ERP DIRECTED ACTION

IMPLEMENTATION OF A CONSTANT FRACTIONAL MARKING/TAGGING PROGRAM FOR CENTRAL VALLEY HATCHERY CHINOOK SALMON

Reference
Ecosystem Restoration Program
Prop 50 Bond Funded
Project No. DFG-05####

Prepared by:
Stan Allen
Pacific States Marine Fisheries Commission
205 SE Spokane Street, Suite 100
Portland, Oregon 97202-6413
Phone: (503) 595-3114

PART A.

A1. Proposal Title: IMPLEMENTATION OF A CONSTANT FRACTIONAL MARKING/TAGGING PROGRAM FOR CENTRAL VALLEY HATCHERY CHINOOK SALMON

A2. Lead Applicant or Organization:

Contact Name: Stan Allen, Pacific States Marine Fisheries Commission
Address: 205 SE Spokane Street, Suite 100
Portland, OR 97202-6413
Phone Number: (503) 595-3114
(503)781-5688 (cell)
Fax Number: (503)595-3232
E-mail: stan_allen@psmfc.org

A3. Project Manager or Principal Investigator

Contact Name: Alice Low
Agency/Organization Affiliation: California Department of Fish and Game
Address: 830 S Street, Sacramento, CA 95814
Phone Number: (916) 323-9583
Fax Number: (916) 327-8854
E-mail: alow@dfg.ca.gov

A4. Cost of Project: $ 6,815,573 (Phase I)

A5. Cost Share Partners: None.

A6. List of Subcontractors: There will be one primary contract for this project, and one sub-contract. Under the primary contract, Pacific States Marine Fisheries Commission (PSMFC) will purchase supplies, and hire and supervise project personnel for the first two years of marking/tagging operations in the spring of 2007 and 2008. PSMFC will subcontract with Northwest Marine Technology, Inc., Shaw Island, Washington, for the purchase of the major equipment, four automated marking/tagging systems (AutoFish System). Northwest Marine Technology is the sole manufacturer of the automated equipment. Department of Fish and Game will own all major equipment after purchase. For project budget, see Part D.

Subcontractor:
Northwest Marine Technology
Corporate Office
PO Box 427, Ben Nevis Loop Road
Shaw Island, WA 98286, USA

Telephone (360) 468 - 3375
Fax (360) 468 - 3844
e-mail office@nmt.us

A7. Other Cooperators: Jim Smith and Kevin Niemala
U.S. Fish and Wildlife Service
10950 Tyler Road
Red Bluff, CA 96080
(530) 527-3043

These cooperators manage Coleman National Fish Hatchery; development of this program will require close coordination with these cooperators.

A8. Project Topic Area
Primary: Harvestable Species Assessment
Secondary: At-Risk Species Assessment

A9. Project Type
Primary: Monitoring
Secondary: Full-scale Implementation

PART B. Executive Summary

B1. Proposal Title: IMPLEMENTATION OF A CONSTANT FRACTIONAL MARKING/TAGGING PROGRAM FOR CENTRAL VALLEY HATCHERY CHINOOK SALMON

B2. Project Description: Over 31 million fall-run Chinook salmon are produced each year at five hatcheries in California's Central Valley. This production contributes to major sport and commercial fisheries in ocean and inland areas. Currently, only experimental releases of fall-run Chinook are externally marked and coded-wire tagged on a consistent basis. In recent years, the Central Valley Project Improvement Act (CVPIA) program, the CALFED Bay-Delta Program, and other state and federally-mandated programs have provided significant funding for salmon habitat restoration programs, with the goal of increasing natural production in the Central Valley. Due to the current low rates of marking/tagging of hatchery fish, evaluation of these restoration programs, and harvest management programs, is limited by the inability to assess the relative contribution of hatchery and natural production of fall-run Chinook in the ocean harvest, inland harvest, in-river spawning escapements, and hatchery returns.

In 2004, the CALFED Program funded a study to design a constant fractional marking/coded-wire tagging program for production releases of fall-run Chinook salmon from Central Valley hatcheries, with the goal of estimating in a statistically valid manner the relative contribution of hatchery production. The study recommended the implementation of a system-wide marking/tagging program for production releases. This proposal includes the first stage of implementing a Central Valley-wide constant fractional marking/coded-wire tagging program for hatchery-reared Chinook salmon. Costs of this program include:

- Purchase of four automated fish tagging systems,
- The first two years of operational costs for marking/tagging 25% of hatchery production releases of fall-run Chinook salmon.

The proposed marking/tagging program will provide CALFED the specific information needed to evaluate Ecosystem Restoration Program Plan (ERPP) actions and goals related to improving conditions for Central Valley Chinook salmon. Specifically, the proposed project will provide CALFED the basis for (i) evaluating and revising Central Valley salmon hatchery operations to result in population augmentation without detrimental effects on wild populations per the Ecosystem Restoration Program Plan (ERPP), Vol. I, pages 519-523; (ii) being able to track restoration of all races of Chinook salmon per ERPP, Vol. I, pages 220-224 and 229-230; (iii) tracking whether CALFED targets for population restoration of Chinook salmon are being reached per ERPP, Vol. II, pages 25-30, and (iv) evaluating effects of harvest per ERPP, Vol. I, pp. 511-518.

PART C. Work Plan

C1. Project Background and Information: Over 31 million fall-run Chinook salmon are produced each year at five hatcheries in California's Central Valley. This production contributes to major sport and commercial fisheries in ocean and inland areas. Currently, only experimental releases of fall-run Chinook are externally marked and coded-wire tagged.

In recent years, the CALFED Ecosystem Restoration Program (ERP), the CVPIA Program, and other programs, have provided hundreds of millions of dollars for the restoration of habitat for Chinook salmon in the Central Valley. Chinook salmon are a "big R" species included in the CALFED Multi-Species Conservation Strategy (MSCS), a key species for which the CALFED ERP Program has established a goal for recovery within the ERP ecological management zones. A parallel goal of the federal Central Valley Project Improvement Act (CVPIA) is to ensure that the natural production of anadromous fish in Central Valley streams will be sustainable, on a long-term basis, at levels at least twice the average levels of natural production in the 1967 through 1991 period.

