

## DEPARTMENT OF FISH AND GAME

FISH AND WILDLIFE WATER POLLUTION CONTROL LABORATORY  
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July 28, 1997

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

Dear CALFED Review Panel:

The enclosed document contains two pages of text and two pages of maps. Please review it as an Inquiry Proposal for CALFEDs Category III funding initiative.

The California Department of Fish and Game's Aquatic Biological Assessment Laboratory has developed macroinvertebrate bioassessment procedures for use in watershed health assessments. These California State Bioassessment Protocols are ready for use in a watershed program like CALFED's Bay Delta Program. We have proposed two demonstration projects in the Bay Delta watershed, but we believe that these procedures would serve very well as a monitoring tool for other projects being supported by Category III funding.

If you have any questions regarding this proposal or issues relating to using the CSBPs in other CALFED projects please contact us at the above address.

Sincerely,

A handwritten signature in black ink, appearing to read "James Harrington".

James Harrington  
Environmental Specialist III  
Aquatic Biological Assessment Lab

**INQUIRY PROPOSAL: Demonstration of Macroinvertebrate-Based Monitoring Techniques in the Cosumnes River and Butte Creek Watersheds**, submitted by James Harrington, J.T.King and P.R. Ode, Aquatic Biological Assessment Laboratory, California Department of Fish and Game

**Project Description/ Primary Objectives:**

This project will demonstrate the application of the California Stream Bioassessment Procedure (CSBP-- California's U.S. EPA-approved protocol for biological assessment of water quality) as a monitoring tool in the Bay Delta watershed. The Cosumnes River and Butte Creek watersheds will be monitored using environmental indicators (bioassessment metrics) derived from the benthic macroinvertebrate community (BMC) structure.

Water quality is usually assessed in California with the traditional tools of chemical and toxicity testing. While these tools provide **indirect** measures of the health of water bodies, water quality can be **directly** assessed by measuring the physical condition of water bodies and the integrity of the biological communities living in them. The bioassessment approach is particularly valuable because it integrates the effects of exposure to stressors over time and is sensitive to multiple aspects of water and habitat quality (many of which can not be detected with traditional methods). Also, since bioassessment is less expensive than chemical or toxicity testing, its use can greatly increase the number of water bodies that can be monitored for a given cost.

Although California's adoption of this nationally accepted monitoring tool has been delayed by this state's tremendous range of ecological diversity, aquatic bioassessment has great potential for use in the Bay Delta system. The California Department of Fish and Game's Aquatic Bioassessment Laboratory has been developing CSBPs for the past six years and has demonstrated the value of this technique for point source impacts and for watershed-scale assessment of non-point impacts throughout the state. Much of the development of the CSBP was based on previous work in the Cosumnes River watershed.

The CSBPs are ready for use in the Bay Delta watershed; we are proposing to monitor the Cosumnes River and Butte Creek watersheds using metrics (many of which were developed in previous work in the Cosumnes River watershed) derived from the BMC structure. The project has three primary objectives:

1. *Establish reference conditions for ecoregions within two comparatively undisturbed watersheds that supply the Bay/Delta region.*
2. *Measure the effect of seasonal variability on macroinvertebrate communities and bioassessment metrics calculated from the BMC.*
3. *Demonstrate the use of the CSBPs by evaluating the influence of land and water use practices on water quality in the Cosumnes River, an East Side tributary to the Bay Delta and Butte Creek, a primary habitat for spring-run Chinook salmon.*

Successful adoption of the CSBPs requires the identification of reference conditions in California and calibration of our reference metrics to the diverse range of ecoregions within the Bay Delta system. The Cosumnes River and Butte Creek watersheds include most of the ecoregions in the Sacramento and San Joaquin drainages. Fulfilling these three objectives will provide crucial information for state and federal watershed agencies and stakeholders interested in maintaining watershed integrity and will demonstrate the application of this monitoring tool.

### Approach/ Tasks/ Schedule

The work will consist of four phases over three years:

- ▶ Phase 1 (years 1 and 2) will consist of developing a sampling plan, contacting watershed stakeholders and acquiring access permission for proposed sampling reaches.
- ▶ Phase 2 (years 1 and 2) will include field sampling and mapping of sampling reaches.
- ▶ Phase 3 (years 2 and 3) will consist of BMC sample analysis including quality assurance procedures and taxonomic validation.
- ▶ Phase 4 (year 3) will consist of data quality evaluation, data analysis, report preparation and data transfer into a standardized electronic format.

### Justification for Funding by CALFED

Calfed's mission is to "restore ecosystem health and improve water management for beneficial uses of the Bay Delta system". The CSBPs will provide Calfed with a powerful, comprehensive and cost-effective tool that can be used for both point-source and non-point source monitoring of ecosystem health throughout the Bay Delta watershed.

Calfed will benefit from supporting this technique in two ways:

- ▶ It can be used to monitor the positive and negative impacts of Calfed-funded projects.
- ▶ It can identify sources and magnitudes of stressors which may affect species targeted by CALFED in upper watersheds.

