

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

Proposal Title: Development of a Comprehensive Implementation Plan for a Statistically-Designed Marking/Tagging and Recovery Program for Central Valley Hatchery-Produced Chinook Salmon and Steelhead

Applicant Name: California Department of Fish and Game

Mailing Address: Central Valley Bay-Delta Branch
Attn: Mr. Alan Baracco
4001 North Wilson Way
Stockton, CA 95205-2486

Telephone: (916) 653 - 4729

Fax: (916) 653 - 8256

Email: abaracco@hq.dfg.ca.gov

Amount of funding requested: \$ 75,951 (total) for 2 years

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

- | | |
|---|---|
| <input type="radio"/> Fish Passage/Fish Screens | <input type="radio"/> Introduced Species |
| <input type="radio"/> Habitat Restoration | <input checked="" type="radio"/> Fish Management/Hatchery |
| <input type="radio"/> Local Watershed Stewardship | <input type="radio"/> Environmental Education |
| <input type="radio"/> Water Quality | |

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

What county or counties is the project located in? Shasta, Butte, Sacramento, San Joaquin, Merced, Fresno, and Sonoma

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

- | | |
|--|---|
| <input type="radio"/> Sacramento River Mainstem | <input type="radio"/> East Side Trib: _____ |
| <input type="radio"/> Sacramento Trib: _____ | <input type="radio"/> Suisun Marsh and Bay |
| <input type="radio"/> San Joaquin River Mainstem | <input type="radio"/> North Bay/South Bay: |
| <input type="radio"/> San Joaquin Trib: _____ | <input checked="" type="radio"/> Landscape (entire Bay-Delta watershed) |
| <input type="radio"/> Delta: _____ | <input type="radio"/> Other: _____ |

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

- | | |
|---|---|
| <input type="radio"/> San Joaquin and East-side Delta tributaries fall-run chinook salmon | <input type="radio"/> Spring-run chinook salmon |
| <input type="radio"/> Winter-run chinook salmon | <input type="radio"/> Fall-run chinook salmon |
| <input type="radio"/> Late-fall run chinook salmon | <input type="radio"/> Longfin smelt |
| <input type="radio"/> Delta smelt | <input type="radio"/> Steelhead trout |
| <input type="radio"/> Splittail | <input type="radio"/> Striped bass |
| <input type="radio"/> Green sturgeon | <input type="radio"/> All chinook species |
| <input type="radio"/> Migratory birds | <input checked="" type="radio"/> All anadromous salmonids |
| <input type="radio"/> Other: _____ | |

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: Specifically, the proposed project will provide CALFED the basis for (i) evaluating and revising Central Valley salmon and steelhead hatchery operations to result in population augmentation without detrimental effects on wild populations per ERPP, Vol. I, pages 522-

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.23: (ii) being able to track restoration of all races of chinook salmon and steelhead per ERPP, Vol. I, pages 220-224 and 229-230; and (iii) tracking whether CALFED targets for population restoration of chinook salmon and steelhead are being reached per ERPP, Vol. II, pages 25-30.

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

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

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

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

Alan Baracco

Printed name of applicant


Signature of applicant

**PROPOSAL TO CALFED BAY-DELTA PROGRAM
ECOSYSTEM RESTORATION PROJECTS AND PROGRAMS
CATEGORY III FUNDING PROGRAM
APRIL 1999**

TITLE PAGE

Project Title: Development of a Comprehensive Implementation Plan for a Statistically-Designed Marking/Tagging and Recovery Program for Central Valley Hatchery-Produced Chinook Salmon and Steelhead

Applicant: California Department of Fish and Game
Central Valley/Bay-Delta Branch
attn: Mr. Alan Baracco
1416 Ninth Street
Sacramento, CA 95814
phone (916) 653-4729
FAX (916) 654-8099
e-mail abaracco@hq.dfg.ca.gov

Proposal Preparers: Mr. Rich Dixon, Central Valley/Bay-Delta Branch - Sacramento
Dr. Rob Titus, Water and Aquatic Habitat Conservation Branch
California Department of Fish and Game
1416 Ninth Street
Sacramento, CA 95814
Dixon: (916) 653-9642, FAX (916) 654-8099, rdixon@hq.dfg.ca.gov
Titus: (916) 654-9865, FAX (916) 653-2588, rtitus@hq.dfg.ca.gov

Participants & Collaborators:

- California Department of Water Resources (DWR)
- East Bay Municipal Utility District (EBMUD)
- Metropolitan Water District of Southern California (MWD)
- National Marine Fisheries Service (NMFS)
- U. S. Bureau of Reclamation (USBR)
- U. S. Fish and Wildlife Service (FWS)
- Contractors and sub-contractors to the Comprehensive Assessment and Monitoring Program of the Central Valley Project Improvement Act, and the CALFED Bay-Delta Program, as applicable

Organization & Tax Status: Public agency, tax exempt.

EXECUTIVE SUMMARY

Project Description: This proposal responds to Section 3.2 of the Proposal Solicitation Package (PSP) to develop an implementation plan for a comprehensive and statistically-sound marking and tagging program for hatchery-produced Central Valley chinook salmon. The proposed project will develop a plan to implement a Constant Fractional Marking (CFM) program that integrates coded-wire tagging/fin marking (CWT) and otolith thermal marking (OTM) to address central salmon management questions regarding the relative contribution of hatchery and natural production to adult populations as represented in fisheries, spawner populations, and at Central Valley salmon hatcheries, and to develop a means to implement selective fisheries. The scope of this project would include not only chinook salmon but also steelhead. Hatchery-produced steelhead are currently identifiable with an adipose-fin clip but more information would be gained by providing an additional mark or tag that would identify the hatchery and/or release group of origin. An integrated CWT/OTM program represents the state-of-the-art approach to addressing stock identification questions in anadromous salmonids, that includes the ability to achieve a level of resolution to monitor weak natural stocks. The goal of the proposed project is to design an implementation program that identifies how these methods can best be applied to address various stock-identification questions with an acceptable level of statistical reliability.

The proposed approach to developing an implementation plan for an integrated CWT/OTM program is to identify the issues, procedures, potential problems, and costs for tagging and marking; tagging and marking logistics; release strategies; recovery of tag and mark information; and management, analysis, and reporting of data. This information will be developed by working with the appropriate managers and staff of the six State and Federal anadromous fish hatcheries, resource assessment personnel responsible for monitoring salmon and steelhead spawner stocks, the California Department of Fish and Game's (DFG) Ocean Salmon Project which monitors the ocean sport and commercial harvest of salmon, the DFG's Central Valley Salmon and Steelhead Harvest and Monitoring Project, and any other pertinent programs identified in this process.

The proposed project will build upon the products of the current CALFED contractor that include model development for statistically evaluating CFM alternatives by mass-marking with CWT's; recommendations for tagging and recovery rates, estimates of the number of fish to tag, sampling and recovery costs, and analytical requirements. The proposed project will also incorporate the results of a CWT mass-marking demonstration project using new technology, to be conducted as part of the current CALFED project in spring 2000.