The focus of restoration activities has been habitat restoration for the improvement of naturally-spawning Chinook salmon populations. However, it is not possible to monitor the success of these actions in restoring naturally-spawning populations of Chinook salmon, or monitor the success of meeting recovery goals, without knowing the relative contribution of hatchery fish to adult populations. Currently, the most significant knowledge gap in the management of Chinook salmon in the Central Valley is the relative contribution of hatchery and natural production to the adult populations. A relatively low and variable proportion of hatchery-reared Chinook salmon are currently marked at Central Valley hatcheries, resulting in lack of a consistent, coordinated means of objectively sampling and identifying the stock origin of adults observed in ocean and inland fisheries, and those returning to spawning streams and hatcheries.

Beginning in 1999, the Department of Fish and Game and NOAA Fisheries conducted a joint review of California's anadromous fish hatcheries. A Joint Review Committee was established and met over the course of about a year. The review was initiated primarily in response to the listing of certain California salmon and steelhead populations under the federal Endangered Species Act, and the resulting requirement that the effects of hatchery operations on listed species be evaluated and, if necessary, authorized under the ESA. In 2001, the Committee issued a final report on anadromous salmonid fish hatcheries in California (DFG and NOAA Fisheries 2001). The report included a strong recommendation for Central Valley hatcheries to establish a constant fractional marking program, with appropriate recovery programs and improvement of salmon escapement estimates in the Central Valley. The report discussed the following consequences of an inadequate marking and sampling program for Central Valley hatchery fish:

1) An approved Hatchery Genetic Management Plan must evaluate, minimize and account for the propagation program's genetic and ecological effects on natural populations, including disease transfer, competition, predation and genetic introgression caused by

straying of hatchery fish. Without effective monitoring and evaluation of returning hatchery populations, the effects of hatchery rearing and release strategies cannot be fully evaluated. Similarly, approved Fishery Management and Evaluation Plans, associated with the 4(d) rules, must include effective monitoring and evaluation programs to assess compliance and effectiveness.

2) There is currently no estimate of an exploitation rate for any Central Valley salmonid population. The lack of an exploitation rate estimate for Central Valley fall chinook substantially impairs NMFS' ability to assess fishery impacts on listed stocks that may share similar ocean and river distributions and vulnerability to harvest. None of the biological opinions that authorize the incidental take of listed salmon in ocean fisheries off California have been able to specify the amount of incidental take that occurs in ocean fisheries. This is a serious problem.

3) The impact of straying hatchery fish on natural populations is a key federal ESA concern. Without adequate marking and monitoring of hatchery populations, the estimation of straying rates between watersheds and the genetic exchange between hatchery and naturally producing stocks will remain a matter subject to speculation.

4) Substantial effort and resources are being expended on improving the spawning and migration habitat for Central Valley salmonids. The CVPIA mandates doubling of natural populations and assessment of the progress toward meeting the goal. Evaluating the success of restoration actions and the impact of changes in water operations is difficult or impossible without adequate monitoring and evaluation of the populations the actions are intended to benefit.

This project therefore addresses many significant questions that need to be answered to determine the overall status of hatchery versus natural stocks of Central Valley salmon. Data are needed for the evaluation of hatchery programs, monitoring the success of restoration efforts, recovery planning for listed stocks, management of water project operations, and sustainable management of ocean and inland harvest:

- 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?
- What are the straying rates of hatchery and naturally-produced Chinook salmon?
- When a hatchery fish is recovered, what is its hatchery of origin?
- What are the effects of mitigation and production hatcheries?
- How effective are ESA constraints on water management and operations in improving conditions for protected stocks?
- What pathways do juvenile Chinook salmon use in migration through the Delta?
- What are stock-specific losses at the Delta pumping facilities?
- What are stock- and age-specific harvest impacts?

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. The method proposed here for a Central Valley-wide program will be even more powerful as it will include more specific information that would identify the spawning stream, or hatchery and release group from which the fish originated.

The project will affect the entire life cycle of Central Valley Chinook salmon, including the constant fractional marking (CWT) and recovery programs. Hatchery juveniles will be CWT'd at a constant rate and released at the emigration life stage. Recovery of CWTs will be made in the ocean sport and commercial harvest, inland sport harvest, in-river spawning escapement, and hatchery returns.

Program Development

In 1998, CALFED funded a pilot constant fractional marking program for Central Valley Chinook. Northwest Marine Technology, Inc. (NMT), manufacturers of automated marking/tagging machines, demonstrated the technology by successfully marking/tagging approximately 5.3 million fish in 2000 and 2001. Those tagged fish are now being recovered in the ocean harvest, in-river spawning escapement surveys, and at hatcheries. Following this pilot program, in 2003 and 2004, marking/tagging rates for hatchery fall-run Chinook returned to relatively low, inconsistent levels.

In 2000, the CALFED ERP funded the Department of Fish and Game to develop an implementation plan for a comprehensive and statistically-sound marking and tagging program for hatchery-produced Chinook salmon. In 2002, this work was subcontracted to Dr. David Hankin, Humboldt State University, and Dr. Ken Newman, University of Idaho. The IEP Central Valley Salmonid Project Work Team (CVSPWT), an interagency team that coordinates Chinook salmon and steelhead monitoring activities, guided the development of this plan. CVSPWT members include staff from the California Departments of Fish and Game and Water Resources, East Bay Municipal Utility District, Metropolitan Water District, Central Valley Project Water Association, National Marine Fisheries Service, Pacific States Marine Fisheries Commission, U.S. Bureau of Reclamation, and the U.S. Fish and Wildlife Service. In July 2004, the team received the plan, "*A marking, tagging, and recovery program for Central Valley hatchery chinook salmon*" K.B. Newman, A.C. Hicks, and D.G. Hankin.

