

**Initial Fisheries and In-Stream Habitat  
Management and Restoration Plan  
For The Lower American River  
(FISH Plan)**

*Status Report*

**September 2005**

# Table of Contents

<b>Introduction</b> .....	3
<b>List of Acronyms</b> .....	4
<b>FISH Plan Section / FISH Plan Page Number</b>	
<b>6.2 Recommendations</b>	
<b>First Priority Actions</b>	
1 / 6-5 .....	5
2.1 / 6-9 .....	5
3.1.1 / 6-10 .....	6
3.1.2 / 6-11 .....	7
3.1.3 / 6-12 .....	7
3.1.4 / 6-12 .....	8
3.2.1 / 6-13 .....	9
3.2.2 / 6-14 .....	10
3.2.3 / 6-14 .....	11
3.2.4 / 6-15 .....	12
3.2.5 / 6-15 .....	13
3.3.1 / 6-16 .....	13
3.3.2 / 6-18 .....	14
<b>6.2.1. Aquatic, Riparian, and Wetland Habitat</b>	
4 / 6-18 .....	14
<b>6.2.2. Levees and Bank Protection</b>	
5 / 6-19 .....	15
<b>6.2.3. Artificial Propagation of Fish</b>	
6 / 6-20 .....	16
7 / 6-21 .....	16
<b>6.2.4. Stranding</b>	
8 / 6-22 .....	17
<b>6.2.5. Other Potential Management Actions</b>	
9 / 6-22 .....	18
10 / 6-23 .....	19
<b>6.2.6. Monitoring</b>	
A / 6-24 .....	19
B / 6-24 .....	20
C / 6-24 .....	20

**Table of Contents (continued)**

**FISH Plan Section / FISH Plan Page Number**

**6.3 Second Priority Actions**

**6.3.1. Aquatic, Riparian and Wetland Habitat**

11 / 6-25 .....21  
12 / 6-26 .....22  
13 / 6-26 .....22

**6.3.3. Harvest of Fish and Wildlife**

14 / 6-27 .....23

**6.3.4. Other Potential Management Actions**

15 / 6-28 .....23

**6.3.5. Coarse Sediment Supply**

16 / 6-28 .....24  
17 / 6-29 .....25

**6.3.6. Artificial Propagation of Fish**

18 / 6-30 .....25

**6.3.7. Other Potential Restoration Activities**

19 / 6-32 .....26

**6.3.8. Monitoring and Evaluation Components**

D / 6-32 .....27  
E / 6-32 .....27  
F / 6-33 .....27  
G / 6-33 .....28

**6.4. Third Priority Actions**

**6.4.1. Aquatic, Riparian, and Wetland Habitat**

20 / 6-34 .....29  
21 / 6-34 .....29  
22 / 6-35 .....30  
23 / 6-36 .....30

**6.4.2. Contaminants**

24 / 6-37 .....31

**6.4.3. Harvest of Fish and Wildlife**

25 / 6-37 .....31

**Table of Contents (continued)**

**FISH Plan Section / FISH Plan Page Number**

**6.4.4. Artificial Propagation of Fish**  
26 / 6-38 .....32

**6.4.5. Other Potential Management Actions**  
27 / 6-39 .....33  
28 / 6-39 .....33

**6.4.6. Monitoring and Evaluation Components**  
H / 6-40 .....34  
I / 6-41 .....34

## Introduction

The Initial Fisheries and In-Stream Habitat Management and Restoration Plan for the Lower American River (FISH Plan) articulates a broadly-shared understanding regarding the management and restoration actions that are most important to undertake to improve conditions for priority fish species in the lower American River. The FISH Plan serves as the aquatic habitat management element of a multi-agency River Corridor Management Plan (RCMP) that was developed by the Lower American River Task Force. It also is intended to serve as the Habitat Management Plan for the lower American River, as required under the Sacramento Area Water Forum Agreement. The FISH Plan was developed in 2001 and is presently being updated.

The purpose of this report is to describe the progress being made for each recommendation in the FISH Plan, and to present the recommendations of the Water Forum staff regarding how each recommendation should be addressed in the future.

The following information is provided for each recommendation in the FISH Plan:

**FISH Plan Section/Page** is provided for easy reference to the FISH Plan. Each new section is distinguished by a

**FISH Plan Title** is verbatim from the FISH Plan.

**Summary Description** is additional information that embellishes the FISH Plan Title. This is only provided where the FISH Plan Title does not capture the scope of the recommendation in the FISH Plan.

**Progress Report** describes progress in three aspects of each recommendation: Evaluation, Implementation, and Monitoring.

**Discussion** is only provided where additional information is needed to provide rationale to support the recommendations.

**Recommendations** are the recommendations of Water Forum staff regarding future actions to be taken. The purpose of the recommendations is to stimulate discussion as the FISH Plan is being updated.

## Acronyms

CDEC	California Data Exchange Center
CDFG	California Department of Fish and Game
CFM	Constant Fractional Marking
COE	U.S. Army Corps of Engineers
ESA	Endangered Species Act
EWA	Environmental Water Account
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FISH	Fisheries and In-stream Habitat
LAR	Lower American River
NOAA	National Oceanic and Atmospheric Administration
Reclamation	U.S. Bureau of Reclamation
RM	River Mile
SAFCA	Sacramento Area Flood Control Agency
SOP	Standard Operating Procedure
SRA	Shaded Riverine Aquatic
SWRCB	State Water Resources Control Board
TCD	Temperature Control Device
USBR	U.S. Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WQCP	Water Quality Control Plan

## 6.2. Recommendations

### First Priority Actions

- ❖ **Reference**  
**FISH Plan Section/Page:** 1/6-5

**FISH Plan Title:** Develop and implement an ecologically based flow management plan for the lower American River, including water temperature management considerations, subject to SWRCB approval

#### **Progress Report**

**Evaluation:** Ongoing. Since 1999, the Water Forum, in conjunction with Reclamation, the USFWS, NOAA Fisheries, CDFG, and other agencies, has been working toward an updated and improved flow standard for the LAR to be presented to the SWRCB. All parties continue to meet and expect to reach agreement by the end of 2005.

**Implementation:** Not started

**Monitoring:** Not started

#### **Recommendations**

It is recommended that progress continue, as described above.

- ❖ **Reference**  
**FISH Plan Section/Page:** 2.1/6-9

**FISH Plan Title:** Develop and implement a basin-wide water temperature monitoring program

**Summary Description:** The program described in the FISH Plan includes temperature monitoring stations on the North and South Forks American River upstream of Folsom Reservoir, temperature profile stations in Folsom Reservoir and Lake Natoma, and temperature monitoring stations downstream of Nimbus Dam on the lower American River. The program also includes a flow monitoring station on the North and South Forks of the American River upstream of Folsom Reservoir.