Actual coordination, collection, compilation, and synthesis of information will occur under the guidance of a Interagency Implementation Project Work Team (IIPWT) that will be formed as one of the first tasks of the proposed project. The IIPWT will include the project participants and collaborators listed on the title page, and will be chaired and coordinated by the DFG.

Subsequent project tasks will include: (i) identification and integration of stakeholder interests and concerns; (ii) conducting interviews and gathering information from hatchery, monitoring, and resource assessment personnel, as described above; (iii) identification of NEPA/CEQA and ESA/CESA compliance requirements for implementation of a CWT/OTM program, and third

party impacts; (iv) and information synthesis and preparation of the draft through final implementation plan, which is the primary deliverable of the proposed project.

Location of Project: The scope of information gathering for development of the implementation plan will include six Central Valley counties (Butte, Fresno, Merced, Sacramento, San Joaquin, and Shasta counties) and Sonoma County.

Primary Biological/Ecological Objectives: The primary biological objective of the proposed project is to develop a plan for determining the relative contribution of hatchery and natural production to adult populations of Central Valley chinook salmon and steelhead. This is an overriding question in Central Valley salmon and water management which, if addressed, would provide the means to answer a large suite of questions relative to tracking the results of restoration and recovery efforts for salmon and steelhead, including CALFED ERPP actions.

Plan development will be consistent with, and occur in cooperation with, the Comprehensive Assessment and Monitoring Program (CAMP), CALFED's Comprehensive Monitoring, Assessment, and Research Program (CMARP), and priorities of the Pacific Fishery Management Council (PFMC).

Cost: \$74,951

Adverse and Third Party Impacts: No adverse impacts will occur as a result of development of an implementation plan for a CWT/OTM program. The plan will confer a third party benefit.

Applicant Qualifications: Mr. Alan Baracco, DFG, will oversee the project. Mr. Baracco has 27 years of experience with the DFG, including the Ocean Salmon Project, inland salmon and steelhead management, and currently as a manager in the DFG's Central Valley Bay-Delta Branch. Extensive experience in both ocean and inland management of salmon and steelhead is represented within the staff of the DFG. This collective experience and expertise includes: hatchery production of chinook salmon and steelhead; coded-wire tagging and recovery; otolith thermal marking and recovery; angler surveying; and spawner stock assessment.

Monitoring and Data Evaluation: Project progress will be monitored by the IIPWT, and reporting to CALFED on project progress and plan development will occur on a quarterly basis. This responsibility will be borne by the DFG.

Local Support and Coordination with Other Programs: Will coordinate with the current CALFED contractor, IEP, CVPLA-CAMP, CMARP, participant agencies, and the PFMC.

Compatibility with CALFED Objectives: The proposed project will provide CALFED the basis for (i) evaluating and revising salmon and steelhead hatchery operations to result in population augmentation without detrimental effects on wild populations (ERPP, Vol. I, pages 522-523); (ii) being able to track restoration of chinook salmon and steelhead (ERPP, Vol. I, pages 220-224 and 229-230); and (iii) tracking whether CALFED targets for population restoration of chinook salmon and steelhead are being reached (ERPP, Vol. II, pages 25-30).

PROJECT DESCRIPTION

Proposed Scope of Work

This proposal responds to Section 3.2 (page 29) of the Proposal Solicitation Package (PSP) to *[d]evelop a comprehensive implementation plan for a statistically designed marking and tagging program for chinook salmon produced at Central Valley facilities consistent with existing programs throughout the West Coast.* The proposed project will develop a plan to implement a Constant Fractional Marking (CFM) program that integrates traditional coded-wire tagging/fin marking (CWT) and otolith thermal marking (OTM) to address central salmon management questions regarding the relative contribution of hatchery and natural production to adult populations as represented in fisheries, spawner populations, and at the Central Valley anadromous fish hatcheries, and to develop a means to implement selective fisheries.

Otolith thermal marking (OTM) is an alternative to CWT as a method for mass-marking up to 100% of hatchery production of anadromous salmonids (e.g. Munk *et al.* 1993). Thermal marking involves either increasing (e.g. Mosegaard *et al.* 1987) or decreasing (e.g. Volk *et al.* 1990) ambient water temperature of salmonid embryos to induce unique, coded sequences of otolith rings. A unique sequence of otolith rings can be applied to specific release groups that can then be recognized through microscopic analysis in otoliths recovered from both juveniles and adults. The proposed project will integrate OTM with CWT applied on a constant fractional basis as a means to validate assumed or estimated proportions of hatchery vs. natural fish in CWT recoveries from fisheries, escapement surveys, and hatcheries. Thermal marking is also particularly useful for assessing fishery impacts on weak natural stocks of salmon and steelhead, as well as their migration patterns and interactions with hatchery stocks (PFMC 1998).

The scope of this project will include not only chinook salmon but also steelhead. Central Valley hatchery-produced steelhead are currently identifiable with an adipose-fin clip but more information would be gained by providing an additional mark or tag that would identify the hatchery and/or release group of origin. Including steelhead in an integrated CWT/OTM will facilitate assessment of steelhead maintenance programs at individual hatcheries.

An integrated CWT/OTM program represents the West Coast state-of-the-art approach to addressing stock identification questions in anadromous salmonids, that includes the ability to achieve a level of resolution to monitor weak natural stocks. The goal of the proposed project is to design an implementation program that identifies how these methods can best be applied to address various stock-identification questions with an acceptable level of statistical reliability.

Approach: The proposed approach to developing an implementation plan for an integrated CWT/OTM program is to identify the issues, procedures, potential problems, and costs for tagging and marking; tagging and marking logistics; release strategies; recovery of tag and mark information; and management, analysis, and reporting of data. To develop information on tagging, marking, release strategies, and associated costs, hatchery managers and staff will be contacted and interviewed at the two Federal and four State Central Valley anadromous fish hatcheries: Livingston

Stone National Fish Hatchery (LSNFH) and Coleman National Fish Hatchery (CNFH); and Feather River Fish Hatchery (FRH), Nimbus Fish Hatchery (NFH), Mokelumne River Fish Hatchery (MRFH), and Merced River Fish Facility (MRFF), respectively.

Information on recovery of marked fish in ocean sport and commercial salmon fisheries and associated costs will be obtained from the DFG's Ocean Salmon Project (OSP). The OSP currently monitors ocean salmon landings from Crescent City to Morro Bay, estimates the ocean catch, and recovers heads from coded-wire tagged fish which are distinguished from untagged fish by an adipose-fin clip. The OSP also extracts and processes the CWTs, and manages, analyzes, and reports CWT recovery data for California's ocean fisheries and the State's Central Valley hatcheries. In addition, OSP has the potential for sampling otoliths from landed salmon to recover thermal marks.

Information on stream recoveries of marked salmon and steelhead and associated costs will be obtained from DFG and U.S. Fish and Wildlife Service (FWS) spawner stock assessment programs in the Sacramento and San Joaquin rivers and tributaries, and the DFG's Central Valley Salmon and Steelhead Harvest and Monitoring Project. Information on the costs of recovering marked fish and sampling otoliths at the hatcheries will be obtained from hatchery managers and staff.

