorado National Forests. The 9.9 sq.mi. Duncan Canyon watershed flows are recorded by gage #11427700 (Duncan Canyon near French Meadows, CA.). The 18.0 sq.mi. Long Canyon watershed flows area recorded by gage #11433100 (Long Canyon near French Meadows, CA.). The project area is approximately latitude 39deg.6min. north, longitude 120deg.28min.west.

## **ECOLOGICAL/BIOLOGICAL BENEFITS**

### **A) Ecological/Biological Objectives:**

The primary ecological/biological objective for this project is to facilitate the improvement of the headwater watershed planning and decision-making process. This project will evaluate watershed process/function, land use, and resource management decisions on watershed yield and flow patterns in this physiographic and climatic region of the Sierra Nevada. The primary benefits of this project will be enhanced knowledge of the watershed process/function in relationship to land use activities and watershed response and the use of this information in planning instream resources that are affected by flow, water temperature and water quality. The most direct benefit will occur in the small headwater reaches of the Sierra Nevada, and with progressive use and implementation, accumulated benefits in downstream reaches as well as Lower Watershed streams.

There have been many paired-watershed studies comparing the relationship between land use and vegetation alterations and their effect on watershed yield and stream flow response. Based on a review by Marvin (1996), the results of paired-watershed research of more arid, maritime and continental climatic regions throughout the world and in the western US should not be applied to the Sierra Nevada. There have been no such studies done in the high elevation, high precipitation, snowmelt dominated headwater regions of the Sierra Nevada which is the headwater source area for much of the summer season baseflow in the Upper Watershed. It has been noted by researchers that vegetation and watershed response relationships in these higher elevations, greater precipitation, snowmelt watershed should be different than in other Sierra Nevada areas.

The expected benefits of this project will be improved watershed stewardship and decision-making throughout a large portion of the watersheds providing flows to the Bay-Delta system and streams of the Central Valley. The primary stressors addressed by this project are flows, specifically baseflow, water temperature and water quality as they are influenced by flows. The improved watershed stewardship expected from this project will result in improved flow, water temperature and water quality parameters with ultimate benefit to instream species in the watershed. The improved watershed stewardship and decision-making will benefit flows, water temperature and water quality for the third party users in various downstream CALFED restoration projects. This benefit will increase restoration project flexibility and facilitate rapid results for restoration projects associated with base flows, water temperature and water quality.

The hypothesis of the project is that vegetation and land use management in high elevation, high precipitation, snowmelt dominated portions of the Sierra Nevada can influence watershed yield and streamflows. This influence can vary according to the watershed process/function attributes of a watershed providing an improved watershed stewardship decision-making process leading to improved flow related resources.

The project is intended to evaluate the relationship between watershed development and response as well as to develop a framework for the development of a watershed process/function by understanding how variable land units play interrelated roles in watershed process/function and may respond to varying land use and resource management. The project will include working with the USFS, RCD's, NRCS, county planning and landowners through American River CRMP to facilitate a project and project result that will effectively assist these entities in their watershed decision-making activities. By developing a process that serves the needs of the decision makers in the targeted physiographic region and by focusing on watershed evaluation on a process/function basis, the project is expected to have wide ranging application and relevant applicability over time. It is recognized that future research and findings on these important watershed issues will be developed resulting in the need to update the products of this project.

This paired-watershed project is ecosystem based because the assessment approach is based on the premise that varying portions of these watersheds have varying hydrologic attributes and have varying roles that interrelate to form what is known as watershed response of process/function. This assessment method does not treat the watershed to be studied as a "black box" but rather as spatially variable land units with different roles in the watershed hydrologic process. It is the intent to uncover these process components of the watershed, to determine their roles in watershed process and to estimate the influence that vegetation and land use management may have on these units. This project follows an adaptive management framework to the extent that the products are subject to changing information and can be altered to accommodate new information and target uses. This project is not long-term and does not involve the implementation of a physical project therefore it does not lend itself to a formal internal adaptive management framework. It will however, form a benchmark in watershed process/function understanding in this physiographic-climatic region of the Sierra Nevada.