#### **Progress Report**

**Evaluation:** Completed. The need for monitoring stations has been assessed by Reclamation, and several stations identified in the FISH Plan may be eliminated. They are the flow station on the South Fork American River, the temperature station at Sacramento Bar on the lower American River, and the ongoing temperature profile stations in Lake Natoma. See “Discussion” below for the rationale for eliminating these stations.

**Implementation:** Ongoing. All monitoring stations identified in the FISH Plan are active except as discussed below. The temperature and flow monitoring stations are operated by the USGS, under a contract with Reclamation. The temperature profile stations are operated by Reclamation.

**Monitoring:** Not applicable

### **Discussion**

North Fork flow gauge: The flow station on the North Fork American River will be installed as part of the Placer County Water Agency's new pump station at Auburn, which has been delayed until early 2007.

South Fork flow gauge: Installing and operating a flow gauge on the South Fork American River immediately upstream of Folsom Lake is problematic in that access is very limited and vandalism is likely. The South Fork temperature gauge has been vandalized repeatedly and the USGS has given up trying to maintain its data transmission capability via satellite. There is a flow gauge at Chili Bar Dam and except during major storm events there are minimal accretions to the river downstream.

Sacramento Bar flow gauge: Sacramento Bar is at river mile 19. Because there are temperature monitoring stations at Hazel Avenue (river mile 23), and at William Pond Park (river mile 13.5). The utility of having an additional station at Sacramento Bar is questionable.

Lake Natoma temperature profiles: The temperature profile stations in Lake Natoma were installed to gain information to support Lake Natoma modeling efforts (see items 6.2.3.3.1 and 6.2.3.3.2). Additional data is not needed for these studies.

### **Recommendations**

It is recommended that the ongoing monitoring plan, as described in the FISH Plan, be continued, except that a new flow gauge on the South Fork American River and a new temperature gauge at Sacramento Bar be eliminated from the FISH Plan; and that temperature profiles in Lake Natoma be a low priority, unless a new special study is conducted.

### **❖ Reference**

**FISH Plan Section/Page:** 3.1.1/6-10

**FISH Plan Title:** Evaluate potential to construct curtains at tributary inflows to Folsom Reservoir, forcing cold water to bottom of reservoir

### **Progress Report**

**Evaluation:** Not started

**Implementation:** Not applicable.

**Monitoring:** Not applicable

### **Recommendations**

Because of the physical and recreational challenges associated with curtains in the tributary arms of the lake, it is recommended that several individuals from Reclamation who have experience

with curtains and modeling do a subjective analysis, as a priority 2 in the FISH Plan. If the results are that the approach is feasible, then a more quantitative evaluation could be done.

❖ **Reference**

**FISH Plan Section/Page:** 3.1.2/6-11

**FISH Plan Title:** Formalize change in USBR standard operating procedure for Folsom Dam to permit release from the spillway gates to save cold water

**Summary Description:** When the FISH Plan was developed, the standard operating procedure (SOP) for Folsom Dam was to release water in excess of power plant capacity first from the river outlets and then from the spillway gates, if possible. Under certain reservoir conditions, this practice released cold water from the reservoir when it would have been possible to release warmer water through the spillway gates. By changing the SOP to release water first from the spillway gates, when possible, cold water could be conserved in the reservoir.

**Progress Report**

**Evaluation:** Complete. The benefits of changing the SOP were considered by Reclamation and it agreed to modify the SOP.

**Implementation:** Ongoing. Reclamation updated its SOP for Folsom Dam in 2003. The updated SOP provides for first using spillway gate 3, when possible, to conserve cold water. Using spillway gate 3 first is optional, at the discretion of Reclamation.

**Monitoring:** Not applicable. The FISH Plan does not call for monitoring.

**Recommendations**

It is recommended that Reclamation's discretion to use spillway gate 3, rather than the river outlets, be monitored to assure that cold water is conserved whenever possible. Monitoring could be accomplished by Reclamation reporting its operations to the American River Operations Work Group, and documenting the operations in the meeting notes.

❖ **Reference**

**FISH Plan Section/Page:** 3.1.3/6-12

**FISH Plan Title:** Evaluate opportunities for re-operation of upstream reservoirs for benefit of Folsom Reservoir coldwater pool management

**Progress Report**

**Evaluation:** Complete. Reclamation conducted a cursory evaluation of the benefits of re-operating upstream reservoirs and concluded that there is little opportunity to enhance the coldwater pool. Any enhancements would require higher releases of cold water in the spring during years that it could be stored in Folsom Reservoir (considering flood control operations). The upstream reservoirs are primarily operated for hydroelectric power generation and releases are made according to power demand, which is typically not high in the spring.

**Implementation:** Not applicable. Based on the evaluation, no further action is planned, at this time.

**Monitoring:** Not applicable.

### **Discussion**

Both the Sacramento Municipal Utility District and Pacific Gas and Electric are in re-licensing procedures with the Federal Energy Regulatory Commission (FERC) for their projects on the South and Middle Forks of the American River, respectively. Re-licensing could result in modifications to the upstream reservoirs.

### **Recommendations**

As a 3<sup>rd</sup> priority, it is recommended that re-licensing activities be monitored to assure that any changes in operation do not adversely affect the cold-water pool in Folsom Reservoir, and to recommend to FERC, any opportunities to improve the cold-water pool. This could be achieved by having the utilities/FERC include an analysis of the effect of re-licensing on the cold-water pool; and by having LAR stakeholders further evaluate, and recommend, opportunities to improve the cold-water pool conditions as part of the re-licensing process.

### ❖ **Reference**

**FISH Plan Section/Page:** 3.1.4/6-12

**FISH Plan Title:** Construct and operate a temperature control device for El Dorado Irrigation District.

**Summary Description:** When the FISH Plan was developed it was proposed that a temperature control device (TCD) be installed on the El Dorado Irrigation District's water supply intake in Folsom Reservoir as part of its plant expansion plans. Presently the intake diverts water from the coldwater pool. Installation and operation of a TCD would allow the District to draw warmer water from the reservoir, which would conserve cold water for use in protecting salmonids in the LAR.

### **Progress Report**

**Evaluation:** Not applicable. The FISH Plan does not call for a specific evaluation. An Environmental Assessment/FONSI for the project was prepared by Reclamation in October 2002; and a variety of environmental documents for other projects have assumed that the TCD would be installed in the future.

**Implementation:** Ongoing. The project is presently in the design phase. Congress has authorized design and construction of the TCD, and \$3 million was appropriated for design and construction in FY 2005.

**Monitoring:** Not applicable. The FISH Plan does not call for monitoring.

## **Discussion**

The project will cost more than the \$3 million already appropriated. Congress is anticipated to appropriate the necessary additional funds to complete the project.

## **Recommendations**

It is recommended that the progress of design and construction be monitored. Once installed, use of the TCD to optimize conservation of the coldwater pool should be monitored. Monitoring of design, construction, and operations could be accomplished through periodic reports by Reclamation to the American River Operations Work Group and documented in the meeting notes.