The proposed project will build upon the products of the current CALFED contractor that include model development for statistically evaluating CFM alternatives by mass-marking with CWT's, recommendations for tagging and recovery rates, estimates of the number of fish to tag, sampling and recovery costs, and analytical requirements. A report presenting this information is due in June 1999. The proposed project will also incorporate the results of a CWT mass-marking demonstration using new technology developed by Northwest Marine Technology, Inc., to be conducted as part of the existing CALFED project in spring 2000. The new automated marking and tagging machine is expected to clip the adipose fin and inject CWTs at a rate of 50,000 fish per 8-hour shift. The operation and success of this technology will be monitored in the course of developing the proposed CFM implementation plan.

Tasks: The first task (Table 1) after the contract is signed is the formation of the Interagency Implementation Project Work Team (IIPWT). The IIPWT will consist of individuals knowledgeable in the issues relevant to this project. In addition to DFG staff, membership in this team will include, but not be limited to, appropriate staff from DWR, FWS (including CVPIA), BOR, EBMUD, MWD, and NMFS who can represent their agencies' interests in this undertaking. Also, representation of CMARP and CAMP will be included to ensure that their respective goals and objectives are accommodated within the implementation plan. Coordination, collection, compilation, and synthesis of information will occur under the guidance of the IIPWT, which will be chaired and coordinated by the DFG. The DFG will be responsible for production of all deliverables.

The next task will be the review and validation of the results of the existing study on both a programmatic and statistical basis. The results of these reviews will be provided to the IIPWT who will identify any gaps of information that need to be filled.

Task 4 will involve identifying and contacting principal stakeholder groups that may be interested in and affected by the proposed CWT/OTM program. These will include ocean sport and commercial, and inland sport fishing interests, and environmental interests. Relevant concerns will be accommodated in the implementation plan.

Proposed project staff will synthesize the results of the current CALFED study and the information-gathering process described earlier with hatchery staff, the ocean salmon fisheries monitoring program, and inland population monitoring and resource assessment programs to develop the implementation plan. This synthesis will include accurate cost estimates for adequate staffing, equipment, and operations of a completely integrated CWT/OTM program for constant fractional marking of Central Valley hatchery-produced chinook salmon and steelhead.

The next series of tasks will involve identifying all NEPA/CEQA and ESA/CESA compliance requirements for CFM implementation. Because of the substantial increase in the numbers of fish to receive CWT's and thermal marks as a result of the proposed program, project staff will identify those entities which may be significantly impacted. These entities are expected to include: the Pacific States Marine Fisheries Commission's Regional Mark Information System, which maintains the CWT release and recovery databases for the entire Pacific Coast; the Oregon Department of Fish and Wildlife, which recovers numerous coded-wire-tagged chinook salmon of Central Valley origin each year in Oregon's ocean salmon fisheries; and the Alaska Department of Fish and Game's (ADFG) Coded Wire Tag and Otolith Processing Laboratory which facilitates OTM coordination on the West Coast (K. Munk, ADFG, pers. comm. of 11 February 1999).

In addition to CWT on a constant fractional basis, the proposed will also identify the issues, logistics, and costs involved in using OTM for mass-marking of Central Valley salmon and steelhead. This task will include a pilot study to evaluate the efficacy of OTM in achieving this objective.

The final series of tasks will entail the preparation of a draft implementation plan that will incorporate all of the information gathered. This synthesis will identify how CWT and OTM will be integrated to best answer key management questions about and related to the relative contribution of hatchery production to adult populations, given the relative strengths and weaknesses of the two methods (see Technical Feasibility and Timing) and the performance results of the new CWT technology. The plan will likely result in a staged CFM implementation schedule, with a 2-3 year lag in recovery implementation following initiation of the CWT/OTM program. The plan will be reviewed by the IPWT before finalization at the end of October, 2000.

Location and/or Geographic Boundaries

This project encompasses seven counties. LSNFH and CNFH are located in Shasta County, FRH is in Butte County, NFH is in Sacramento County, MRFH is in San Joaquin County, and MRFF is in Merced County. The headquarters of the three Central Valley Regions are located in Redding (Shasta County), Rancho Cordova (Sacramento County), and Fresno (Fresno County), for Regions 1, 2, and 4, respectively. The DFG's Ocean Salmon Project staff is headquartered in Healdsburg (Sonoma County).

Table 1. Tasks for Developing an Implementation Plan for an Integrated CWT/OTM Constant Fractional Marking Program for Central Valley Hatchery-Produced Chinook Salmon and Steelhead.

Task	Time Frame
Task 1. Sign contract with CALFED	Month 1
Task 2. Establish Interagency Implementation Project Work Team (IIPWT) of knowledgeable staff from State and Federal agencies, and other entities involved in Central Valley salmon and steelhead stocks' management and recovery.	Month 2
Task 3. Conduct statistical and programmatic review and validation of results of previous CALFED-funded study involving evaluation of constant fractional marking (CFM) for Central Valley hatchery-produced salmon and steelhead.	Month 2
Task 4. Conduct outreach program to principal organizations representing environmental, commercial and recreational ocean salmon fishermen, inriver salmon/steelhead sportfishing, and other concerned stakeholder groups in order to identify and address their concerns and obtain their support.	Month 2
Subtask 4a. Identify the principal organizations to be contacted, in part through IIPWT	Month 2
Subtask 4b. Contact the organizations to identify and address their concerns and obtain their support.	Month 2
Task 5. Create staged implementation plan segment for CFM of all hatchery-produced Central Valley chinook salmon.	Months 3 - 6
Subtask 5a. Based on results of Task 3, identify additional information needed to develop complete CFM plan for chinook salmon.	Month 3
Subtask 5b. Based on results of Subtask 5a, meet with staff of each of the six Central Valley hatcheries to identify issues/procedures/logistics for each hatchery and identify additional costs and personnel required to achieve coded-wire tagging levels estimated by previous study for chinook salmon.	
Subtask 5c. Based on results of Subtask 5a, meet with appropriate staff of agencies involved in Central Valley chinook salmon and steelhead monitoring and resource assessment, including those involved with sportfishery monitoring and natural escapement to identify current levels of monitoring and increased costs of staffing levels necessary for recovery of marked/tagged chinook salmon.	
Subtask 5d. Based on results of Subtask 5a and accompanying subtasks, meet with DFG Ocean Salmon Project Staff to identify anticipated increases in costs of recovery, processing, data management, and reporting as a result of increased tagging levels.	
Subtask 5e. Identify all CEQA, CESA, NEPA, and ESA compliance requirements for implementation of CFM for chinook salmon.	