This implementation plan extended statistical procedures that the authors previously developed for estimating the production of wild and hatchery Chinook salmon in the Central Valley (Hicks 2003, Hicks and Hankin 2003, Hicks and Newman, 2000, Newman, Hicks, and Hankin 2003). Corresponding enhancements were also made to the computer program *CFM Sim* which simulates marking, tagging, sampling, and production estimation procedures. Using *CFM Sim* and a factorial experimental design, the plan evaluated the effects of varying four man-controlled factors on the quality of estimates of wild and hatchery Chinook salmon production. The four man-controlled factors were:

- Constant Fractional Marking (CFM) rate (f): the percentage of production releases at a given hatchery that received a coded-wire-tag and an adipose fin clip,
- Catch sampling rate (CSR): the fraction of ocean and freshwater salmon catch being sampled,
- Escapement sampling rate (ESR): the fraction of in-river escapement being sampled, and
- Coefficient of variation of escapement estimates (ECV).

The plan also estimated the cost of tagging and marking juvenile hatchery-reared Chinook salmon, sampling ocean catches, estimating in-river escapement, and recovering and reading coded-wire tags. Cost calculations were incomplete, however, in that costs for freshwater catch sampling were not included. Additionally, the costs of escapement sampling, including sampling especially for coded-wire tag recoveries in the in-river escapement, were only approximately calculated.

The association between current escapement sampling efforts, the precision of current estimates of escapement, and the costs of escapement sampling was also imprecise and coarsely approximated in the plan. As a result, the recommendations of the plan, regarding constant fractional marking levels and some of the other controllable factors, are described by the plan authors as general and relative in nature. General recommendations of the plan include the implementation of a system-wide constant fractional marking program for Central Valley hatchery reared salmon at a rate of 1/3 or 33% of production releases. Following subsequent review of the plan recommendations, and communication with managers in the Northwest, the Central Valley Salmon Project Work Team (CVSPWT) recommended a marking/CWT rate of 25% of fall-run production releases.

Program Feasibility

The coded-wire tag/adipose fin clip is the method agreed to by the Pacific Salmon Treaty (1999) to monitor Chinook salmon in ocean fisheries along the Pacific Coast. It is a cost-effective method to apply a long-term mark that gives data on hatchery origin and release group, and provides for external identification of tagged fish. The CWT/ad clip marking method has been used throughout the West Coast since the 1970's. Currently, over 50 million Chinook and coho salmon are coded-wire tagged each year. This Central Valley program will be an integral part of this Coast-wide tagging program; tagged fish will be recovered in ocean fisheries throughout the West Coast.

Implementation of a constant fractional marking program for Central Valley Chinook salmon will not require electronic detection of tags in the ocean harvest, inland harvest, or in the in-river spawning escapement or at hatcheries, because all CWT'd fish will also be externally marked with an adipose fin clip.

This first phase of the program includes the purchase of automated fish marking systems and marking/tagging production releases of fall-run Chinook salmon at Central Valley hatcheries for two years. Because the automated marking system is not an off-the-shelf item, NMT estimates that it will take approximately nine months to deliver the four systems needed in the Central

Valley, from the time an order is placed. The AutoFish marking/tagging system and decimal coded-wire tags are described in Attachment 1. Northwest Marine Technology is the sole manufacturer of the automated equipment.

C2. Project Goals and Objectives: The objective of this proposal is to implement the first phase of a Central Valley-wide Constant Fractional Marking (CFM) program that uses coded-wire tagging/adipose fin clipping (CWT) to address central salmon management questions. The relative contribution of hatchery and natural production to adult populations will be determined, as represented in fisheries, spawner populations, and at Central Valley salmon hatcheries.

The overall objectives of the Central Valley CFM program are:

1. To evaluate the contribution rates of hatchery fish to Central Valley Chinook salmon populations,
2. To evaluate the Central Valley propagation program's genetic and ecological effects on natural Chinook populations,
3. To estimate exploitation rates of hatchery and natural Central Valley Chinook salmon in ocean and inland fisheries,
4. To evaluate the success of restoration actions designed to increase natural production of Central Valley Chinook salmon,
5. To evaluate the relative impacts of water project operations on hatchery and naturally-produced Chinook salmon,
6. To evaluate the recovery of listed stocks of Chinook salmon.

C3. Approach/Methodology: Based on the recommendations in the implementation plan described in the previous sections, the CVSPWT has recommended that a marking/coded-wire tagging program be implemented for Chinook salmon at Central Valley hatcheries, as follows:

- Continue marking/coded-wire tagging all production of winter-run Chinook at Livingston Stone National Fish Hatchery, all late fall-run Chinook production at Coleman National Fish Hatchery, and all spring-run Chinook production at Feather River Hatchery.

- Continue marking/coded-wire tagging all experimental releases of fall-run Chinook from Feather River, Merced River, and Mokelumne River Hatcheries at current rates.

- Implement a system-wide constant fractional marking/coded-wire tagging program for production releases of Central Valley hatchery reared fall-run Chinook, at a rate of 25%.

To complement the implementation of the CFM program, revised freshwater CWT recovery programs will be developed on a parallel track. The CALFED ERP Program is providing funding for the development of a comprehensive Central Valley Chinook Salmon Escapement Monitoring Plan. The goal of this plan will be to improve the precision of in-river escapement

estimates for Chinook salmon and improve coded-wire tag recovery programs. The plan proposal was developed by, and will be coordinated with, the IEP Central Valley Salmonid Escapement Project Work Team (SEPWT), a sub-team of the CVSPWT. The SEPWT includes representatives from the California Department of Fish and Game, Department of Water Resources, NOAA Fisheries, U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, Pacific States Marine Fisheries Commission, Yuba County Water Agency, and East Bay Municipal Water District.