### Budget Costs/ Third Party Impacts

This project requires funding for two full time Environmental Specialist II positions for three years at a total cost of \$360,000.00. Additional costs of sample processing and equipment will total approximately \$80,000.00. The total budget costs for this project will total \$440,000.00.

We can identify no third party impacts.

### Applicant Qualifications

Our laboratory is fully staffed with experienced invertebrate taxonomists and field-collecting specialists. We have had considerable experience implementing biological assessments and we are in a strong position to use this monitoring tool at the level of the Bay Delta watershed. The three primary investigators have 35 years of combined experience in watershed ecology and 20 years of combined experience in the bioassessment field.

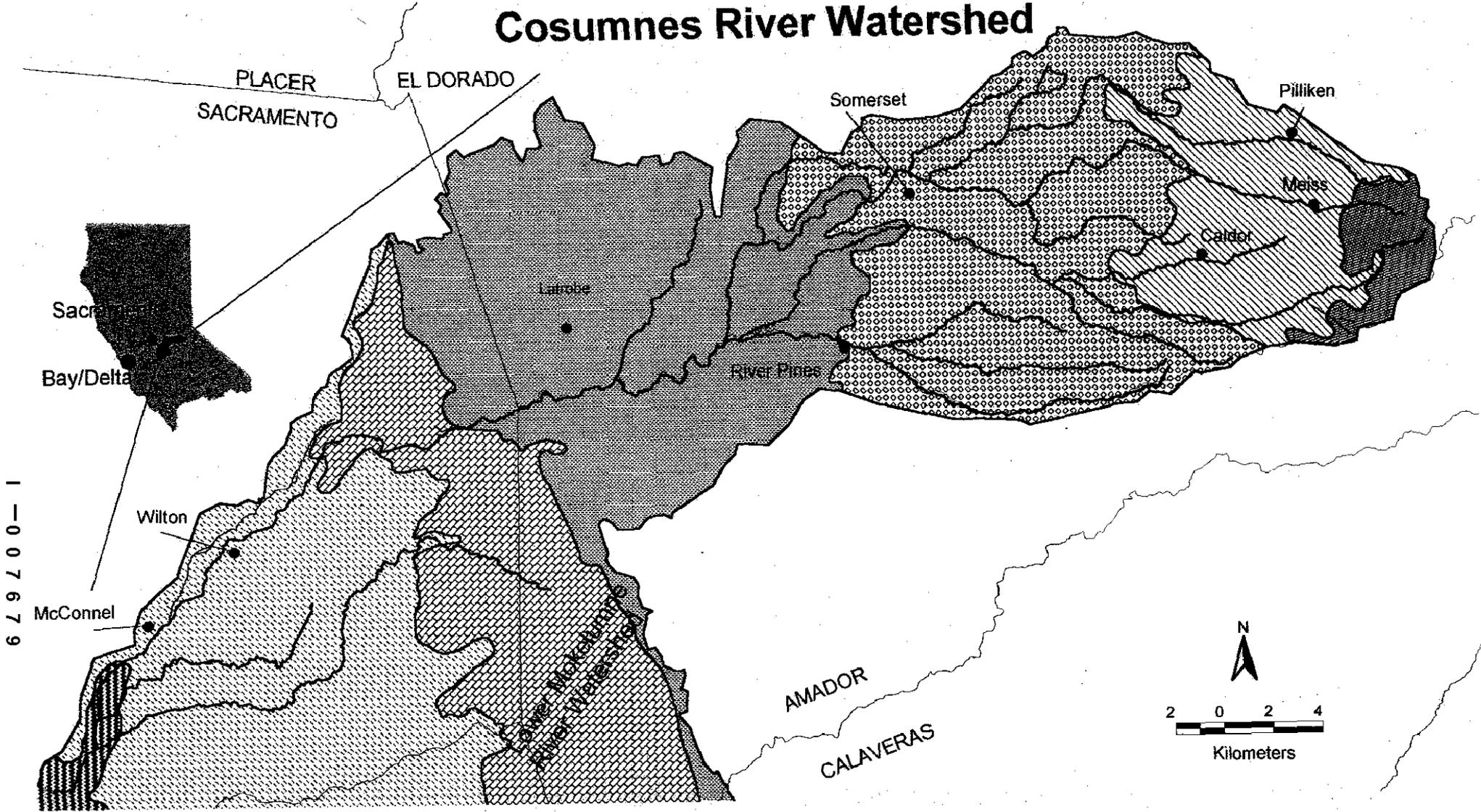
### Monitoring and Data Evaluation

Quality assessment of CSBP data can be easily evaluated because organisms may be preserved indefinitely and re-evaluated by other investigators at any time (there are no limited holding times as there are with samples collected for chemical or toxicity tests). For quality assurance of this proposed work, ten percent of randomly selected samples will be evaluated by an outside source. Data evaluation will be made using proven statistical designs.

### Local Support/ Coordination with Other Programs/ Compatibility with CALFED Objectives

Several groups are currently involved in these watersheds. The Nature Conservancy is submitting research and land acquisition proposals to CALFED, the Butte Creek Conservancy is involved in protection of its watershed, and CDFG is actively involved in protection of spring-run Chinook salmon in Butte Creek.