Month 3

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Subtask 5f.	Identify all agencies and other entities that need to be coordinated with that could be significantly affected by increased tagging rates of CFM (examples may include Pacific States Marine Fisheries Commission Regional Mark Information System, Oregon Department of Fish and Wildlife).	Month 4
Subtask 5g.	Develop draft staged CFM implementation plan for all hatchery-produced Central Valley chinook salmon that addresses concerns identified in contracted outreach (Task 4).	Month 5
Subtask 5h.	Have IPWWT review draft plan for chinook salmon and provide comments.	Month 6
Subtask 5i.	Incorporate IPWWT comments into draft plan for chinook salmon and finalize plan to submit to CALFED.	Months 3 - 6
Task 6.	Create staged implementation plan segment for CFM of all hatchery-produced Central Valley steelhead.	
Subtask 6a.	Per Subtask 5a, except for steelhead.	
Subtask 6b.	Per Subtask 5b, except for steelhead.	
Subtask 6c.	Per Subtask 5c, except for steelhead.	Month 3
Subtask 6d.	Per Subtask 5d, except for steelhead.	
Subtask 6e.	Per Subtask 5e, except for steelhead.	
Subtask 6f.	Per Subtask 5f, except for steelhead.	
Subtask 6g.	Per Subtask 5g, except for steelhead.	Month 4
Subtask 6h.	Per Subtask 5h, except for steelhead.	Month 5
Subtask 6i.	Per Subtask 5i, except for steelhead.	Month 6
Task 7.	Create staged implementation plan segment for otolith thermal marking (OTM) all Central Valley hatchery-produced chinook salmon and steelhead.	Months 5 - 6
Subtask 7a.	Compile information on OTM programs from Alaska Department of Fish and Game, and Washington Department of Fish and Wildlife.	Month 5
Subtask 7b.	Meet with appropriate staff of Nimbus and/or Feather River Hatchery to identify feasibility/costs/procedures/tasks to pursue OTM on a pilot basis.	
Subtask 7c.	Identify feasibility, logistics, and costs for sampling OTM recovery.	

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Subtask 7d.	Identify those agencies/entities that may be affected by OTM pilot study	
Subtask 7e.	Identify all CEQA, CESA, NEPA, and ESA compliance requirements for implementation of OTM for chinook salmon and steelhead	Month 5
Subtask 7f.	Prepare report segment of evaluation of information collected on issues/procedures/logistics/costs involved in conducting a OTM pilot study with specific recommendations.	Month 6
Subtask 7g.	Submit report to IPWJT for their review and comments and integrate those comments into final report.	
Task 8.	Monitor and manage project, including preparation of quarterly progress reports to IPWJT and CALFED.	Months 1 - 6

ECOLOGICAL/BIOLOGICAL BENEFITS

Ecological/Biological Objectives

One of the central questions in the management of chinook salmon and steelhead in the Central Valley is the relative contribution of hatchery and natural production to the adult population. The agencies responsible for managing these fish lack a means of objectively sampling and identifying the stock origin of adults captured in various ocean and inland fisheries, and those returning to spawning streams and hatcheries. At a minimum, a stock-identification methodology should be able to determine if a returning fish originated from hatchery or natural production, regardless of specific location or brood year. Beyond that, the method would be even more powerful if it could be applied to include more specific information that would identify the spawning stream, or hatchery and release group from which the fish originated.

The current PSP calls for a proposal to develop a comprehensive implementation plan for a marking and tagging program that is statistically robust and in-line with existing programs on the Pacific Coast. In response to this proposal solicitation, the DFG convened a meeting of agency and stakeholder biologists and hatchery managers on March 19, 1999 to solicit input for the current proposal. This meeting generated an extensive list of questions and sub-questions that need to be addressed to determine the overall status of hatchery versus natural stocks of Central Valley salmon and steelhead. These questions also related to the ability to track recovery as restoration and other actions are implemented to improve conditions for target natural stocks, or "species" as defined under NMFS's application of the federal Endangered Species Act (ESA) to Pacific salmon.

- What is the relative contribution of hatchery and natural production to the juvenile and adult populations as seen in juvenile rearing and emigration monitoring, ocean commercial and sport fisheries, inland sport fisheries, in-river escapement surveys, and at the hatcheries?

Again, the ability to track and evaluate management of Central Valley salmon and steelhead hinges upon this overriding question. Meeting participants articulated many other questions and problem areas related to being able to distinguish hatchery- and naturally-produced fish that would be answered or would gain a means for evaluation through a comprehensive and systematic marking/tagging and recovery program.

These questions were:

- What are straying rates of hatchery-produced salmon and steelhead?
- When a hatchery fish is recovered, can its hatchery of origin be detected?
- What are the effects of mitigation hatcheries?
- How effective are ESA constraints on water management and operations in improving conditions for protected stocks?
- What are stock-specific losses at the Delta pumping facilities?
- What are stock- and age-specific harvest impacts?

A comprehensive and systematic marking/tagging and recovery program would also provide

a means to do the following:

- Implement selective fisheries to protect weak and listed stocks.
- Develop method for salmon race discrimination.
- Evaluate studies funded through the Interagency Ecological Program (IEP).
- Evaluate juvenile salmon and steelhead migration through the Delta.
- Evaluate interactions of hatchery- and naturally-produced salmon and steelhead.
- Track recovery of natural stocks.

Linkages

Plan development will build upon current work funded by CALFED Category III on a pilot tagging program, statistically-designed marking/tagging and recovery program, and evaluation of implementation potential for selective fisheries to protect weak and listed stocks. This effort will include retrieval of information from the CALFED contractor for the earlier work, Mr. Randy Bailey.

Plan development will also be consistent with, and occur in cooperation with, the Comprehensive Assessment and Monitoring Program (CAMP) provided for under the the Central Valley Project Improvement Act (CVPIA), and CALFED's Comprehensive Monitoring, Assessment, and Research Program (CMARP). Alignment with CAMP and CMARP will include concordance in how project success will be evaluated.

In addition, development of this plan will reflect salmon fishery management priorities drafted in November 1998 by the Pacific Fishery Management Council. As salmon fishery management shifts from mixed stock fisheries to selective fisheries for hatchery stocks, these priorities include using new methods, such as genetic stock identification and otolith marking, to better assess fishery impacts and migration patterns of naturally-reproducing stocks and stocks that contribute to fisheries at low rates. Another priority represented in this proposal is for optimal tagging and data collection designs for use of CWT information in the context of selective fisheries.

This plan will be the precursor to an actual marking/tagging and recovery program that will provide CALFED the information necessary to evaluate Ecosystem Restoration Program Plan (ERPP) actions and goals related to improving conditions for Central Valley chinook salmon and steelhead. Specifically, the proposed project will provide CALFED the basis for (i) evaluating and revising Central Valley salmon and steelhead hatchery operations to result in population augmentation without detrimental effects on wild populations per ERPP, Vol. I, pages 522-523; (ii) being able to track restoration of all races of chinook salmon and steelhead per ERPP, Vol. I, pages 220-224 and 229-230; and (iii) tracking whether CALFED targets for population restoration of chinook salmon and steelhead are being reached per ERPP, Vol. II, pages 25-30.

System-Wide Ecosystem Benefits

Synergy, consistency, and system-wide ecosystem benefits of the implementation plan are strongly indicated by:

- the ecosystem-wide distribution of chinook salmon and wide distribution of steelhead;
- the linkage of the CFM program to CALFED's ERP; and
- the involvement of agencies with marine or freshwater habitat responsibilities, locally and

along the West Coast.