This proposal includes only the first phase of implementation of the constant fractional marking program, the purchase of four automated marking trailers and marking/tagging for the first two years. Due to the short period of time and large numbers of fall-run Chinook that need to be marked/tagged, traditional manual marking/tagging will not be feasible at the 25% rate. Northwest Marine Technology (NMT) has estimated that four AutoFish Systems are needed to meet the marking/tagging needs at Central Valley hatcheries. The AutoFish System and decimal coded-wire tags are described in Attachment 1. This proposal does not include the continuing costs of marking/tagging after the second year, or the CWT recovery costs. These costs are expected to be substantial; additional funding will be sought to continue marking/tagging and expand recovery efforts after the end of this first project phase.

This project does not include marking/tagging by techniques other than coded-wire tagging and adipose fin clipping. However, data from this program will be closely coordinated with other marking programs such as otolith thermal and/or chemical marking. Feather River Hatchery plans to begin otolith thermal marking of fall-run Chinook releases in 2006.

C4. Tasks and Deliverables:

Task 1. Project Management and Administration - Semi-annual reports will be submitted by PSMFC to DFG and the CALFED ERP program documenting equipment purchase, personnel management, numbers of fish marked/tagged and any problems encountered in the tagging process. A final report will be submitted at the end of the second year of marking/tagging, summarizing the numbers of fish marked/tagged and recommendations for continuation of the program.

Task 2. Purchase Automated Tagging Systems - PSMFC will purchase four (4) AutoFish System through a sub-contract with Northwest Marine Technology, Inc. Purchase oversight will be conducted by existing DFG staff at no cost to the program. Costs include only funding of the automated tagging systems. The AutoFish System and decimal coded-wire tags are described in Attachment 1. Northwest Marine Technology is the sole manufacturer of the automated marking/tagging equipment.

Task 3. Mark/tag Production Releases - PSMFC will purchase supplies, and hire and supervise project personnel for the first two years of marking/tagging operations in the spring of 2007 and 2008. 25% of fall-run Chinook production releases at Central Valley hatcheries will be marked by adipose fin clip and CWT'd for two years, in the spring of 2007 and 2008 (Brood Years 2006 and 2007). The estimated annual number of fish to be marked/tagged will be:

Hatchery	Total Fall-run Chinook Production	Number Marked/Tagged for Experiments	Production Number	CFM Number (1/4)
Coleman National Fish Hatchery	12,000,000	0	12,000,000	3,000,000
Feather River Hatchery	8,000,000	1,500,000	6,500,000	1,625,000
Mokelumne River Hatchery	5,400,000	500,000	4,900,000	1,225,000
Nimbus Hatchery	4,000,000	0	4,000,000	1,000,000
			TOTAL	**6,850,000**

Annual hatchery production goals were obtained from Chuck Knutsen, DFG, Statewide Hatchery Coordinator. The budget for minor equipment, operating, and personnel expenses for the automated marking/tagging program was developed by David Knutzen, Northwest Marine Technology, working in conjunction with the PSMFC.

C5. Subcontractors: Under a primary contract, Pacific States Marine Fisheries Commission (PSMFC) will purchase supplies, and hire and supervise project personnel for the first two years of marking/tagging operations in the spring of 2007 and 2008. PSMFC will purchase four automated tagging systems (AutoFish System) through a sub-contract with Northwest Marine Technology, Inc.

Subcontractor:
Northwest Marine Technology
Corporate Office
PO Box 427, Ben Nevis Loop Road
Shaw Island, WA 98286, USA

Telephone (360) 468 - 3375
Fax (360) 468 - 3844
e-mail office@nmt.us

C6. Work Schedule:

Project timeline will be as follows:

2006 - March:

- Complete contracting process
- Place order with NMT for four (4) AutoFish Systems

May:

- Hire Tagging Coordinator

July:

- Semi-annual Report

2007 - January:

- NMT delivers AutoFish Systems
- Hire project operators and technicians
- Semi-annual Report

February – May:

- Marking/tagging production releases of fall-run

July:

- Semi-annual Report

2008 - January:

- Semi-annual Report

February – May:

- Marking/tagging production releases of fall-run

June:

- Final Report

Schedule of Deliverables:

Task	Task Title	Deliverable	Estimated Completion Dates
1	Project Management and Administration	• Semi-Annual Progress Report • Monthly Invoices • Final Report • Project Close Out Report • Final Invoice	• Semi-annual reports throughout the contract term. Due 10th of July, Jan. of each year. • Monthly invoices due the 10th of the month following billing period. • June 2008 • June 2008 • June 2008
2	Purchase Automated Tagging Systems	• (4) AutoFish Tagging Systems	• January 2007 (estimated delivery date)
3	Mark/tag Production Releases	• Approximately 7 million CWT/Ad-clipped juvenile fall-run Chinook salmon, spring 2007 and 2008	• May 2008

Project Timeline for Implementation of a Constant Fractional Marking/Tagging Program for Central Valley Chinook Salmon.
(Relative Schedule and Milestone dates assuming contract completed March 2006)

Task	Task Title	Relative Milestones				Relative Completion Schedule
		FY 05/06	FY 06/07	FY 07/08	FY 08/09	
	Contract Execution					March 2006
1	Project Management					
	Semi-annual fiscal and technical reports					10th of July, January each year
	Final Report					June 2008
2	Purchase Automated Tagging Systems					
	Place order for AutoFish System					March 2006
	Delivery of AutoFish System					January 2007
3	Mark/tag Production Releases					
	Year 1					February – May, 2007
	Year 2					February – May, 2008

C7. Special Equipment and Supplies Required: Due to the short period of time and large numbers of fall-run Chinook that need to be marked/tagged, the traditional manual marking/tagging will not be feasible at the 25% rate. Four automated marking/tagging systems, AutoFish System, available from Northwest Marine Technology, Inc., will be purchased to mark/tag production releases. These systems are the state-of-the-art for fish marking/CWT. Expendable supplies include coded-wire tags (1.1 mm. decimal tags). Specifications for the automated fish marking/tagging systems and decimal tags are shown in Attachment 1.

C8. Project Impacts (beneficial or adverse): This project will not require environmental impact documentation under NEPA/CEQA as it represents a relatively minor modification to current hatchery operations. No permits or agreements will be needed. Private property access will not be needed. All activities will be on state or federal hatchery property. No third party impacts will occur.