#### **B) Linkages:**

This project is intended to be a stand alone project without previous or subsequent phases funded through CALFED. This project does relate to a larger watershed planning and stewardship project funded by CALFED that is currently underway in the North Fork/Middle Fork (NF/MF) American River watershed (within which Duncan and Long Canyons are located). The objectives of this project include the collection and evaluation of watershed process/function information which will facilitate and enhance the larger more general NF/MF American River Watershed Plan and Stewardship program. Although, these are two different projects conducted at different scales with different objectives and using different types of resource information, the Duncan/Long Canyon project and the NF/MF American River Watershed Plan and Stewardship will be structured to mutually benefit each other. The Duncan/Long Canyon project will assist in identifying the most useful watershed resource information to be collected and evaluated by the larger more general watershed scale. In turn, the NF/MF American River Watershed Plan and Stewardship Program will assist in setting the context for the stewardship of the smaller scale, more detailed paired-watershed study.

The primary objective of the Duncan/Long Canyon project is to enhance watershed process/function understanding and enhance watershed stewardship and decision-making in the headwater watershed areas of the Upper Watershed. The third party beneficiaries of this project include the Upper Watershed Areas from the NF Tuolumne River north to the SF Feather River. The primary CALFED ERP objective for the American River is Target 1 and Programmatic Action 1B (Vol. 2, p.325), 'to improve upper watershed health by implementing watershed improvement practices'. Secondary objectives addressed include flow, water temperature and water quality concerns; Target 1, improved flows in the Sacramento River (Vol. 2, p.183), Target 1, maintain mean daily water temperature in Central Valley streams (Vol. 2, p.186), Target 1, improved water quality in the Feather, Yuba and Bear Rivers (Vol. 2, p.297), Target 1A, maintain low water temperatures in the Lower American River (Vol. 2, p.330), Target 1, maintain or restore natural summer and fall baseflows on the Consumes River (Vol. 2, p.371-72), Target 2, provide conditions to maintain fishery ... in good conditions in the Mokelumne River (Vol. 2, p.372), Target 1, manage releases from tributary streams to provide adequate fall-run and late fall-run spawning in the Merced River (Vol. 2, p.399), Target 1, manage reservoir releases and other factors to provide suitable water temperatures in the Merced River (Vol. 2, p.400), Target 1 maintain baseflows below Goodwin Dam in the Stanislaus River (Vol. 2, p.431).

Two of CALFED's overall objectives include improved flows and water quality in the Bay-Delta system and the mainstem streams of the Lower Watershed and improved watershed management, planning and stewardship, flows and water quality in the Upper Watersheds. This project is intended to provide a basis for improved watershed management decision-making in the headwater watershed areas of the Upper Watersheds, with results including improved land stewardship around watershed resource objectives to improve flows, and water quality. It is intended to be applicable in the Sierra Nevada from the NF Tuolumne River to the SF Feather River addressing CALFED objectives in these Upper Watershed areas, as well as, in the Lower Watershed and Bay-Delta.

The project does not relate directly to any legal obligations or agency mandates, but does address issues related to local agency resource management responsibilities and policies. The project benefits will include enhanced watershed management decision-making at the local, state and federal levels in small headwater watersheds which will facilitate these agencies in realizing their desired resource management goals.

The project provide system-wide and ecosystem wide benefits in that its primary objective is to improved watershed stewardship decision-making in headwater areas. It is also fully compatible with all CALFED restoration objectives.

## **TECHNICAL FEASIBILITY AND TIMING**

The project is a research project to advance the knowledge of overall watershed process/function and to acquire more knowledge on the implications of land use and resource

management to watershed yield and streamflows in the high elevation, snowmelt dominated region of the Sierra Nevada. The intent is to develop knowledge needed to improve watershed management decision-making throughout the higher elevations of the main Sierra Nevada watersheds. As such the "project" will not be a physical solution to an ecosystem problem but a body of knowledge and a methodological approach to improve ecosystem conditions and therefore alternative considered were non-modeling approaches and alternative modeling approaches to paired-watershed evaluations.

Although the non-modeling approach was found to be a cheaper approach it could not adequately establish a link between flow alteration discovered by statistical analysis and the various HRUs and would make it in the end very expensive if these connections were to be reliably established. Alternative modeling approaches were considered, however, the HRU water balance approach and the physical watershed process simulation of this model make it structurally similar to a non-modeling approach and therefore relies heavily on understanding of overall watershed process and spatial relations which are very important to project objectives. The model has been well documented in the research literature and its usefulness and applicability demonstrated. In addition this model has been recently applied in and around the American River watershed and results and data used in those efforts represent data and comparability opportunities for the Duncan/Long Canyon project.