The science concerned with managing activities on streams and rivers supporting these species will benefit. Scientists will finally be able to identify effects of restoration and other activities on Central Valley salmon and steelhead. Further, through the adaptive management process, CALFED and other agencies will be able to implement actions based on new understanding of how our activities affect ecosystem processes, habitats, and salmon and steelhead in the Sacramento and San Joaquin drainages, the Bay/Delta, and the Pacific Ocean. In particular, we would gain new data on how wild salmon or steelhead respond to restoration measures and to changes in river flows, fluvial geomorphology, and water temperature.

CFM implementation will provide a complementary benefit to essentially all fishery management, enhancement, recovery, restoration, and protection programs involving chinook salmon and steelhead in the Central Valley and along California's coast. The primary benefits will include more sustainable fish populations and increased harvests based on the information that can be developed by being able to track the success of hatchery- and naturally-produced salmon and steelhead, with an accepted statistical reliability, and on a stock-specific basis.

Compatibility with Non-Ecosystem Objectives

Development of a marking/tagging-and-recovery-program implementation plan is fully compatible with all CALFED non-ecosystem objectives. We anticipate positive third-party impacts to both the fishery- and water-management communities, including all management agencies and stakeholders, in the form of reduced uncertainty regarding actions based on the stock origin of chinook salmon and steelhead in the Central Valley.

TECHNICAL FEASIBILITY AND TIMING

Constant fractional marking with CWT's and otolith thermal marking represent the state of the art for permanent mass-marking of juvenile salmon and steelhead. Although yearling salmon and steelhead are of a size to allow tagging with Passive Integrated Transponders (PIT tags), the cost of these tags (~\$5/tag) is prohibitive for mass marking. CWT's and thermal marks have advantages and disadvantages that make use of the two methods complementary. These are as follows:

Constant Fractional Marking with CWT's	100% Thermal Marking in Otoliths
Application is invasive to the fish.	Application is non-invasive to the fish.
External mark applied facilitating selective harvest.	External mark typically not applied.
Logistics/costs restrict application to some fraction of production in large hatchery populations.	Can inexpensively and practically mass-mark 100% of production, thus enhancing efficacy of M/R effort.
Fish heads retained and frozen for later tag removal, requiring transport of heads and freezer space.	Otoliths can easily be dissected during sampling, eliminating need to keep, freeze, and store heads.
Clearly marked tag.	Requires preparation of otolith for code reading.

Tagging costs with CWT's relatively high.	Recovery costs with thermal marking may be relatively more costly for preparing and reading otoliths.
Fractional marking does not allow for direct, comprehensive evaluation of natural vs. hatchery production.	100% marking of hatchery production allows unbiased sampling of adult populations to directly determine contribution of natural and hatchery production.

Although pre-project review under NEPA/CEQA will be necessary, it is anticipated that these projects will not require extensive environmental impact documentation as they represent relatively minor modifications to current hatchery operations.

MONITORING AND DATA COLLECTION METHODOLOGY

Biological/Ecological Objectives

The principal objective with development and ultimate implementation of a plan for an integrated CWT/OTM program is to provide the basis for determining the relative contribution of hatchery and natural production to juvenile and adult salmon and steelhead populations as seen in juvenile rearing and emigration monitoring, ocean commercial and sport fisheries, inland sport fisheries, in-river escapement surveys, and at the hatcheries.

Data Collection Approach

The proposed project consists of an information gathering and synthesis effort (Table 2), the product of which will be an implementation plan for an integrated CWT/OTM program. Information gathering, compilation, and product reporting will be led by the DFG, under the general direction of Mr. Alan Baracco. Appropriate DFG staff will assume on-the-ground lead of various project segments relative to areas of expertise.

Monitoring and Data Evaluation Approach

As identified earlier, the IIPWT will be formed at the outset of this project. Information gathering and evaluation will be coordinated and conducted by the IIPWT, utilizing the representation and collective expertise available from the agencies and stakeholder groups listed as participants and collaborators on the proposed project. The IIPWT will meet monthly, or as needed, to provide information requested at prior meetings, to monitor project progress, and provide a peer review function for project products.

LOCAL INVOLVEMENT

As noted under Project Description, principal stakeholder groups that would be interested (and may be affected by this program) will be identified early in the plan development process and contacted. Such groups may include fishing interests (commercial ocean fishing, and ocean and inriver sportfishing), environmental interests, and others. By conducting the "outreach process" early in the process, their concerns can be identified and addressed sooner rather than later.

COST

Budget

The total budgeted costs requested from CALFED for this proposal are slightly less than \$75,000. These costs are based on the six months of actual work time to complete the project. The actual number of months from the start of the project until the plan is completed will be at least a year to allow for evaluation of the performance of the mass-marking machine that will not be used in the current CALFED-funded study until Spring 2000. The breakdown of these costs are displayed to the subtask level in Table 3 and are allocated across the cost categories as specified in Table 3 in Section 4.3 of the PSP. The personnel costs are based on the DFG utilizing an existing Biologist (Marine/Fisheries) (Range A/B) or Environmental Specialist I (ES I) position for six person-months to conduct much of the actual gathering and assembling of information from various sources. Project personnel funds will support a Fish and Wildlife Scientific Aide who will assist the Fishery Biologist/ES I. Project Management will be funded at the Senior Biologist Supervisor level at 0.15 of the six person-months. Statistical Review of previous CALFED-funded study's statistical methodology and results (Task 3) will be conducted by a DFG Statistical Methods Analyst III-level staff member who will be funded for one person month.

Staff benefits are based on the current State factors for estimating employee benefits' costs; these factors are 32.096% and 7.66% for permanent and temporary staff, respectively. Miscellaneous and Direct Costs' estimates are based on \$10,000 operating expenses per person-year currently used by the DFG for its biologist staff. Operating expenses for the Scientific Aide position are estimated for this project at \$2,500 per person-year. These operating expenses include rent, telephones, furniture, general office staff support, and travel, and are allocated based on the estimated hours for each subtask. Overhead and Indirect Costs are estimated using a factor of 17.2%, which the DFG uses to estimate administrative overhead for those Federal funds awarded by CALFED. The DFG uses a factor of 17.3% to estimate administrative overhead costs for State funds.

Schedule

Table 1 in the Project Description section of this proposal identifies the start dates and completion dates for each task and subtask based on a relative month basis. An example is Task 2, establishing an Interagency Implementation Project Work Team, which would be completed by November 30, 1999 (Month 2) if the contract with CALFED is signed in October, 1999.

COST-SHARING

There are no cost-sharing requirements for the proposed project. However, cost sharing will occur in the form of in-kind services of permanent staff time and facilities, not only from the applicant agency, the Department of Fish and Game, but also from the participating and collaborating agencies, agency/stakeholder consortia, and consultants. Combined, these services represent the equivalent of many times over the level of funding sought in this application.