As described previously, this project has many benefits, as it addresses many significant questions that need to be answered to determine the overall status of hatchery versus natural stocks of Central Valley salmon. Data are needed for the evaluation of hatchery programs, monitoring the success of restoration efforts, recovery planning for listed stocks, management of water project operations, and sustainable management of ocean and inland harvest.

C9. Stakeholders and Interested Parties:
Implementation of the constant fractional marking program will provide a complementary benefit to essentially all fishery management, enhancement, recovery, restoration, and protection programs involving Chinook salmon 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, with an accepted statistical reliability, and on a stock-specific basis.

Agencies involved in Central Valley hatchery management, funding, or permitting, including the Department of Fish and Game, Department of Water Resources, NOAA Fisheries, US Fish and Wildlife Service, US Bureau of Reclamation, and East Bay Municipal Utilities District all support the development of this program.

C10. Consistency with CALFED ERP Goals:*

1). Identify Project Applicability to Eco-Elements
Primary: Artificial Fish Propagation
Secondary: Essential Fish Habitats
Fish and Wildlife Harvest

2). Identify Project Applicability to ERP Goals and Objectives: The proposed marking/tagging

program will provide CALFED the specific information needed to evaluate Ecosystem Restoration Program Plan (ERPP) actions and goals related to improving conditions for Central Valley Chinook salmon. Specifically, the proposed project will provide CALFED the basis for (i) evaluating and revising Central Valley salmon hatchery operations to result in population augmentation without detrimental effects on wild populations per the Ecosystem Restoration Program Plan (ERPP), Vol. I, pages 519-523; (ii) being able to track restoration of all races of Chinook salmon per ERPP, Vol. I, pages 220-224 and 229-230; (iii) tracking whether CALFED targets for population restoration of Chinook salmon are being reached per ERPP, Vol. II, pages 25-30, and (iv) evaluating effects of harvest per ERPP, Vol. I, pp. 511-518.

The project will contribute toward meeting ERP Goal 1: Endangered and Other At-risk Species and Native Biotic Communities. Marking/tagging of production releases of Central Valley fall-run Chinook salmon will improve restoration assessment and management of harvest, resulting in benefits to all Chinook salmon runs. The project will also contribute toward meeting ERP Goal 3: Harvested Species. In particular, the project will contribute to meeting Objective 4 under Goal 3, " to ensure that Chinook salmon, steelhead trout, and striped bass hatchery rearing and planting programs do not have detrimental effects on wild populations of native fish species and ERP actions." Marking/tagging production releases of fall-run Chinook will provide an essential tool to assess the effects of propagation programs on wild populations of Chinook salmon in the Central Valley.

3). Identify Project Applicability to Environmental Water Quality Constituents:
Primary: N/A
Secondary: N/A

4) Identify Project Applicability to CALFED ERP Stage 1 Milestones:
Project applies to the following Milestones:

- Milestone 118. Assess the impact of hatchery practices on naturally spawning populations of Chinook salmon and steelhead and operate hatcheries in a manner consistent with safe genetic practices that will maintain genetic integrity of all Central Valley anadromous salmonid populations.

  [This project is critical to the assessment of the contribution rate of hatchery-origin fish to fall-run Chinook salmon populations in the Central Valley.]

- Milestone 112. Develop and implement a comprehensive monitoring, assessment and research program (CMARP) for terrestrial and aquatic habitats and species populations acceptable to the fish and wildlife agencies. Conduct rangewide surveys for all "R" and "r" covered plants and animals in the MSCS Focus Area.

  [This project will be a critical part of the long-term monitoring program for Central Valley Chinook salmon.]

C11. Related Projects

1). If this project is related to another restoration project, identify other projects by number and program (e.g. CALFED, CVPIA), and if CALFED, identify that relationship by category: N/A

References

Hicks, A.C. 2003. A discussion and analysis of four constant fractional marking alternatives for California's Central Valley salmon hatcheries. Unpublished Master's Thesis, University of Idaho.

Hicks, A.C. and Hankin, D.G. 2003. Hatchery and escapement survey costs for Central Valley Chinook salmon. Unpublished report to Central Valley Salmonid Project Work Team.

Hicks, A.C. and Newman, K.B. 2000. User guide for CFM Sim. Unpublished report for Bailey Environmental.

Newman, K.B., Hicks, A.C., and Hankin, D.G. 2003. Estimating natural Chinook salmon production using tagged and marked hatchery releases as surrogates. Unpublished report to Central Valley Salmonid Project Work Team.

Newman, K.B., Hicks, A.C., and Hankin, D.G. 2004. A marking, tagging, and recovery program for Central Valley hatchery Chinook salmon. Unpublished report to Central Valley Salmonid Project Work Team. July 7, 2004.

PART D. Budget Summary

D1. Budget (See attached Excel Spreadsheet)

PART E. Project Location Information

E1. Project Location: Four Central Valley Chinook salmon hatcheries: Coleman National Fish Hatchery, Feather River Hatchery, Nimbus Hatchery, and Mokelumne River Hatchery.

E2. County or Counties Project is Located In: Shasta, Butte, Sacramento, and San Joaquin counties

E3. ERP Eco-Region, Eco-Zone, and Eco-Unit Project is Located In:
Eco-Region: Program-wide
Eco-Zone: All.
Eco-Unit: All.