The proposed project does not include a physical solution nor a site specific plan and is therefore not a project in the CEQA/NEPA sense of the term. No CEQA/NEPA requirements will apply to this project and there are no other identified institutional constraints that would impede the undertaking or implementation of the project.

The main issue with respect to implementation is the incorporation of the project findings into on-going and future watershed management planning and decision-making. The implementation of the findings will be voluntary on the part of various agencies in the target physiographic-climatic region of the Sierra Nevada. To enhance the voluntary implementation of the findings, the project design includes a close and cooperative working relationship with the local land use and resource management agencies in the American River basin to ensure that the project is meaningful to their needs and purposes and result in a set of products on watershed process/function, watershed assessment, and land use implications to flows that will be targeted at professional and decision-making levels of land use and resource management agencies.

## **MONITORING AND DATA COLLECTION METHODOLOGY**

### **A) Biological/Ecological Objectives:**

The primary objective of this project is to improve overall watershed conditions by developing improved understanding of watershed process/function in headwater areas and to better understand the influences of land use and resource activities in the target physiographic-climatic region. The hypotheses addressed include: 1) varying influences of land use development

on watershed response and streamflows unique to the mid-high elevation Sierra Nevada headwater areas; 2) hydrologically and functionally significant HRUs in these watershed contribute to overall watershed process/function; 3) land use and resource management activities can influence watershed response according to the HRU's involved; and, 4) land use and resource management approaches and watershed stewardship approaches can avoid adverse watershed responses. This project is focused on research, improved information and outreach mechanisms for watershed stewardship decision-making throughout the target physiographic region and is not a discrete physical project.

**B) Monitoring Parameters and Data Collection Approach:**

The three main aspects that will be subjected to monitoring are research, application and outreach. The first phase of the project, the one on which all basic results will depend, is the PRMS, the research associated with watershed response to land use, and watershed process in the study watershed. This is a research component and must be technically adequate and structured to address the stewardship application objectives of the project. The PRMS design, the hydrologic and climatic data, and the hydrologic attribute findings will be reviewed by the USFS and the USGS for technical competence before the application of the PRMS will commence. The structural development of the HRU's will be reviewed for attribute adequacy by the USFS and the NRCS and reviewed for the scale and refinement suitability to stewardship applications by the USFS, NRCS, PCRCD, and the landowner and business sector interests in the ARWG.

The primary intent of the project is to facilitate improved watershed stewardship in the target physiographic-climatic region. A clear understanding of the information and applications needed by agencies and land management entities involved in watershed stewardship decision-making is crucial. To facilitate this process, formal workshop sessions early in the PRMS application phase will be held. All potential user entities (USFS, NRCS, RCD, county planning/public works, landowners, business interests, etc) will assist in developing application targets, overall framework for outreach and a vehicle for dissemination of information.

**C) Data Evaluation Approach:**

The monitoring procedures for this project involve input to assure the project is appropriately structured, the project results are appropriately targeted to applicants needs, and the results are in a form suitable for use. Therefore, the data collected will be in the form of formal peer review of the research, user review of project objectives, and project result materials. This input will be consistently used to evaluate the project and guide it's course during the development and execution.

TABLE 1

Hypothesis/Question to be evaluated	Monitoring Parameter(s) and Data Collection Approach	Data Evaluation Approach	Comments Data Priority
PRMS Structure	Technical Peer Review	Input and Modification	High
HRU Development	Review Workshop w/Applicants	Input and Modification	High
WS Assess. & Structure	Review Workshop w/Applicants	Input and Modification	High
Outreach Vehicles	Review Workshop w/Applicants	Input and Modification	High

**LOCAL INVOLVEMENT**

The County of Placer Board of Supervisors, County Chief Executive Officer, and lead county staff that provide coordination with the American River CRMP are aware of this project and are supportive of same. The American River CRMP voted to support the PCWA’s submittal of this project under the banner of the American River CRMP. The bulk of the land ownership of the affected and adjacent properties is owned by the Federal Government. The private landowners have cooperated with the USFS and NRCS staff in the recent past on similar studies. Once the project receives CALFED grant approval, a public outreach will be conducted to thoroughly inform the public and private landowners and acquire the necessary written permission for access on private property if applicable.