APPLICANT QUALIFICATIONS

Mr. Alan Baracco, DFG, will oversee the project. Mr. Baracco has 27 years of experience with the DFG, including the Ocean Salmon Project, inland salmon and steelhead management, and currently as a manager in the DFG's Central Valley Bay-Delta Branch.

Mr. Rich Dixon, DFG, will act as project co-manager. Mr. Dixon has over 25 years of experience with the DFG, including the Ocean Salmon Project, Biometrics Section, and is currently the Central Valley Salmon and Steelhead Habitat Restoration Coordinator.

Dr. Rob Titus, DFG, will also serve as a project co-manager. Dr. Titus has worked on the DFG's *Stream Evaluation Program* for 6 years, and has 12 years of experience working on anadromous salmonids, including various salmon and steelhead monitoring programs and applications of otolith microstructure analysis and thermal marking.

Extensive experience in both ocean and inland management of salmon and steelhead is represented within the staff of the applicant agency, the DFG. This collective experience and expertise includes: hatchery production of chinook salmon and steelhead; coded-wire tagging and recovery; otolith thermal marking and recovery; angler surveying; and spawner stock assessment.

REFERENCES

- Mosegaard, H., N. G. Steffner, and B. Ragnarsson. 1987. Manipulation of otolith microstructures as a means of mass-marking salmonid yolk sac fry. Pages 213-220 in S. O. Kullander and B. Fernholm, editors. *Proc. Fifth Congress European Ichthyologists*. Swedish Museum Natural History, Stockholm.
- Munk, K. M., W. W. Smoker, D. R. Beard, and R. W. Mattson. 1993. A hatchery water-heating system and its application to 100% thermal marking of incubating salmon. *Prog. Fish-Cult.* 55:284-288.
- PFMC. 1998. Draft research and data needs, 1998-2000: Salmon Fishery Management Plan. Pacific Fishery Management Council, Portland, OR. Pp. 16-18.
- Volk, E. C., S. L. Schroder, and K. L. Fresh. 1990. Inducement of unique otolith banding patterns as a practical means to mass-mark juvenile Pacific salmon. *Am. Fish. Soc. Symp.* 7:203-215.

Table 3. Total Project Budget (CALFED funds only).

Task	Direct Labor Hours	Direct Salary and Benefits	Service Contracts	Material and Acquisition Costs	Miscellaneous and other Direct Costs	Overhead and Indirect Costs	Total Cost
1	0	\$0			\$0	\$0	\$0
2	0	\$0			\$0	\$0	\$0
3	176	\$6,045			\$800	\$1,177	\$8,022
4							
4a	127	\$2,534			\$863	\$584	\$3,980
4b	190	\$3,185			\$1,013	\$722	\$4,920
5							
5a	71	\$1,471			\$506	\$340	\$2,318
5b	76	\$1,225			\$383	\$276	\$1,884
5c	76	\$1,226			\$383	\$277	\$1,885
5d	76	\$1,225			\$383	\$276	\$1,884
5e	100	\$1,912			\$641	\$439	\$2,993
5f	19	\$343			\$113	\$78	\$534
5g	333	\$6,374			\$2,138	\$1,464	\$9,976
5h	29	\$589			\$203	\$136	\$927
5i	171	\$2,793			\$878	\$631	\$4,302
6							
6a	48	\$899			\$300	\$206	\$1,405
6b	55	\$816			\$244	\$182	\$1,242
6c	55	\$816			\$244	\$182	\$1,242
6d	55	\$816			\$244	\$182	\$1,242
6e	40	\$900			\$319	\$210	\$1,428
6f	11	\$191			\$63	\$44	\$297
6g	185	\$3,541			\$1,188	\$813	\$5,542

6h	16	\$327			\$113	\$76	\$515
6i	63	\$1,226			\$413	\$282	\$1,920
7							
7a	48	\$858			\$281	\$196	\$1,335
7b	48	\$858			\$281	\$196	\$1,335
7c	48	\$858			\$281	\$196	\$1,335
7d	16	\$286			\$94	\$65	\$445
7e	16	\$286			\$94	\$65	\$445
7f	95	\$1,716			\$563	\$392	\$2,670
7g	48	\$858			\$281	\$196	\$1,135
Project Mgmt	158	\$5,728			\$750	\$1,114	\$7,592
Totals	2,446	\$49,901			\$14,050	\$11,000	\$74,951

Table 4. Quarterly Budget.

Task	Quarterly Budget Oct-Dec 1999	Quarterly Budget Jan-Mar 2000	Quarterly Budget Apr-Jun 2000	Quarterly Budget Jul-Sep 2000	Quarterly Budget Oct-Dec 2000	Quarterly Budget Jan-Mar 2001	Total Budget
1							\$0
2							\$0
3	\$8,022						\$8,022
4							
4a	\$1,990	\$1,990					\$3,980
4b	\$2,460	\$2,460					\$4,920
5							
5a	\$2,318						\$2,318
5b	\$1,884						\$1,884
5c	\$1,885						\$1,885
5d	\$1,884						\$1,884

5e	\$2,993						\$2,993
5f	\$267	\$267					\$534
5g		\$4,988	\$2,494	\$2,494			\$9,976
5h				\$927			\$927
5i				\$2,151	\$2,151		\$4,302
6							
6a	\$1,405						\$1,405
6b	\$1,242						\$1,242
6c	\$1,242						\$1,242
6d	\$1,242						\$1,242
6e	\$1,428						\$1,428
6f	\$148	\$149					\$297
6g		\$2,771	\$1,385	\$1,386			\$5,542
6h				\$515			\$515
6i				\$960	\$960		\$1,920
7							
7a		\$668	\$667				\$1,335
7b		\$1,335					\$1,335
7c		\$668	\$667				\$1,335
7d		\$223	\$222				\$445
7e		\$223	\$222				\$445
7f				\$1,335	\$1,335		\$2,670
7g					\$1,335		\$1,135
Project Mgmt	\$1,518	\$1,518	\$1,518	\$1,518	\$1,520		\$7,592