# Cosumnes River Watershed



1-007679

## U.S. Department of Agriculture Ecoregion Subsections

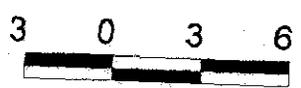
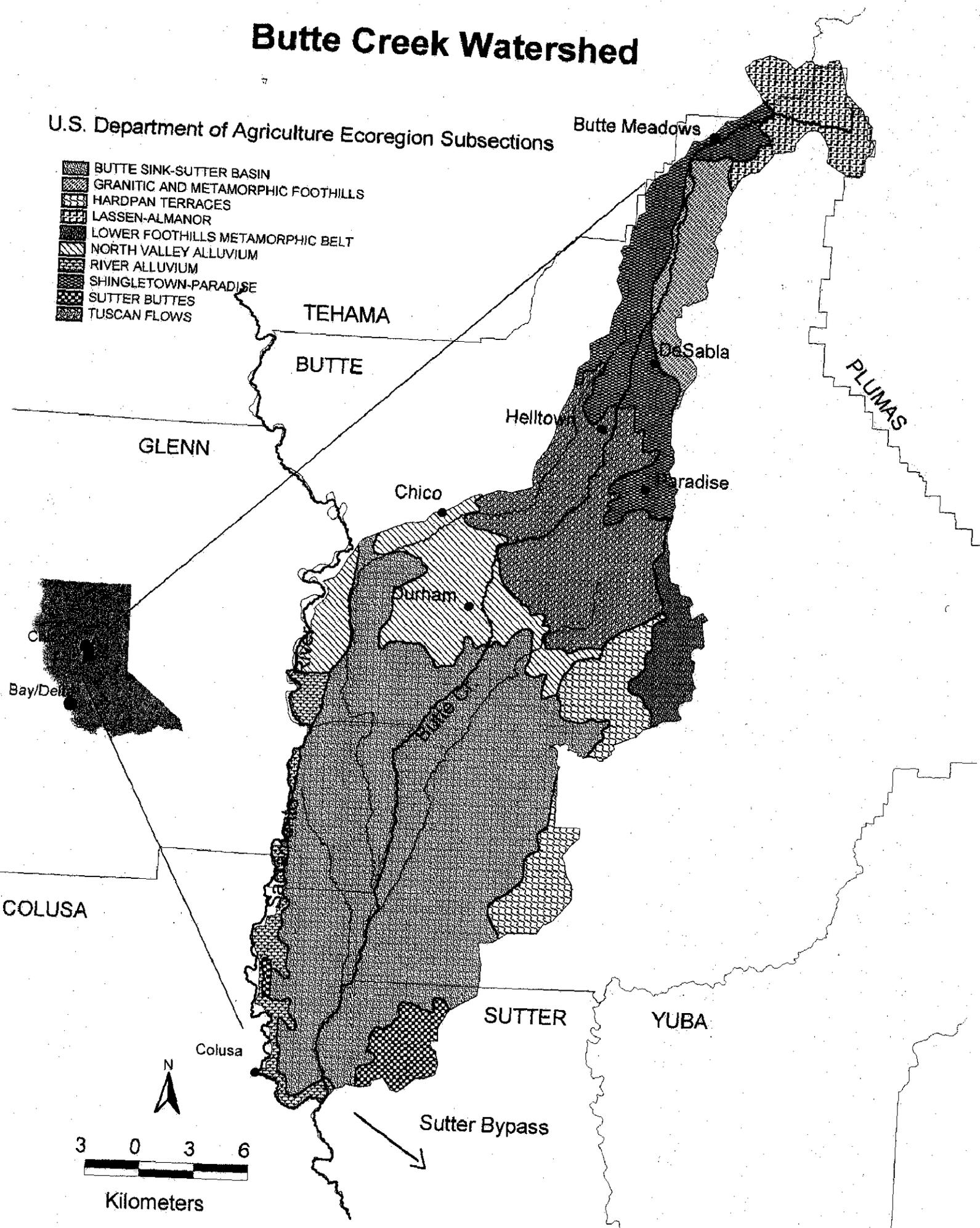
-  BATHOLITH AND VOLCANIC FLOWS
-  CAMANCHE TERRACES
-  DELTA BASINS
-  HARDPAN TERRACES
-  LODI ALLUVIUM
-  LOWER FOOTHILLS METAMORPHIC BELT
-  UPPER BATHOLITH AND VOLCANIC FLOWS
-  UPPER FOOTHILLS METAMORPHIC BELT

 Cosumnes River and Major Tributaries

# Butte Creek Watershed

U.S. Department of Agriculture Ecoregion Subsections

-  BUTTE SINK-SUTTER BASIN
-  GRANITIC AND METAMORPHIC FOOTHILLS
-  HARDPAN TERRACES
-  LASSEN-ALMANOR
-  LOWER FOOTHILLS METAMORPHIC BELT
-  NORTH VALLEY ALLUVIUM
-  RIVER ALLUVIUM
-  SHINGLETOWN-PARADISE
-  SUTTER BUTTES
-  TUSCAN FLOWS



Kilometers