## ❖ **Reference**

**FISH Plan Section/Page:** 3.2.1/6-13

**FISH Plan Title:** Improve capability to control Folsom Dam release water temperatures for the benefit of priority lower American River fish species by improving effectiveness of Folsom Dam power penstock inlet port, shutters, and guidance structure.

**Summary Description:** This action includes (1) ascertaining whether current operations are meeting water temperature requirements through long-term temperature scheduling, a combination of existing tools, and proposed modifications; (2) conducting an investigation of the cause of leakage around the temperature shutters, and developing and implementing a remedial plan; and (3) improving management/operations of shutters to reduce the “stair-step” changes in water temperature to gradual changes, and to blend water of varying temperature available in the reservoir.

## **Progress Report**

**Evaluation:** Ongoing. Sub-action (1) is an ongoing evaluation. Since the time the FISH Plan was prepared, Reclamation has been developing an annual plan to optimally use the cold-water pool for the benefit of over-summering steelhead and spawning salmon. It has become apparent that in some years there is not enough cold water available to meet target temperatures for both species. Sub-action (2) was started, but not completed. A formal investigation of the cause and magnitude of leakage through the shutters has not been conducted; however, Tracy Vermeyen did a qualitative analysis from Reclamation's Technical Service Center in Denver, Colorado. The qualitative analysis showed there is significant potential for leakage around the shutter system's superstructure (above elevation 428 ft) and to a lesser degree around the shutter guides (below elevation 428 ft). A one dimensional selective withdrawal model (SELECT) was used to estimate the impact of leakage on Folsom power plant release temperatures but the results were not reasonable. It was concluded that the results were poor because the model is not well suited for simulating the effects of leakage along long vertical leakage paths.

**Implementation:** Ongoing. Sub-action (3) is ongoing. In recent years, Reclamation has decreased the “stair-step” changes in Folsom Dam releases water temperature by making more frequent shutter changes, by drawing water from different levels in the reservoir and blending the water through the various penstocks.

**Monitoring:** Ongoing. Reclamation has been monitoring water temperatures in the river and DFG has been monitoring the health of salmon and steelhead. In the fall of 2003, there was significant pre-spawning salmon mortality that corresponded with warm water temperatures because the cold water in the reservoir had been depleted. Over-summering steelhead have appeared healthy, except in the late summer of 2004 when there was an outbreak of rosy anus. The condition disappeared once the water cooled in the fall.

### **Discussion**

Ongoing monitoring and adaptive management of operations is needed to maintain temperatures suitable for the health of salmon and steelhead. Reclamation has been, and is expected to continue, funding the temperature monitoring program and developing and implementing an annual cold-water pool management plan. DFG has not fully funded the biological monitoring of steelhead and salmon in the past few years and has relied on financial assistance from the Water Forum and Reclamation. No funds have been allocated for evaluating the cause and magnitude of shutter leakage.

### **Recommendations**

It is recommended that the development and implementation of an annual cold-water pool management plan, including the biological monitoring component, be continued indefinitely by Reclamation. Securing a reliable, long-term, funding source for the biological monitoring should be a high priority (FISH Plan priority 1). There is no evidence that the leakage around the shutters adversely affects the cold water pool, therefore there does not appear to be a compelling reason to evaluate the cause and magnitude of shutter leakage, therefore this component should be changed to a level 3 priority in the FISH Plan.

### ❖ **Reference**

**FISH Plan Section/Page:** 3.2.2/6-14

**FISH Plan Title:** Evaluate the effectiveness of and construct, as appropriate, a fully automated temperature control device.

**Summary Description:** This action is to evaluate the costs and benefits of replacing the existing temperature shutters on the Folsom Dam penstocks with a fully automated temperature control device (TCD). If feasible, the TCD would be constructed.

### **Progress Report**

**Evaluation:** Complete. In 2002 HDR Engineering evaluated Various TCD conceptual designs. Because of cost, SAFCA is considering moving forward with a fully mechanized TCD on only one penstock, which would allow for refined temperature control on one unit, while still using the existing shutters on the other two units. This would allow refined temperature control of the total penstock releases.

**Implementation:** Not started. Design and construction are presently on hold pending a final decision on how to proceed and funding. Since the FISH Plan was developed, Reclamation has significantly improved its ability to manage the cold-water pool using the existing shutter system. This has decreased the incremental benefits of constructing a new TCD. In addition, the

Army Corps of Engineers (COE) has revised the cost estimates for the Folsom Dam modifications. Pending decisions regarding modification and raising of the dam, funding for the TCD is uncertain.

**Monitoring:** Not applicable.

### **Discussion**

SAFCA has \$2 million committed to making water temperature improvements and Congress has authorized funds to make improvements on the temperature shutters as part of the Water Resources Development Act of 1999, but because of cost over runs on the dam, it is not likely that the Corps would be in a position to use appropriated funds for the TCD at this time.

### **Recommendations**

It is recommended that SAFCA and Reclamation further evaluate the benefits of a new TCD and determine whether it is appropriate to proceed with a design at this time in light of the current funding situation.

### ❖ **Reference**

**FISH Plan Section/Page:** 3.2.3/6-14

**FISH Plan Title:** Evaluate the effectiveness of accessing coldwater between the lower river outlet works and the penstocks to address needs of priority lower American River fish species.

**Summary Description:** The evaluation is to determine the benefits and costs of alternative means of accessing coldwater between the lower river outlet works and the existing power penstocks at Folsom Dam. The evaluation should include a determination of whether dissolved oxygen and nitrogen super-saturation present a water quality problem below Nimbus Dam.

### **Progress Report**

**Evaluation:** Partially complete. HDR Engineering evaluated several alternatives for accessing the cooler water below the existing penstock intakes and directing it into the penstocks. This evaluation did not include a cost/benefit analysis comparing these alternatives (which involve physical modifications to the penstock intakes) vs. simply using the existing river outlets to release cooler water and foregoing the generation of power, as Reclamation did in the fall of 2001 and 2002. Reclamation presently includes an estimate of the costs of the foregone power when using the river outlets and bypassing the penstocks in its annual cold-water pool management plans. No evidence was found that dissolved neither oxygen nor nitrogen super-saturation presented a water quality issue downstream of Nimbus Dam after use of the river outlets in 2001 and 2003. Also, dissolved oxygen is routinely monitored as part of the conduct of temperature profiles in Folsom Lake.

**Implementation:** Ongoing. Although the evaluation has not been completed, Reclamation has been using the river outlets to blend lower-elevation cooler water with warmer water from the penstocks to meet water temperature criteria for salmon spawning, as needed. Bypassing the penstocks results in a loss of power generation. Power users have been reimbursed for this loss using funds from the Environmental Water Account (EWA). None of the alternatives which

were identified by HDR for directing water from below the penstocks into the penstocks are being pursued at this time.

**Monitoring:** Not applicable.

**Discussion**

Bypassing the power penstocks is practicable and technically and politically feasible, as long as there are funds for reimbursing the power users. Funding has been available from the EWA in the past, however the allocation is made on an annual basis.