**COST**

**A) Budget:**

Project management will be the responsibility of Placer County Water Agency as project applicant. This task of project over-sight and contract administration and accounting etc. and the development of quarterly reporting will be undertaken by PCWA as part of the in kind contributions made to this project pending project approval. Of the \$10,000 of in kind services, \$8,000 will be dedicated to project management, over-site, quarterly reporting, contract administration, and accounting.

**B) Schedule:**

Task 1: First Quarter; Baseflow synoptic flow measurements will be conducted, gage records will be reviewed, gage site survey will be conducted, the flow record will be corrected and verified; the watershed hydrologic attributes and disturbance conditions will be reviewed

# COST

TABLE 2

Task*	Direct Labor Hours	Direct Salary & Benefits	Service Contract	Material and Acquisition Costs	Misc. and other Direct Costs	Overhead and Indirect Costs	Total Cost	In Kind Labor
Task 1	112	4,600	40,820	----	----	----	45,420	5,000
Task 2	56	1,400	680	----	----	----	2,080	4,000
Task 3	256	6,400	2,720	----	----	----	9,120	4,000
Task 4	96	3,200	10,340	----	----	----	13,540	4,500
Task 5	96	3,000	9,440	----	1,000	----	13,440	4,500
<b>Total</b>		<b>18,600</b>	<b>64,000</b>	----	<b>1,000</b>	----	<b>83,600</b>	22,000

\* Task Descriptions

Task 1 - Precipitation-Runoff Modeling System set-up

Task 2 - Develop GIS framework

Task 3 - Develop land use disturbance and watershed condition chrono-sequence

Task 4 - Run PRMS

Task 5 - Develop project report

TABLE 3

Task	Quarterly Budget Oct-Dec 99	Quarterly Budget Jan-Mar 00	Quarterly Budget Apr-Jun 00	Quarterly Budget Jul-Sep 00	Quarterly Budget Oct-Dec 00	Total Budget
Task 1	27,250	9,100	9,070			45,420
Task 2		2,080				2,080
Task 3		4,500	4,620			9,120
Task 4			2,700	6,800	4,040	13,540
Task 5				2,700	10,740	13,440
<b>Total</b>	<b>27,250</b>	<b>15,680</b>	<b>16,390</b>	<b>9,500</b>	<b>14,780</b>	<b>83,600</b>

on-site, the development of watershed attribute parameters will be identified and data collection underway.

Second Quarter; Climatic data will be reviewed and appropriate climate/elevation/aspect relationship will be developed and correlated for use in the PRMS, HRU base information will be collected and corrected as needed for GIS input, the development of the PRMS will be initiated.

Third Quarter; The PRMS model will be completed verified, the HRUs will be delineated using the mapped resource information, the snowmelt period over-flights will be conducted and the snowmelt runoff synoptic flows measurements will be conducted.

Task 2: Second Quarter; The GIS will be developed and, as made available, hydrologic parameter data needed to construct the HRUs will be entered.

Task 3: Second Quarter; The watershed disturbance/condition overlay development will be initiated.

Third Quarter; The watershed disturbance/condition overlay development will be completed.

Task 4: Third Quarter; A workshop review of the project objectives will occur to define agency needs and specific PRMS assessment issues, the PRMS will be initiated.

Fourth and Fifth Quarters; The PRMS will be used to approach project objectives, at least two workshops will be used to maintain assessment target and agency needs.

Task 5: Fourth Quarter; A workshop review of the project research results will be held and objectives and agency needs defined for project products and outreach, the development of project products will be initiated.

Fifth Quarter; Draft project products will be prepared, agencies and ARWG CRMP members and others will be invited to review the draft, and a final project product(s) will be prepared.

Payment schedule can be based on a combination of major task-compenant completion, task completion, and monthly progress reports. These milestones will be defined during project scoping

## **COST-SHARING**

Pending project approval, the main cooperating agencies have pledged \$22,000 of in kind services to the project.

- Placer County Water Agency, as project applicant and project manager, has pledged \$10,000 of in kind services primarily for project management and contract/accounting services but also for professional services on tasks related to verifying stream gage records.
- The US Forest Service has pledged \$8,000 of in kind professional services in the professional areas of watershed hydrology, land use disturbance assessment, and the development of project products to supplement there

requested project budget.