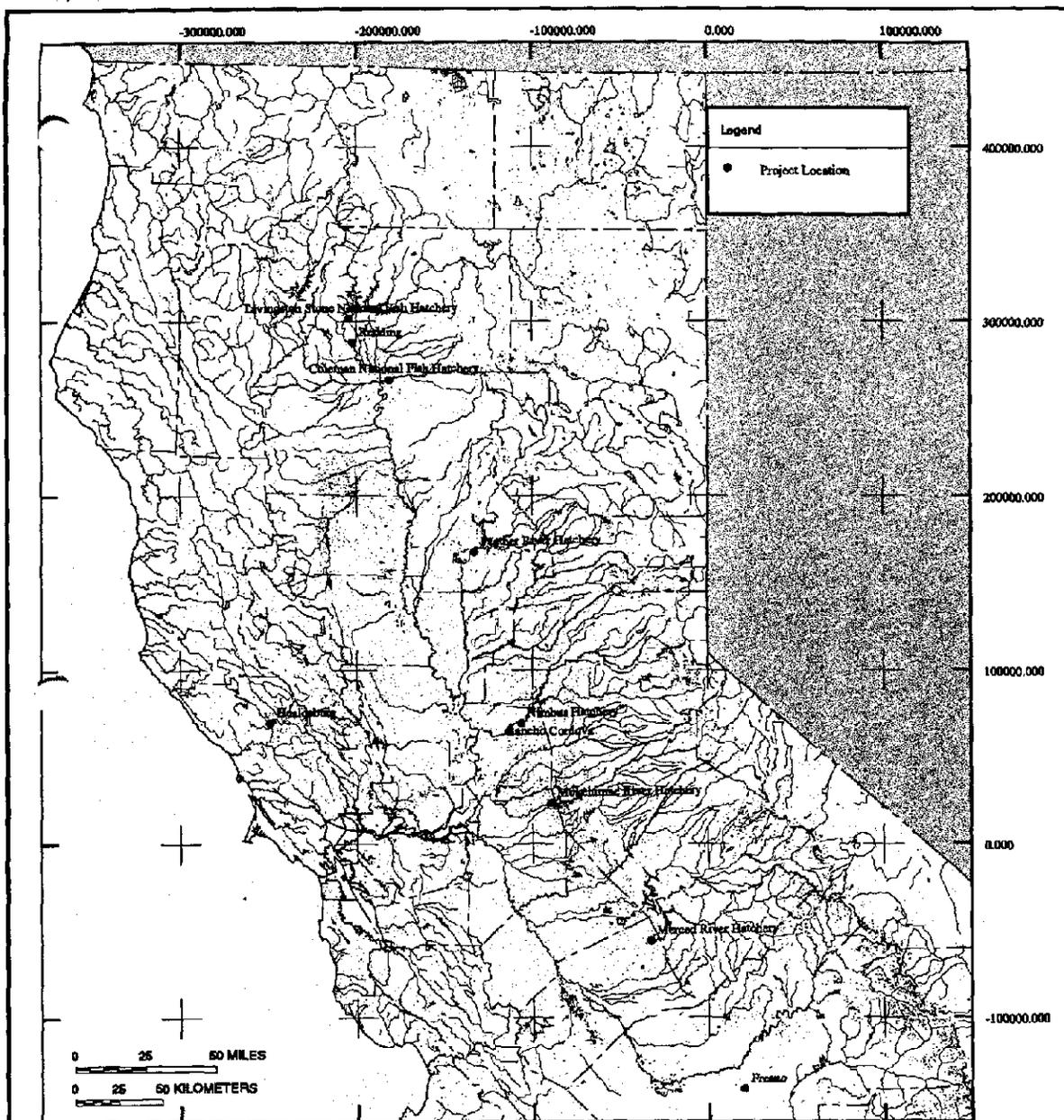


Figure 1. Development of a Comprehensive Implementation Plan
for Constant Fractional Marking/Tagging for Central Valley
Hatchery Produced Chinook Salmon and Steelhead

1:3000000

April 15, 1998

Central Valley Bay-Delta Branch

Tirle Albers
Projection: Albers
Units: Meters
Datum: NAD27
1st standard parallel: 34 0 0.000
2nd standard parallel: 40 30 0.000
Central meridian: -120 0 0.000
Latitude of projection's origin: 0 0 0.000
False easting (meters): 0.00000
False northing (meters): -4000000.00000

APPLICATION FOR
FEDERAL ASSISTANCE

OMB Approval No. 0348-0043

1. TYPE OF SUBMISSION: Application Preapplication Construction Construction Non-Construction Non-Construction		2. DATE SUBMITTED 04/16/99	Applicant Identifier
		3. DATE RECEIVED BY STATE	State Application Identifier
		4. DATE RECEIVED BY FEDERAL AGENCY	Federal Identifier
5. APPLICANT INFORMATION			
Legal Name: State of California		Organizational Unit: Department of Fish and Game	
Address: Department of Fish and Game Central Valley Bay Delta Branch 4001 North Wilson Way Stockton CA 95205-2486		Name and telephone number of person to be contacted on matters involving this application: Alan Baracco (916) 653-4729	
6. EMPLOYER IDENTIFICATION NUMBER (EIN): 94-1697587		7. TYPE OF APPLICANT: (enter appropriate letter in box) A	
8. TYPE OF APPLICATION: <input checked="" type="checkbox"/> New <input type="checkbox"/> Continuation <input type="checkbox"/> Revision If Revision, enter appropriate letter(s) in box(es) A. Increase Award B. Decrease Award C. Increase Duration D. Decrease Duration Other (specify) _____		A. State H. Independent School Dist. B. County I. State Controlled Institution of High Lrn. C. Municipal J. Private University D. Township K. Indian Tribe E. Interstate L. Individual F. Intermunicipal M. Profit Organization G. Special District N. Other (Specify): _____	
		9. NAME OF FEDERAL AGENCY: U.S. BUREAU OF RECLAMATION	
10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: TITLE: _____		11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT: Constant Fractional Marking of Chinook Salmon	
12. AREAS AFFECTED BY PROJECT (Cities, Counties, States, etc.) Statewide			
13. PROPOSED PROJECT		14. CONGRESSIONAL DISTRICTS OF: Statewide	
START DATE	ENDING DATE	a. Applicant	b. Project Statewide
15. ESTIMATED FUNDING:		16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?	
a. Federal	\$ 74,951	a. YES, THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON: DATE: _____ b. No, PROGRAM IS NOT COVERED BY E.O. 12372 OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW	
b. Applicant	\$		
c. State	\$		
d. Local	\$		
e. Other	\$		
f. Program Income	\$		
g. TOTAL	\$ 74,951		
17. IS THE APPLICATION DELINQUENT ON ANY FEDERAL DEBT? Yes if "Yes", attach and explanation. <input checked="" type="checkbox"/> No			
18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.			
a. Type Name of Authorized Representative Alan Baracco		b. Title Operations Manager CEA I	c. Telephone Number (916) 653-4729
d. Signature of Authorized Representative 		d. Date Signed April 15, 1999	

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Standard Form 424 (Rev. 7-97)
Prescribed by OMB Circular A-102

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

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

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

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

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

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

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

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL: _____



TYPED NAME AND TITLE: Alan Baracco, Operations Manager, CEA

DATE: 04/16/99



DEPARTMENT OF FISH AND GAME

<http://www.dfg.ca.gov>
1416 Ninth Street
Sacramento, CA 95814



Department of Fish and Game
Central Valley Bay-Delta Branch
4001 North Wilson Way
Stockton, California 95205-2486

April 13, 1999

San Joaquin County Board of Supervisors
222 East Weber Avenue
Room 701
Stockton, California 95202

Dear Supervisors:

As required by the CalFed Bay-Delta Program, this letter is to notify the Board of Supervisors that the California Department of Fish and Game will submit two proposals to the CalFed Bay-Delta Program for funding of projects that will occur within San Joaquin County. One of the projects will consist of developing an implementation plan to mark a constant percentage of all hatchery-produced Central Valley salmon and steelhead. The other proposal is for a Central Valley Steelhead Trout Genetic Evaluation Study. The goal of each of these projects is to enhance Central Valley Salmon and Steelhead.