E4. Project Centroid: Sacramento, CA
Latitude/Longitude Coordinates: 38º 31' N, 121º 30' W

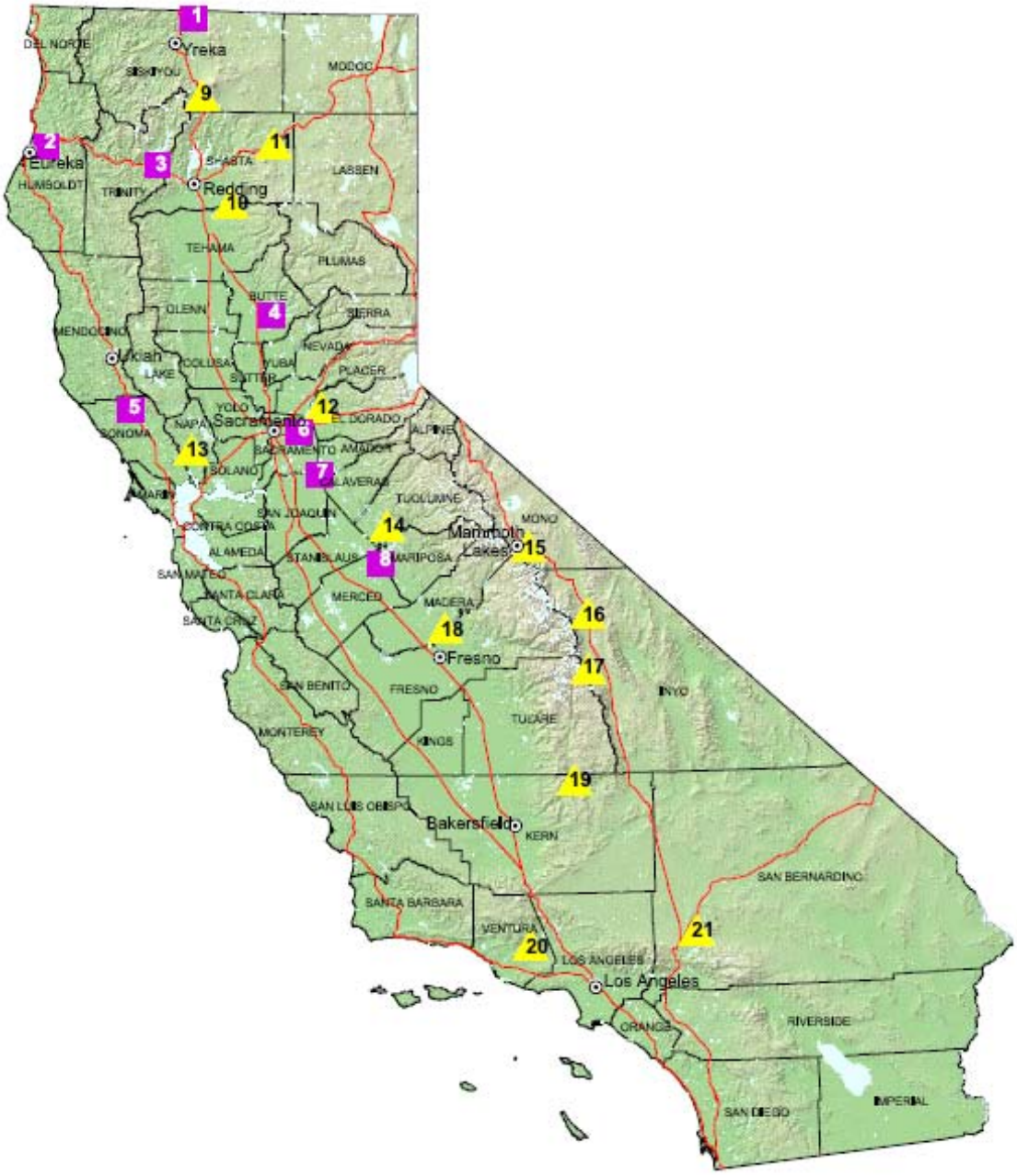
E5. Project Map: See attached map (next page).

E6. Digital Geographic File: Available on request.

E7. Congressional Districts: 2, 3, and 11

Map showing location of Central Valley salmon hatcheries included in this project:

- **4 – Feather River Hatchery**
- **6 – Nimbus Hatchery**
- **7 – Mokelumne River Hatchery**
- **10 – Coleman National Fish Hatchery**



PART F. Environmental Information

F1. CEQA/NEPA Compliance

1). Will this project require compliance with CEQA, NEPA, both, or neither:
This project will not require environmental impact documentation under NEPA/CEQA as it represents a relatively minor modification to current hatchery operations. Private property access will not be needed. All activities will be on state or federal hatchery property. No third party impacts will occur.

2). Is your project covered by either a Statutory or Categorical Exemption under CEQA or a Categorical Exclusion under NEPA: Yes.

3). If your project requires additional CEQA/NEPA analysis, please indicate which type of documents will be prepared: N/A

4). If the project will require CEQA and/or NEPA compliance, identify the lead agency(ies).
N/A

5). If your project is not covered under items 2 or 3, and you checked no to question 1, please explain why compliance is not required for the actions in this proposal:
Project represents a relatively minor modification to current hatchery operations. All activities will be on state or federal hatchery property, and will be part of already permitted activities.

6). If the CEQA/NEPA process is not complete, please describe the estimated timelines for the process and the expected date of completion: N/A

7). If the CEQA/NEPA document has been completed, what is the name of the document and provide State Clearinghouse number: N/A

F2. Environmental Permitting and Approvals

Please indicate what permits or other approvals may be required for the activities contained in your proposal and which have already been obtained. Please indicate all that 1) are needed, and 2) if needed, have been obtained:

No permits or agreements will be needed. All activities will be on state or federal hatchery property, and will be part of routine hatchery activities.

PART G. Land Use Questionnaire

G1. Land Use Changes

1). Do the actions in the proposal involve physical changes in the land use, or potential future changes in land use (Yes/No): No. Project involves activities on existing state or federal hatchery property.

2). How many acres of land will be subject to a land use change under the proposal:
N/A

3). Is the land subject to a land use change in the proposal currently under a Williamson Act contract (Yes/No):
N/A

4). For all lands subject to a land use change under the proposal, describe what entity or organization will manage the property and provide operations and maintenance services.
N/A

5). Does the applicant propose any modifications to the water right or change in the delivery of the water (Yes/No): No. Existing hatchery water supply will be used.