- The National Resources Conservation Service and the Placer County Resource Conservation District have each pledged \$2,000 of in kind services in the areas of land use and resource management practices, the development of alternative stewardship actions, and in outreach through the development of project products to supplement their requested project budgets.

## APPLICANT QUALIFICATIONS

The American River Watershed CRMP committees will work with the Resource Conservation District, Natural Resource Conservation Service, U.S. Forest Service, County of Placer staff and Placer County Water Agency staff to select the appropriate consulting team for the technical aspects of the project. The CRMP committees include a wide range of state, federal and local government agencies, as well as, private non-profit and private landowners. A list of the core group from the American River CRMP committees is shown below. The PCWA Deputy Director of Planning and Marketing will provide for project management. Certain administrative and financial functions will be handled by the PCWA Director of Financial Services. PCWA and RCD will serve to provide coordination and linkages between the project implementation and the multitude of agencies involved

### COMPREHENSIVE RESOURCE MANAGEMENT PLANNING COMMITTEE AMERICAN RIVER WATERSHED (Core Group)

Richard Gresham	RCD	885-3046
Kelly Keenan	CDF	823-4904
Otis Wollan	PCWA, Board Member	823-4860
Mike Theroux	Theroux Environmental	641-9603
Paula Nelson	USFS	367-2224
Julie Tupper	USFS	478-6241
Rex Bloomfield	Placer County Bd of Supervisors	889-4010

### PCWA STAFF

**Mal Toy** - Deputy Director of Planning and Marketing, Placer County Water Agency

Mr. Toy has been the Deputy Director of Planning and Marketing of PCWA since 1994. He has over 25 years of professional engineering experience involving water supply, wastewater treatment, industrial waste enforcement, and solid waste collection and disposal. He has a Master's Degree in Civil Engineering from Loyola Marymount University in Los Angeles,

California. He is directly involved in advance planning related to water resource management planning throughout the County of Placer. Mr. Toy is the PCWA coordinator to the various watershed CRMP's within the County of Placer.

**Patricia A. Anders** - Director of Financial Services, Placer County Water Agency

Patricia Anders had been Director of Financial Services for Placer County Water Agency since 1983. She has over 20 years of accounting and financial experience with public and private industry. She has a Bachelor of Business Administration from National University; a Master of Business Administration in Finance and a Master of Business Administration in Marketing from Golden Gate University. She sits on the Finance Committee for the Association of California Water Agencies. A Certified Government Financial Manager, a Member of the Government Finance Officers' Association, The California Municipal Treasurers' Association, The California Society of Municipal Finance Officers, The Municipal Treasurers' Association of the United States and Canada, Sacramento Treasury Management Association and the National Institute of Governmental Purchasing, Inc. Also, a budget reviewer for the Government Finance Officers' Association.

Bibliography:

- Jetson, Anne E., Dettinger, Michael D., and Smith J. LaRue; 1995; Potential effects of climate change on streamflow, eastern and western slopes of the Sierra Nevada, California and Nevada; US Geological Survey Water-Resources Investigations Report 95-4260, 43 p.
- Kattlemann, Richard C., Berg, Neil H., and Rector, John; 1983; The potential for increasing streamflow from Sierra Nevada watersheds; Water Resource Bulletin; Vol 19, No. 3, p.395-402.
- Leavesley, G.H., Litchy, R.W., Troutmen, M.M., and Saindon, L.G.; 1983; Precipitation-runoff modeling system--User's manual; US Geological Survey Water-Resources Investigations Report 83-4238, 207 p.
- Marvin, Sarah; 1996; Possible changes in water yield and peak flows in response to forest management; *In*, Sierra Nevada Ecosystem Project: Final Report to Congress Davis: University of California, Centers for Water and Wildland Resources; Vol.III, p.153-199.
- McCurk, Bruce J. and Davis, Maureen L.; 1996; Camp and Clear Creeks, El Dorado County: chronology and hydrologic effects of land-use change; *In*, Sierra Nevada Ecosystem Project: Final Report to Congress Davis: University of California, Centers for Water and Wildland Resources; Vol.II, p.1369-1406.
- Menning, Kurt, Erman, Don C., Johnson, K. Norman, and Sessions, John; 1996; Modeling aquatic and riparian systems, assessing cumulative watershed effects, and limiting watershed disturbance; *In*, Sierra Nevada Ecosystem Project: Final Report to Congress Davis: University of California, Centers for Water and Wildland Resources; Addendum, p.33-51.