**Recommendations**

It is recommended that Reclamation, using the HDR analysis, complete the cost/benefit evaluation. In the meantime it should continue to consider using the river outlets in its annual cold-water pool management plans as a FISH Plan priority 1.

❖ **Reference**

**FISH Plan Section/Page:** 3.2.4/6-15

**FISH Plan Title:** Assess ability to access low-elevation cold-water pool with hydroelectric power generation and to economically utilize cold-water pool below penstock intakes.

**Summary Description:** This action is to specifically evaluate constructing a new power plant in an existing or a new river outlet in order to continue to generate power while accessing the cold water below the existing penstocks.

**Progress Report**

**Evaluation:** Complete. This action was evaluated by Reclamation’s Central Valley Operations and determined not to be cost effective.

**Implementation:** Not applicable.

**Monitoring:** Not applicable.

**Recommendations**

It is recommended that this action be eliminated from the FISH Plan. Documentation of this action should be included in an Appendix to the FISH Plan.

❖ **Reference**

**FISH Plan Section/Page:** 3.2.5/6-15

**FISH Plan Title:** Modify the existing automated temperature selection schedule for multi-species benefits to accommodate potential modifications to the existing power penstock shutters at Folsom Dam, or other infrastructure actions.

**Summary Description:** Reclamation developed an automated temperature selection schedule for multi-species benefits to use in its cold-water pool management model for planning

applications. The selection schedule is specific to the existing infrastructure and priority fish species, and if they were changed, the selection schedule would need to be modified.

### **Progress Report**

**Evaluation:** Not started. Neither the infrastructure nor the priority species have changed; therefore the selection schedule does not need to be modified, at this time.

**Implementation:** Not applicable.

**Monitoring:** Not applicable.

### **Recommendations**

There is no reason to modify the schedule at this time. Also, Reclamation does not use the schedule in its planning studies and has no plans to do so. Therefore, it is recommended that this action be eliminated from the FISH Plan, and that action documented in an Appendix to the FISH Plan.

### ❖ **Reference**

**FISH Plan Section/Page:** 3.3.1/6-16

**FISH Plan Title:** Evaluate the effectiveness of temperature control structures for the Nimbus Dam spillway and power intake to help address needs of priority lower American River fish species. Potential actions include the installation of temperature curtains at the plunge zone of Lake Natoma and around the Nimbus Dam power plant intake, and removal of a portion of, or the entire, concrete debris wall in front of the intake. Also, evaluate operations of Nimbus Dam during occasional spills to minimize release of warm water from Lake Natoma.

### **Progress Report**

**Evaluation:** Ongoing. The Water Forum received a three-year, \$454 thousand grant from the Anadromous Fish Restoration Program in 2003 to evaluate the effectiveness of the various temperature control structures identified in the FISH Plan, using mathematical hydrologic and thermodynamic models. Preliminary results are expected to be available by the end of 2005. The final report will be completed in 2006.

**Implementation:** Not applicable.

**Monitoring:** Not applicable.

### **Recommendations**

It is recommended that the study be completed, as a FISH Plan priority 1. Subsequently, as a priority 1, decisions should be made regarding the implementation of the findings of the study.

❖ **Reference**

**FISH Plan Section/Page:** 3.3.2/6-18

**FISH Plan Title:** Improving efficiency of water transport through Lake Natoma (e.g. modifying channel in Lake Natoma).

**Summary Description:** This work is being done in conjunction with item 6.2.3.3.1.

**Progress Report**

**Evaluation:** Ongoing. The Water Forum received a three-year, \$454 thousand grant from the Anadromous FISH Restoration Program in 2003 to evaluate the effectiveness of the various temperature control structures identified in the FISH Plan, using mathematical hydrologic and thermodynamic models. Preliminary results are expected to be available by the end of 2005. The final report will be completed in 2006.

**Implementation:** Not applicable.

**Monitoring:** Not applicable.

**Recommendations**

It is recommended that the study be completed, as a FISH Plan priority 1. Subsequently, as a priority 1, decisions should be made regarding the implementations of the findings of the study.

### **6.2.1. Aquatic, Riparian, and Wetland Habitat**

❖ **Reference**

**FISH Plan Section/Page:** 4/6-18

**FISH Plan Title:** Develop a plan or policy for management of large woody debris in the lower American River, consistent with recreation safety needs, including a pilot project.

**Summary Description:** The debris maintenance program would facilitate improving and/or restoring instream cover for salmonid rearing, and should consider modifying current practices for removing and placing large woody debris and implementing a pilot project to place large woody debris into the river to meet the needs of priority species.

**Progress Report**

**Evaluation:** Completed. A significant concern of the managing agencies is that of liability associated with placing woody debris into the river, especially as it relates to health and safety. This issue was evaluated in 1996 and it was concluded that if the wood was placed so that it was pointing downstream, anchored to the bank so it did not float away, and if there was some surface indication that the material was there, it would be acceptable to include wood in projects. It was also discovered that woody complexes were superior to individual tree trunks for fish cover. Since then, wood has been placed at several erosion sites in the area. The concern over liability remains an issue.

**Implementation:** Partial implementation is ongoing. No plan or policy for woody debris management has been developed; however, several bank protection projects on the American River have woody complexes in the water, including Sites 1, 3, and 5. These serve as the pilot project identified in the FISH Plan. On the issue of liability, SAFCA, and others would like to see broadening legislation that would reduce liability for injuries associated with debris that has been placed in the river.

**Monitoring:** Ongoing. SAFCA conducted snorkel surveys of the bank protection and habitat restoration sites in 2004 and 2005.

### **Recommendations**

It is recommended that the development of a plan be revitalized and that it include a statement/position related to the liability issue. The plan should consider all the issues outlined in the FISH Plan. Also, it is recommended that broadening legislation related to the liability issue be pursued, possibly in AB1665 (Reform of Flood Control System).

## **6.2.2. Levees and Bank Protection**

### **❖ Reference**

**FISH Plan Section/Page:** 5/6-19

**FISH Plan Title:** Identify and evaluate locations in the lower American River where existing revetments could be modified to incorporate bank protection habitat features to aid in preservation and re-establishment of both high-quality nearshore aquatic and riparian habitats, and implement measures where appropriate and possible to do so without having an impact on the integrity of the bank protection.

### **Progress Report**

**Evaluation:** Ongoing. Three sites were evaluated and selected for implementation.

**Implementation:** Ongoing. Site RM1.8 was planted through existing riprap and through additional riprap added in 2004 as part of the FEMA Emergency Erosion Control Sites. Trees, shrubs and herbaceous plants were planted at RM 4.2 and RM 7.6. These sites were irrigated and maintained for several years, and are now considered self-sustaining.

**Monitoring:** Ongoing. RM 4.2 and 7.6 have been monitored for the last 5 years, and have met survival goals. Both sites have continued to grow over the last two years without supplemental irrigation and have created SRA habitat along the river.