G2. Current Land Use and Zoning

1). What is the current land use of the area subject to a land use change under the proposal:
N/A

2). What is the current zoning and general plan designation(s) for the property:
N/A

3). How is the land categorized on the Important Farmland Series (IFL) maps (published by the California Department of Conservation):
N/A

G3. Land Acquisition

1). Will the applicant acquire any land under the proposal, either in fee or through a conservation easement (Yes/No): No.

2). For land acquisitions (fee title or easements), will existing water rights be acquired (Yes/No):
N/A

G4. Land Access

1). Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal (Yes/No): No. All project activities will occur on existing state or federal hatchery property.

PART H. Qualifications

H1. Qualifications

Mr. Stan Allen, Pacific States Marine Fisheries Commission, is a Senior Program Manager and has over 20 years of fisheries project administration and data collection/management experience. Mr. Allen has spent the last 17 years developing, coordinating and administering multi-agency cooperative projects. Mr. Allen will provide administrative, project coordination, and personnel management support and assistance to the study.

Ms. Alice Low (DFG) is a Senior Fisheries Biologist in the Native Anadromous Fish and Watershed Branch of the DFG and is the DFG Recovery Coordinator for Threatened and Endangered Salmon. Ms. Low has a Masters degree from San Diego State University and has more than 22 years experience in fisheries management, primarily in management of Central Valley salmon. She is a member of the NOAA Fisheries Technical Recovery Team for the Central Valley domain. She currently chairs the IEP Salmonid Escapement Project Work Team (SEPWT) and is a member of the Central Valley Salmonid Project Work Team (CVSPWT). Ms. Low will provide internal coordination for this project, ensuring consistency with DFG management objectives for Chinook salmon, and will provide interagency coordination through the Central Valley Salmonid Project Work Team.

Mr. James G. Smith (USFWS) is the Project Leader at the Service's Northern Central Valley Fish and Wildlife Office (NCVFWO) in Red Bluff, California. The NCVFWO been extensively involved with monitoring Chinook salmon in the Northern Sacramento River since 1978. The office is staffed with approximately 80 personnel, and has responsibilities that include identifying and defining factors affecting the abundance and survival of anadromous salmonids in the Sacramento River Basin. Mr. Smith has a B.S. from Humboldt State University (1975) and conducted post-graduate study in Fisheries also from Humboldt State University (1976-1979). Mr. Smith has been with the USFWS for 26 years, and for the past 22 years, has been involved with numerous fishery studies directly in the upper Sacramento River (e.g., investigations at RBDD, monitoring juvenile outmigrants, hatchery evaluation efforts at Coleman NFH, Battle Creek restoration, and mainstem Sacramento River spawning gravel evaluations). Mr. Smith works on a daily basis with numerous federal, state, and private entities in developing actions and programs for restoring, conserving, and enhancing anadromous salmonids in the upper Sacramento River.

Mr. Kevin Niemala (USFWS) is a 1992 graduate from University of Minnesota (B.S., Fisheries and Wildlife) and a 1995 graduate from University of Idaho (M.S., Fisheries Resources). While pursuing his Masters degree, Mr. Niemela worked for the Idaho Cooperative Fish and Wildlife Research Unit and the Office of Naval Research evaluating effects of U.S. Navy acoustical testing on salmonids in Lake Pend O'reille, Idaho. Mr. Niemela has been with the U.S. Fish and Wildlife Service for nine years. Mr. Niemela is currently assistant Project Leader at the NCVFWO and serves as the program leader for monitoring and evaluations of Coleman and Livingston Stone National Fish Hatcheries.

ATTACHMENT 1. Description of Decimal Coded-Wire Tags and AutoFish Automatic Marking System

AutoFish System™

History

In 1995, NMT in cooperation with the Washington Department of Fish and Wildlife and the Bonneville Power Administration began developing a revolutionary new series of machines to automatically inject Decimal Coded Wire Tags (CWT) and excise the adipose fin on salmonids. Through consistent research and development these partners created a system that requires no human handling or anesthetic.

Since its implementation the AutoFish System has been utilized at hatcheries in California, Idaho, Oregon, and Washington. By 2003 over 50 million fish had been Coded Wire Tagged or fin clipped by fishery management agencies in the Pacific Northwest. In 2004 there were twelve AutoFish units in use, including one in the Great Lakes Basin. Increasing interest in the AutoFish System will eventually result in its use throughout the aquaculture and hatchery programs of the world.

In 2001, NMT entered a cooperative agreement with the National Institute of Standards and Technology (NIST) and was awarded a three-year grant to explore the potential of developing an automated vaccination system. That project resulted in a working prototype.

Current Development

AutoFish goals for 2005 are primarily focused on AutoFish SV (Sort and Vaccinate), the new system that delivers intraperitoneal vaccine to juvenile fish. The AutoFish team is working to improve throughput, increase ease of use through system integration, and provide continued improvements in reliability. Discoveries they make during this research phase are being integrated into the other AutoFish configurations. Recent examples include adding the dual port sorter and fish lift into the AutoFish SCT (Sort, Clip and Tag) trailers.

AutoFish SCT (Sort, Clip, Tag)

The SCT (sort, clip, tag) is a self-contained mobile unit that has one sorter and one to five processing lines. This complete system can sort, and/or clip, and/or tag 57 mm to 142 mm salmonids.

Formerly called the NMT Marking and Tagging System (MATS) this technology has been deployed by four different agencies in a SCT5 (five-line) configuration with over 50 million fish processed.

The SCT5 is housed in a 32-foot all aluminum trailer, designed for large-scale salmon, steelhead and trout programs. They are not only economical and efficient to run, but provide less stress on the fish due to no human handling, and no anesthetic.

This highly efficient and mobile system has demonstrated low mortality (<0.1%), exceptional reliable adipose fin clipping (>99%), and high CWT retention (>98%).