If you have any questions, I can be reached at (916) 653-4729 for additional information.

Sincerely,

Alan Baracco
Operations Manager
Central Valley Bay-Delta Branch

cc: County Planning Department

Conserving California's Wildlife Since 1870.



DEPARTMENT OF FISH AND GAME

<http://www.dfg.ca.gov>
1416 Ninth Street
Sacramento, CA 95814



Department of Fish and Game
Central Valley Bay-Delta Branch
4001 North Wilson Way
Stockton, California 95205-2486

April 13, 1999

Fresno County Board of Supervisors
1100 Van Ness
Fresno, California 93721

Dear Supervisors:

As required by the CalFed Bay-Delta Program, this letter is to notify the Board of Supervisors that the California Department of Fish and Game will submit two proposals to the CalFed Bay-Delta Program for funding of projects that will occur within Fresno County. One of the projects will consist of developing an implementation plan to mark a constant percentage of all hatchery-produced Central Valley salmon and steelhead. The other proposal is for a Central Valley Steelhead Trout Genetic Evaluation Study. The goal of each of these projects is to enhance Central Valley Salmon and Steelhead.

If you have any questions, I can be reached at (916) 653-4729 for additional information.

Sincerely,

Alan Baracco
Operations Manager
Central Valley Bay-Delta Branch

cc: County Planning Department

Conserving California's Wildlife Since 1870.



DEPARTMENT OF FISH AND GAME

<http://www.dfg.ca.gov>
1416 Ninth Street
Sacramento, CA 95814



Department of Fish and Game
Central Valley Bay-Delta Branch
4001 North Wilson Way
Stockton, California 95205-2486

April 13, 1999

Shasta County Board of Supervisors
Suite 1, 1815 Yuba Street
Redding, California 96001

Dear Supervisors:

As required by the CalFed Bay-Delta Program, this letter is to notify the Board of Supervisors that the California Department of Fish and Game will submit two proposals to the CalFed Bay-Delta Program for funding of projects that will occur within Shasta County. One of the projects will consist of developing an implementation plan to mark a constant percentage of all hatchery-produced Central Valley salmon and steelhead. The other proposal is for a Central Valley Steelhead Trout Genetic Evaluation Study. The goal of each of these projects is to enhance Central Valley Salmon and Steelhead.

If you have any questions, I can be reached at (916) 653-4729 for additional information.

Sincerely,

Alan Baracco
Operations Manager
Central Valley Bay-Delta Branch

cc: County Planning Department

Conserving California's Wildlife Since 1870.



DEPARTMENT OF FISH AND GAME

<http://www.dfg.ca.gov>
1416 Ninth Street
Sacramento, CA 95814



Department of Fish and Game
Central Valley Bay-Delta Branch
4001 North Wilson Way
Stockton, California 95205-2486

April 13, 1999

Butte County Board of Supervisors
25 County Center Drive
Oroville, California 95965

Dear Supervisors:

As required by the CalFed Bay-Delta Program, this letter is to notify the Board of Supervisors that the California Department of Fish and Game will submit two proposals to the CalFed Bay-Delta Program for funding of projects that will occur within Butte County. One of the projects will consist of developing an implementation plan to mark a constant percentage of all hatchery-produced Central Valley salmon and steelhead. The other proposal is for a Central Valley Steelhead Trout Genetic Evaluation Study. The goal of each of these projects is to enhance Central Valley Salmon and Steelhead.

If you have any questions, I can be reached at (916) 653-4729 for additional information.

Sincerely,

Alan Baracco
Operations Manager
Central Valley Bay-Delta Branch

cc: County Planning Department

Conserving California's Wildlife Since 1870.



DEPARTMENT OF FISH AND GAME

<http://www.dfg.ca.gov>
1416 Ninth Street
Sacramento, CA 95814



Department of Fish and Game
Central Valley Bay-Delta Branch
4001 North Wilson Way
Stockton, California 95205-2486

April 13, 1999

Sacramento County Board of Supervisors
700 H Street
Sacramento, California 95814

Dear Supervisors:

As required by the CalFed Bay-Delta Program, this letter is to notify the Board of Supervisors that the California Department of Fish and Game will submit two proposals to the CalFed Bay-Delta Program for funding of projects that will occur within Sacramento County. One of the projects will consist of developing an implementation plan to mark a constant percentage of all hatchery-produced Central Valley salmon and steelhead. The other proposal is for a Central Valley Steelhead Trout Genetic Evaluation Study. The goal of each of these projects is to enhance Central Valley Salmon and Steelhead.

If you have any questions, I can be reached at (916) 653-4729 for additional information.

Sincerely,

Alan Paracco
Operations Manager
Central Valley Bay-Delta Branch

cc: County Planning Department

Conserving California's Wildlife Since 1870.



DEPARTMENT OF FISH AND GAME

<http://www.dfg.ca.gov>
1416 Ninth Street
Sacramento, CA 95814



Department of Fish and Game
Central Valley Bay-Delta Branch
4001 North Wilson Way
Stockton, California 95205-2486

April 13, 1999

Sonoma County Board of Supervisors
575 Administration Drive
Santa Rosa, California 95403

Dear Supervisors:

As required by the CalFed Bay-Delta Program, this letter is to notify the Board of Supervisors that the California Department of Fish and Game will submit two proposals to the CalFed Bay-Delta Program for funding of projects that will occur within Sonoma County. One of the projects will consist of developing an implementation plan to mark a constant percentage of all hatchery-produced Central Valley salmon and steelhead. The other proposal is for a Central Valley Steelhead Trout Genetic Evaluation Study. The goal of each of these projects is to enhance Central Valley Salmon and Steelhead.

If you have any questions, I can be reached at (916) 653-4729 for additional information.

Sincerely,

Alan Baracco
Operations Manager
Central Valley Bay-Delta Branch

cc: County Planning Department

Conserving California's Wildlife Since 1870.



DEPARTMENT OF FISH AND GAME

<http://www.dfg.ca.gov>
1416 Ninth Street
Sacramento, CA 95814



Department of Fish and Game
Central Valley Bay-Delta Branch
4001 North Wilson Way
Stockton, California 95205-2486

April 13, 1999

Merced County Board of Supervisors
2222 M street
Merced, California 95340

Dear Supervisors:

As required by the CalFed Bay-Delta Program, this letter is to notify the Board of Supervisors that the California Department of Fish and Game will submit two proposals to the CalFed Bay-Delta Program for funding of projects that will occur within Merced County. One of the projects will consist of developing an implementation plan to mark a constant percentage of all hatchery-produced Central Valley salmon and steelhead. The other proposal is for a Central Valley Steelhead Trout Genetic Evaluation Study. The goal of each of these projects is to enhance Central Valley Salmon and Steelhead.

If you have any questions, I can be reached at (916) 653-4729 for additional information.

Sincerely,


Alan Baracco
Operations Manager
Central Valley Bay-Delta Branch

cc: County Planning Department

Conserving California's Wildlife Since 1870.