### **Recommendations**

It is recommended that additional sites be evaluated, and implemented. Impacts associated with beaver pruning on riparian woody vegetation require more focused research.

### 6.2.3. Artificial Propagation of Fish

#### ❖ Reference

**FISH Plan Section/Page:** 6/6-20

**FISH Plan Title:** Estimate relative proportion of hatchery and naturally-produced Chinook salmon and steelhead to annual spawning escapement and commercial and sports fisheries to enhance management capabilities.

#### Progress Report

**Evaluation:** Ongoing. CDFG has been planning a Central Valley-wide Constant Fractional Marking (CFM) Program for production releases of fall-run Chinook salmon since 1998. In 2001 and 2002 a pilot CFM program was conducted at Central Valley hatcheries, including the Nimbus Hatchery. An implementation plan was developed in 2004 and a marking/tagging rate of 25% decided in early 2005. The project is included in the 2005 CALFED Ecosystem Restoration Program Workplan. The California Bay Delta Authority is expected to finally approve the work plan for funding in September 2005.

**Implementation:** Not started. Full program implementation (marking/tagging of fall-run production releases) is expected to start when funding is approved.

**Monitoring:** Not started.

#### Recommendations

It is recommended that the CFM Program be funded and implemented as a FISH Plan priority 1.

#### ❖ Reference

**FISH Plan Section/Page:** 7/6-21

**FISH Plan Title:** Undertake long-term modifications of the diversion structure at the Nimbus Salmon and Steelhead Hatchery to protect salmon and steelhead and other lower American River resources from potential impacts associated with flow fluctuations for operations and maintenance.

#### Progress Report

**Evaluation:** Ongoing. Reclamation has been evaluating alternatives for replacing the existing diversion structure, including three configurations of fish ladders to the Nimbus stilling basin with removal of the existing structure and two configurations of a concrete structure across the river in the vicinity of the existing structure. Reclamation plans to decide on a proposed action late in 2005 and then issue a draft environmental assessment for public review and comment.

**Implementation:** Not started. Reclamation plans to initiate construction in 2007 or 2008.

**Monitoring:** Not applicable.

## **Recommendations**

Several other projects in the area are contingent upon Reclamation's decision regarding the existing diversion structure; there it is recommended that Reclamation expedite selecting a proposed action and completing the environmental review and design activities.

### **6.2.4. Stranding**

#### ❖ **Reference**

**FISH Plan Section/Page:** 8/6-22

**FISH Plan Title:** Complete the inventory of areas that pose a stranding threat to juvenile salmonids. Conduct function analysis workshop to identify measures to reduce or eliminate stranding. Implement measures where appropriate opportunities exist.

#### **Progress Report**

**Evaluation:** Ongoing. CDFG identified stranding and isolation areas in its "Evaluation of Effects of Flow Fluctuations on the Anadromous Fish Populations in the Lower American River" report published in 2001. Reclamation, and others, sponsored a Lower American River Flow Fluctuation Function Analysis Workshop in 2002, and a variety of operational and physical solutions were recommended. Through ongoing monitoring, several problematic areas were identified that lent themselves to physical solutions, including one at a side channel at Lower Sunrise and one an isolation pool below the Sunrise Boulevard Bridge.

**Implementation:** Ongoing. Measures to correct stranding and isolation problems include both operational changes and physical modifications to the riverbed. In recent years, Reclamation has been modifying its historic operations to minimize flow fluctuations that can lead to the stranding and isolation of juvenile salmonids. Until 2004, other than identifying problem locations, little had been done to implement physical solutions. Two physical modification projects are now in the planning phase: the Lower Sunrise Side Channel Project and the Sunrise Isolation Pool Project. In 2004, the CDFG, the Water Forum, and SAFCA, with the assistance of other agencies, initiated a project to physically modify the Lower Sunrise Side Channel to prevent it from becoming dewatered at flows that might typically occur during the time of steelhead spawning and incubation. The Water Forum has funded initial studies, and in coordination with CDFG and SAFCA, is seeking a grant to design and construct the side channel modification from the Anadromous Fish Restoration Program. Additionally, in cooperation with several agencies, the Water Forum designed a channel to connect the Sunrise Isolation Pool to the main river at lower river flows. Construction of this pilot project, by volunteers, is planned for fall 2005.

**Monitoring:** Ongoing. CDFG will be monitoring the effectiveness of the channel constructed at the Sunrise Isolation Pool. CDFG and Reclamation will continue to monitor stranding and isolation events as part of their ongoing monitoring programs.

## **Recommendations**

It is recommended that the stranding and isolation areas identified in the 2001 report be systematically evaluated for potential of implementing physical solutions, and that Reclamation

continue to implement operational solutions to minimize stranding and isolation of juvenile salmonids. Also, the Water Forum, SAFCA, CDFG, and other agencies are encouraged to expeditiously pursue funding for the Lower Sunrise Side Channel Project and to complete the Sunrise Isolation Pool Project.

## 6.2.5. Other Potential Management Actions

### ❖ Reference

**FISH Plan Section/Page:** 9/6-22

**FISH Plan Title:** Identify the fishery impacts on lower American River priority species caused by meeting Sacramento-San Joaquin River Delta Water Quality Control Plan (WQCP) requirements and needs from Folsom Reservoir.

**Summary Description:** Because of the close proximity of Folsom Dam and Reservoir to the Delta, releases from Folsom Dam are commonly relied upon to meet Delta standards in lieu of releases from more distant reservoirs or reductions in Delta exports. This FISH Plan item identifies, and bring to the attention of the CALFED Operations Group, and the SWRCB, the fishery impacts on lower American River priority species resulting from meeting water quality standards and needs from Folsom Reservoir. The FISH Plan calls for the following components to be included in the evaluation: Reclamation's criteria for balancing releases from Folsom and Shasta Reservoirs, focusing on year-round implications of spring time releases; documentation of historical and recent operational decisions related to Folsom releases to meet Delta standards, including resource implications such as fluctuating flows, temperature shutter changes, and loss of cold water; and a qualitative assessment of fishery impacts. The evaluation would be included in a report to the CALFED Operations Group and the SWRCB.

### Progress Report

**Evaluation:** Completed. The Water Forum completed an analysis and a draft report of the impacts on the lower American River salmonid fisheries of Reclamation meeting Delta water quality standards as it did in 2001 through 2004 (Impacts on Lower American River Salmonids and Recommendations Associated with Folsom Reservoir Operations to Meet Delta Water Quality Objectives and Demands, December 2004).

**Implementation:** Completed. The draft report was sent to the SWRCB and the CALFED Operations Group.

**Monitoring:** Not Applicable.

### Discussion

Although the draft report was not prepared in final, nor did it include an evaluation of long-term historical operations or Reclamation criteria for balancing the operations of Folsom and Shasta, it did present the point that meeting Delta water quality requirements and needs has a major effect on the protection of salmonids in the lower American River.