**NONDISCRIMINATION COMPLIANCE STATEMENT**

STD. 19 (REV. 3-95) FMC

COMPANY NAME

PLACER COUNTY WATER AGENCY

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

MICHAEL COOPER

DATE EXECUTED

APRIL 14, 1999

EXECUTED IN THE COUNTY OF

PLACER

PROSPECTIVE CONTRACTOR'S SIGNATURE

PROSPECTIVE CONTRACTOR'S TITLE

DIRECTOR OF HUMAN RESOURCES

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

PLACER COUNTY WATER AGENCY



United States  
Department of  
Agriculture

Forest  
Service

Foresthill  
Ranger  
District

22830 Foresthill Road  
Foresthill, CA  
95631  
530 367-2224  
530 367-2226 TDD  
530 367-2992 FAX

File Code: 3500

Date: April 15, 1999

Mal Toy  
Placer County Water Agency  
144 Ferguson Road  
Auburn, CA 95603

Dear Mr. Toy,

This letter expresses the Foresthill Ranger District's desire to participate with the American River Watershed Group, the Placer County Water Agency, the Eldorado National Forest, Hydmet and WRC Environmental in the proposed project to examine the watershed function of the Duncan Canyon and Long Canyon watersheds.

The Duncan Canyon and Long Canyon watershed are two sub-watersheds of the American River watershed. An examination of these two watersheds have revealed that despite their close proximity, they have drastically different levels of annual water yield. The proposed study will examine the function of these two watersheds to determine possible reasons for this difference. In addition, the proposed project will examine the applicability of a hydrological model to establish a better understanding of watershed function in the Sierra Nevada.

The Tahoe National Forest is interested in the proposed project for a number of reasons. It will allow the agency to assess the effects of its land use practices upon watershed function. This project will also result in the examination of alternative watershed assessment techniques for use on National Forest lands. Finally, this study will provide the Forest with crucial information about how its practices influence the quantity and quality of water delivered to the Bay-Delta System.

If you have any questions about the Foresthill Ranger District's participation in the project, please contact Mary Grim at (530) 367-2224.

Sincerely,

  
RICHARD A. JOHNSON  
District Ranger



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United States  
Department of  
Agriculture

Natural  
Resources  
Conservation  
Service

251 Auburn Ravine Rd., Suite 201  
Auburn, CA 95603  
(530) 823-6830  
FAX (530) 823-5504

April 16, 1999

Mal Toy, Deputy Director  
Placer County Water Agency  
P.O. Box 6570  
Auburn, Ca 95604

Re: Paired Watershed Evaluation

Dear Mal:

We are very much interested in and support the idea of evaluating two close proximity watersheds in the upper elevations of the Sierras. Of importance is if and or how land use activities influence water quality and yields. I know it will be a challenge to sort out land use activities from geologic influences.

This evaluation will flow nicely with the American River Watershed CRMP and it's objectives. We are also very much interested, as an agency, on watershed activities and their impacts. We continue to gain more information and change our ideas and concepts from activities such as this.

We thank you for your interest in this project and support your proposed evaluation.

Sincerely,

Clifford A. Heitz  
District Conservationist

The United States Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication or program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD). To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5864 (voice or TDD). USDA is an equal opportunity provider and employer.



**Placer County Resource Conservation District**

251 Auburn Flavine Rd., Suite 201 - Auburn, CA 95803-3719 - Phone (916) 885-3046 / FAX (916) 823-5504

April 15, 1999

Mal Toy  
PCWA  
PO Box 6570  
Auburn, CA 95604

Dear Mr. Toy

The District, on behalf of the American River Watershed Group, wishes to express our support for your proposal to conduct a paired-watershed evaluation using the USGS Precipitation-Runoff Modeling System.

Your proposal will complement existing funded watershed programs and proposed Integrated Watershed Plan and Stewardship Strategy. A model that is sensitive to influences on watershed yield and stream flows due to land uses and vegetative management will assist in our long-term desire to understand watershed function.

Thank you for your interest in working with the American River Watershed Group.

Cordially,

Richard C. Gresham,  
Manager