Specifications:

- Adipose Clip & Snout Tag or Adipose Clip only, or Snout Tag only salmonids ranging from 57 mm to 142 mm total length
- 25-35 thousand fish processed per shift with one skilled operator and an assistant
- Sorter accurate within 1 mm
- No anesthetic required
- Fin clipping and CWT placement superior to that achievable by hand
- Less costly to operate than traditional clipping and tagging systems

Decimal Coded Wire Tags™ (CWT)

The CWT is a length of magnetized stainless steel wire 0.25 mm in diameter. The tag is marked with rows of numbers denoting specific batch or individual codes. Tags are cut from rolls of wire by an injector that hypodermically implants them into suitable tissue. The standard length of a tag is 1.1 mm. For very small animals half-length (0.5 mm) are used. For larger specimens or improved magnetic detection, one and a half (1.6 mm) or double length (2.2 mm) may be utilized.

Salmonid fishes are usually tagged in the snout, but "cheek" muscle and certain other tissue offers superior sites for many other species.

NMT has yet to encounter a fish, of sufficient size, that cannot be tagged. Arctic char *Salvelinus alpinus* as small as 22 mm total length have been successfully snout-tagged with half-length CWT (Champigneulle, et al. 1987 [Abstract]). Since body muscle also provides a suitable and much larger target than the snout of a char, it appears that smaller fish and other organisms can be successfully tagged. Although designed originally for small fish, coded wire tags have been applied successfully in a number of crustacean studies.

Advantages of CWT system:

- Can be used in very small animals.
- Minimal biological impact.
- High retention rates over the life of the host.
- Enormous code capacity (batch or individual identification).
- Tags are inexpensive.
- Potential for automatic scanning of large samples.

Limitations of the CWT system:

- Capital equipment is expensive (but can be rented from NMT or borrowed from other agencies).
- In most applications, tags must be excised, usually from dead animals, for reading decimal codes.
- Tags usually not externally visible.

Part D. Budget Detail

TASKS:
Task 1 - Project Management and Administration
Task 2 - Purchase Automated Tagging Systems
Task 3 - Mark/Tag Production Releases

YEAR SCHEDULE:
Year 1: 4/1/06 - 6/30/06
Year 2: 7/1/06 - 6/30/07
Year 3: 7/1/07 - 6/30/08

			AMOUNTS																	
			YEAR 1						YEAR 2						YEAR 3					
Personnel Services	**Annual Salary**	**Total Months**	**Y1 Months**	**Task 1**	**Task 2**	**Task 3**			**Y2 Months**	**Task 1**	**Task 2**	**Task 3**			**Y3 Months**	**Task 1**	**Task 2**	**Task 3**		
	(Average)			**AMOUNT**	**AMOUNT**	**AMOUNT**				**AMOUNT**	**AMOUNT**	**AMOUNT**				**AMOUNT**	**AMOUNT**	**AMOUNT**	**AMOUNT**	
Supervisor/Coordinator	56,759	24.00	3.00	$14,190					12.00	$46,145		$9,229			12.00	$48,452		$9,691		
Operator 1	38,330	24.00							6.00			19,165			12.00			40,247		
Operator 2	38,330	24.00							6.00			19,165			12.00			40,247		
Operator 3	38,330	24.00							6.00			19,165			12.00			40,247		
Operator 4	38,330	8.00							4.00			12,777			4.00			13,416		
Operator 5	38,330	8.00							4.00			12,777			4.00			13,416		
Assistant 1	30,967	5.00							2.50			6,294			2.50			6,609		
Assistant 2	30,967	5.00							2.50			6,294			2.50			6,609		
Assistant 3	30,967	5.00							2.50			6,294			2.50			6,609		
Assistant 4	30,967	5.00							2.50			6,294			2.50			6,609		
Assistant 5	30,967	5.00							2.50			6,294			2.50			6,609		
Assistant 6	30,967	5.00							2.50			6,294			2.50			6,609		
Sub-Total Personnel Services		142.00	3.00	$14,190					53.00	$46,145		$130,042			71.00	$48,452		$196,918		
Benefits (28%)				$3,973						$12,921		$25,838				$13,567		$44,034		
Benefits (Medical Premium)				$1,917						$6,390		$7,082				$6,390		$7,100		
($639 p/mo p/employee)																				
Benefits - Seasonal (14%)												$7,076						$7,430		
Overtime (600 hrs p/yr)												17,510						18,386		
Total Personnel Services				$20,080						$65,456		$187,548				$68,409		$273,868		
Operating Expenses																				
Project Mgmt/Coord				$3,000						$8,000						$8,400				
Trailer Transport												25,000						10,000		
Trailer/Tagging Supplies												$37,500						$38,500		
Training										$2,000						$2,000				
*Travel and Per Diem				$2,000						$8,000		$36,000				$8,000		$36,000		
Trailer Maintenance																		$67,000		
Field Supplies												$3,000						$3,000		
Hatchery Infrastructure	*see hatchery infrasture tab for more detail*											$85,000						$20,000		
Printing / Misc										1,500						1,500				
Workshop Supplies																				
Coded-Wire Tags (14 M)**												$952,000								
Sub-Contract																				
Equipment	Trailer Purchase			$6,000	$ 1,100,000						$ 3,440,000									
Total Operating Expense				$11,000	$1,100,000					$19,500	$3,440,000	$1,138,500				$19,900	$0	$174,500		
Subtotal Operating Expenses and Personnel Services				$31,080	$1,100,000					$84,956	$3,440,000	$1,326,048				$88,309	$0	$448,368		
Overhead Costs @ 0.15				$4,662						$12,743		$198,907				$13,246	$0	$67,255		
Total by Fiscal Year				$35,742	$1,100,000					$97,699	$3,440,000	$1,524,955				$101,555	$0	$515,623		
Contract Total by FY					**$1,135,742**							**$5,062,654**						**$617,178**		

Contract Total Amount 6,816,000 **$6,815,573**

* Indicate Rate in Column A/Row 50

* Travel Expenses and per diem rates set a the rate specified by the Department of Personnel Administration for employees. (See Attachment 3 - Travel guidelines). The contractor is required to maintain travel receipts and records for auditing purposes.