### **Recommendations**

It is recommended that this action be considered complete, unless further issues are raised during current or future periodic reviews of the Delta standards. Reclamation's operations to meet Delta standards should be continually monitored through the American River Operations Work Group, or its successor. If meeting Delta standards continues to have adverse impacts on lower American River salmonids, or if new issues arise, this issue needs further review.

### ❖ **Reference**

**FISH Plan Section/Page:** 10/6-23

**FISH Plan Title:** Improve availability and management of lower American River research data, with attention to quality control.

**Summary Description:** Storage of existing lower American River data is scattered among various organizations. This activity would consolidate databases and/or make it common knowledge what data is available and where it can be accessed.

### **Progress Report**

**Evaluation:** Not started.

**Implementation:** Not started.

**Monitoring:** Not started.

### **Recommendations**

It is recommended that this effort be changed to a 2<sup>nd</sup> priority. It could be addressed in the monitoring portion of the update of the lower American River flow standard (Section 6.2.1).

## **6.2.6 Monitoring**

### ❖ **Reference**

**FISH Plan Section/Page:** A/6-24

**FISH Plan Title:** To improve management capabilities, determine the relative contribution of fall-run Chinook salmon that leave the lower American River early as post emergent fry to the lower American River spawning stock escapement.

**Summary Description:** Based on recent monitoring, the vast majority of young Chinook salmon leave the river within a few weeks of emergence. However, it is not known what the contribution of the early emigrating fish contribute to the returning adults relative to the juveniles that remain in the river and leave as smolts. This information is paramount to making decisions on operations that affect the different life stages of the fish.

### **Progress Report**

**Evaluation:** Not started.

**Implementation:** Not started.

**Monitoring:** Not started.

### **Discussion**

The best method for distinguishing between fish that leave the system as fry versus those that leave as smolts has yet to be determined. One method might be to examine otolith characteristics, however the method needs to be tested to determine whether it would work.

### **Recommendations**

It is recommended that a study be conducted to determine if fish that leave the system as fry can be distinguished from those that leave as smolts by examining otolith characteristics, as a FISH Plan priority 1.

### ❖ **Reference**

**FISH Plan Section/Page:** B/6-24

**FISH Plan Title:** Investigate temporal and spatial distribution of steelhead in the lower American River to strengthen the information base for management decisions.

### **Progress Report**

**Evaluation:** Not applicable.

**Implementation:** Ongoing. CDFG has been monitoring the spatial and temporal distribution of steelhead in the lower American River in summer and through fall since 2001, in accordance with the recommendations in the FISH Plan. Recently this has required supplemental financial support from Reclamation and the Water Forum.

**Monitoring:** Not applicable.

### **Recommendations**

It is recommended that CDFG continue its monitoring of steelhead spatial and temporal distribution in the lower American River. Short and long-term funding for this activity needs to be established as a FISH Plan priority 1. Possible funding sources are through the Flow Management Standard process (item 6.2.1), or in conjunction with Reclamation's monitoring obligations.

### ❖ **Reference**

**FISH Plan Section/Page:** C/6-24

**FISH Plan Title:** Use best available information (or develop new information as needed) to cost-effectively create a multi-point lower American River water temperature predicting and estimating model with shorter timesteps to strengthen adaptive management capabilities.

**Summary Description:** When the FISH Plan was developed, Reclamation used a monthly temperature model for the lower American River. This action is to have Reclamation upgrade its

model to a daily temperature model. Included in this action is to correct the Fair Oaks temperature gauge, review the Lake Natoma thermal profiles, and assess the Lake Natoma temperature modeling results.

**Progress Report**

**Evaluation:** Not applicable.

**Implementation:** Ongoing. Since the development of the FISH Plan, Reclamation has developed a model with a one-week timestep, and plans to develop one with a daily timestep, pending funding. The Fair Oaks temperature gauge has been replaced with one at Hazel Avenue, the Lake Natoma thermal profiles have been reviewed and the Lake Natoma temperature modeling results are being assessed as part of sections 6.2.3.3.1 and 6.2.3.3.2.

**Monitoring:** Not applicable.

**Recommendations**

It is recommended that Reclamation continue to pursue funding and develop a model with a daily timestep, and to complete assessing the Lake Natoma temperature modeling results as part of sections 6.2.3.3.1 and 6.2.3.3.2.

**6.3. Second Priority Actions**

**6.3.1. Aquatic, Riparian and Wetland Habitat**

❖ **Reference**

**FISH Plan Section/Page:** 11/6-25

**FISH Plan Title:** Identify and evaluate opportunities to implement wetland/slough complex restoration, with needs of all priority species in mind.

**Progress Report**

**Evaluation:** Ongoing. Through the American River Parkway Plan Update Process, three sites have been investigated including, Woodlake, Bushy Lake, and the Gardenland/Urrutia property. It was noted that Woodlake might be a possible candidate for a slough complex or wetland that would filter out drainage water from pumps 151 and 152. Bushy Lake may also be a candidate for this type of enhancement as well.

**Implementation:** Ongoing. Design for the Gardenland/Urrutia property is underway. SAFCA and Sacramento County intend to submit a proposal for this project to the California River Parkways Grant Program (Proposition 50).

**Monitoring:** Not applicable.

**Recommendations**

It is recommended to continue developing ideas on how to enhance these areas in the parkway.

❖ **Reference**

**FISH Plan Section/Page:** 12/6-26

**FISH Plan Title:** Inventory locations for creating shallow inundated floodplain habitat for multi-species benefits and implement where suitable opportunities are available. Protect existing overflow areas.

**Summary Description:** This activity includes inventory, protecting existing overflow areas, and restoring suitable areas.

**Progress Report**

**Evaluation:** Ongoing. Extensive planning, design, and coordination with resource agencies has occurred for a major floodplain habitat enhancement opportunity at RM 0.5

**Implementation:** Not started. Construction of habitat enhancement at RM 0.5 may occur in 2006.

**Monitoring:** Not started. As needed, baseline monitoring will be done prior to construction and monitoring will continue after construction.

**Recommendations**

It is recommended that this activity remain in the FISH Plan as priority 2.

❖ **Reference**

**FISH Plan Section/Page:** 13/6-26

**FISH Plan Title:** Identify opportunities to, and potential benefits and detriments of, enhancing or constructing mainstem and side channel habitats that provide fall-run Chinook salmon and steelhead spawning and rearing habitat, and implement measures where suitable opportunities are available.

**Progress Report**

**Evaluation:** Ongoing. Although a systematic inventory has not been conducted, three locations where new side channel development may be desirable have been identified. The proposed sites are at Nimbus Shoals, Sailor Bar and the bar at lower Sunrise (this is separate of the project described in Section 6.2.6.2.4.8). CDFG wishes to use the lower Sunrise site for a project that will serve as a guidepost for future side-channel projects. If that project is successful relative to its stated objectives, then the techniques could be applied elsewhere to measurably improve salmonid production.

**Implementation:** Not started. The Water Forum and CDFG intend to submit a proposal for the lower Sunrise project to the Anadromous Fish Restoration Program for funding in FY 2006.

**Monitoring:** Not applicable.

### **Recommendations**

It is recommended that the project at lower Sunrise be pursued, and that the river be systematically inventoried for other opportunities if the lower Sunrise pilot project produces good results.

### **6.3.3. Harvest of Fish and Wildlife**

#### ❖ **Reference**

**FISH Plan Section/Page:** 14/6-27

**FISH Plan Title:** To assist in protecting and enhancing natural production of lower American River salmonids, develop and implement a marking and selective harvest program for lower American River Chinook salmon and steelhead, ideally in the context of a Central Valley-wide effort.

#### **Progress Report**

**Evaluation:** Not applicable.

**Implementation:** Ongoing. All hatchery-produced Central Valley steelhead are currently adipose-fin clipped and therefore identifiable as being of hatchery origin. Wild steelhead are by default marked by being unclipped. Current regulations only allow harvest of clipped steelhead so selective sport fishery is in place. Only a variable fraction of Central Valley Chinook salmon are clipped and coded-wire tagged, and there is no selective fishery.

**Monitoring:** Ongoing. Steelhead returning to the Nimbus Hatchery are monitored as to whether they are fin clipped, or not. None of the sport fishery is currently monitored, but a new DFG creel survey program will be implemented in 2006.

#### **Discussion**

A selective fishery for Chinook salmon will require external tag of all hatchery fish.

### **Recommendations**

It is recommended to continue the ongoing monitoring program and implement the CFM program (see page 18).

### **6.3.4. Other Potential Management Actions**

#### ❖ **Reference**

**FISH Plan Section/Page:** 15/6-28

**FISH Plan Title:** Continue to provide ongoing long-term consultation/technical assistance to LAR Task Force, its component committees, and responsible agencies for lower American River management.

**Summary Description:** The activity includes the establishment of a management team, similar to, or the same as, the American River Operations Work Group.

### **Progress Report**

**Evaluation:** Not applicable.

**Implementation:** Ongoing. The American River Operations Work Group continues to convene and provide consultation and technical assistance regarding Reclamation's operations on the American River.

**Monitoring:** Not applicable.

### **Discussion**

The American River Operations Work Group has been very effective in providing its recommendation regarding the operation of Folsom and Nimbus Dams. The plan for revising the flow standard (section 6.2.1) includes establishing the American River Operations Work Group as the primary forum for adaptive management. Since development of the FISH Plan, the Water Forum envisions the establishment of a "River Management Group" that would supercede the American River Operations Work Group.

### **Recommendations**

It is recommended that this activity continue and that the American River Operations Work Group, or its successor, continue to meet and to provide recommendations regarding the operation of Folsom and Nimbus Dams; and that the priority be raised to 1<sup>st</sup>.

## **6.3.5. Coarse Sediment Supply**

### **❖ Reference**

**FISH Plan Section/Page:** 16/6-28

**FISH Plan Title:** Develop a collaborative program to investigate erosion, bedload movement, sediment transport, and depositional processes and their relationship to the formation and maintenance of fish habitat in the lower American River.

### **Progress Report**

**Evaluation:** Not applicable.

**Implementation:** Ongoing. Although a formal collaborative program has not been developed, agency and academic experts in the field have been coordinating ad hoc efforts to understand these processes. Organizations have included CDFG, NOAA Fisheries, USFWS, Reclamation, CSUS, UC Davis, and others. In June 2005 a workshop was held to explore ways to improve aquatic habitat in the reach of river between Nimbus Dam and Sailor Bar, and a large portion of the discussion was in regard to these processes. A follow-up meeting on the subject is scheduled for September 2005. In addition, California State University, Sacramento has recently received a contract to develop a gravel budget for the LAR, and that effort will include coordination with Federal, State and Local agencies. Tasks associated with developing this gravel budget include collaboration with agency personnel, review of existing data sets and air photos, field mapping,

and a gravel mobility study. Although these ad hoc efforts have been very useful, they have not resulted in a comprehensive program.

**Monitoring:** Not Applicable.

### **Recommendations**

It is recommended that the various coordination efforts be consolidated, and enhanced, into a more formal collaborative program among the organizations described above, and that program be documented.

#### ❖ **Reference**

**FISH Plan Section/Page:** 17/6-29

**FISH Plan Title:** Assess the need to develop a spawning gravel monitoring and management program for steelhead and fall-run Chinook salmon in which intervention would be based on identification of specific sites where intervention would enhance or increase salmonid spawning habitat.

### **Progress Report**

**Evaluation:** Ongoing. Although a formal comprehensive assessment has not been conducted, some activities have been started. One of the products of the recently awarded contract with California State University, Sacramento is to identify locations where intervention would increase or enhance salmonid spawning habitat.

**Implementation:** Ongoing.

**Monitoring:** Not applicable.

### **Recommendations**

It is recommended that a comprehensive assessment be conducted building upon the collaborative effort described in item 6.3.5.16: the work of the California State University, Sacramento, the Nimbus Dam to Sailor Bar gravel activities, and other such efforts. The first step should be to identify what information is needed.

## **6.3.6. Artificial Propagation of Fish**

#### ❖ **Reference**

**FISH Plan Section/Page:** 18/6-30

**FISH Plan Title:** Evaluate Nimbus Salmon and Steelhead Hatchery production and stocking practices to identify measures that would promote restoration of native fish species in the lower American River.

### **Progress Report**

**Evaluation:** Not started.

**Implementation:** Not applicable.

**Monitoring:** Not applicable.

### **Discussion**

Although this item of the FISH Plan has not started, several other activities have been or will be underway to address the issue. The CDFG prepared "Production Goals and Constraints" which were approved by NMFS. Production goals are 4 million Chinook salmon smolts and 430 thousand steelhead yearlings per year. CDFG and NMFS prepared a Final Report on Anadromous Salmonid Fish Hatcheries in California (December 3, 2001) that includes recommendations for operating the Nimbus Hatchery. CDFG expects to complete a genetic management plan, required by NMFS, by 2007. Reclamation is in the early planning stages of consulting with NMFS regarding the operation of the Nimbus Hatchery, pursuant to the federal Endangered Species Act (ESA). The consultation will evaluate the affects of the hatchery operations on wild stocks of fall-run Chinook salmon and steelhead, and will provide recommendations to minimize any adverse effects.

### **Recommendations**

It is recommended that CDFG continue to conform to its production goals and constraints and complete the genetic management plan; and that Reclamation and NMFS complete the ESA consultation. Change to a 1<sup>st</sup> priority.

## **6.3.7. Other Potential Restoration Activities**

### ❖ **Reference**

**FISH Plan Section/Page:** 19/6-32

**FISH Plan Title:** Assess feasibility of providing enhanced off-site steelhead habitat (e.g. Coon Creek, Dry Creek, Auburn Ravine).

### **Progress Report**

**Evaluation:** Not started.

**Implementation:** Not applicable

**Monitoring:** Not applicable

### **Recommendations**

It is recommended that this item be removed from the FISH Plan because it does not affect the lower American River.

### 6.3.8. Monitoring and Evaluation Components

❖ **Reference**

**FISH Plan Section/Page:** D/6-32

**FISH Plan Title:** Develop and implement a method of estimating annual steelhead in-river spawning population and population trends to assist in management decision-making.

**Progress Report**

**Evaluation:** Completed. In 2003, Reclamation developed a methodology.

**Implementation:** Ongoing. Since 2003 Reclamation has used the methodology to quantify the number of in-river steelhead, and the number of steelhead redds. Annual reports have been published.

**Monitoring:** Ongoing.

**Recommendations**

It is recommended that the monitoring be continued indefinitely as a FISH Plan priority 2.

❖ **Reference**

**FISH Plan Section/Page:** E/6-32

**FISH Plan Title:** Develop an in-river production model for fall-run Chinook salmon to assist in understanding factors critical to the well-being of this species

**Progress Report**

**Evaluation:** Not applicable

**Implementation:** Ongoing. CDFG have been assembling juvenile Chinook salmon production estimates from the screw trap data, and have been developing escapement estimates. These data are basic components for an in-river production model. CDFG has generated some simple models relating the “survival,” or “production” index to flow variation, maximum flow, and other parameters during key phases of the early life history. Preliminary work has indicated that flow may be an important factor during key phases of early life history.

**Monitoring:** Ongoing. See above.

**Recommendations**

It is recommended that CDFG continue to further develop an in-river production model, especially in regard to flow during key stages of the early life history. A next step might be to develop a conceptual framework to identify what other factors may be important.

❖ **Reference**

**FISH Plan Section/Page:** F/6-33

**FISH Plan Title:** Develop a juvenile steelhead over-summer model to assist in understanding factors critical to the well-being of this species.

**Progress Report**

**Evaluation:** Not applicable.

**Implementation:** Ongoing. CDFG has been studying over-summering steelhead in the lower American River since 2001, which has provided a good body of information toward achieving the objective. The studies have included the special distribution of steelhead, growth patterns, temperature, and mobility. CDFG has developed a draft model in regard to temperature.

**Monitoring:** Ongoing. See above.

**Discussion**

DFG intends to formally summarize the four years of over-summering steelhead work, especially with regard to temperature. Physical habitat availability as a function of flow has emerged as an important factor, as evidenced in the fall of 2004, when flows were reduced from 1,500 cfs to 1,000 cfs, and rosy anus became more problematic with increased water temperature and crowding. CDFG will collaborate with U.C. Santa Cruz and the NMFS Santa Cruz Laboratory to study the effects of flow on steelhead prey availability/energetics. Predation has not been addressed, and CDFG suspects that it may be a limiting factor on juvenile steelhead production.

**Recommendations**

It is recommended that CDFG continue its over-summering steelhead work and complete its summary of the first four years of effort, and follow through with its plans to collaborate with U.C. Santa Cruz and the NMFS Santa Cruz Laboratory. In addition, it is recommended that the predation influences over steelhead production be investigated.

❖ **Reference**

**FISH Plan Section/Page:** G/6-33

**FISH Plan Title:** Develop a stock-recruitment model for fall-run Chinook salmon to guide management decision-making..

**Progress Report**

**Evaluation:** Not Applicable.

**Implementation:** Ongoing. Work related to this item is being done in conjunction with item 6.3.8.E.

**Monitoring:** Ongoing. See above

**Recommendations**

Because this item of the FISH Plan builds up item 6.3.8.E, it is recommended that this item be combined into 6.3.8.E.

## 6.4. Third Priority Actions

### 6.4.1. Aquatic, Riparian, and Wetland Habitat

#### ❖ Reference

**FISH Plan Section/Page:** 20/6-34

**FISH Plan Title:** Identify and characterize opportunities to improve the complexity and diversity of aquatic habitats in the lower American River, and implement measures where suitable opportunities are available.

**Summary Description:** This project is to build upon the habitat characterization of the lower American River conducted by CDFG in the early 1990's.

#### Progress Report

**Evaluation:** Not started. Although a comprehensive study has not started, some site specific evaluations have been conducted associated with flood control projects along the river. Evaluations have included RM 0.5, and a preliminary evaluation of Woodlake by the COE.

**Implementation:** Ongoing. Several site-specific projects have been or are planned to be implemented, including the one that SAFCA has identified to create seasonally inundated floodplain habitat at RM 0.5. The plans and specifications are nearing sixty percent completion. Construction of this enhancement could occur in 2006.

**Monitoring:** Ongoing. The projects being implemented have an associated monitoring plan.

#### Recommendations

It is recommended that other opportunities be explored as they arise as priority 3.

#### ❖ Reference

**Fish Plan Section/Page:** 21/6-34

**Fish Plan Title:** Identify and evaluate suitable locations and benefits of establishing/providing SRA habitat along the lower American River to benefit priority fish species, and implement measures where appropriate opportunities exist.

#### Progress Report

**Evaluation:** Although a comprehensive study has not started, some site specific evaluations have been conducted associated with flood control projects along the river. An evaluation has been completed at RM 0.5 to investigate opportunities to create a series of seasonally inundated benches to establish low floodplain habitat and associated riparian upland. Additional sites under investigation (specific evaluations have not occurred) have been identified along the south bank of the LAR in the vicinity of Sutter's Landing Park and the river edge of the Gardenland property.

**Implementation:** Ongoing. SAFCA is working with its federal and state flood control partners to implement a project at RM 0.5 in 2006.

**Monitoring:** Ongoing. The projects once implemented will have an associated monitoring plan.

**Recommendations**

It is recommended that as resources permit, a systematic evaluation should be completed with and emphasis on reaches 1 and 3 of the LAR.

❖ **Reference**

**FISH Plan Section/Page:** 22/6-35

**FISH Plan Title:** Identify and evaluate suitable locations to use large in-stream objects (e.g., boulders) to modify flow dynamics to increase cover and diversity of in-stream habitat for priority fish species. Implement measures where suitable opportunities are available.

**Progress Report**

**Evaluation:** Ongoing. Although a comprehensive evaluation has not been started, one site at RM 0.5 has been identified.

**Implementation:** Ongoing. Design for RM 0.5 is in process.

**Monitoring:** Not started.

**Recommendations**

It is recommended to implement pilot projects as opportunities arise as priority 3.

❖ **Reference**

**FISH Plan Section/Page:** 23/6-36

**FISH Plan Title:** Identify and evaluate suitable locations to establish/provide wetland filtration habitat on inflow point source discharges; create such habitat if suitable opportunities can be identified.

**Progress Report**

**Evaluation:** Ongoing. An evaluation is underway by MIG, Inc. as part of the Integrated Area Plan associated with the American River Parkway Plan Update. Three sites have been identified where wetlands could be developed or enhanced using urban runoff resulting in improved water quality of the runoff. The water sources and locations are: Chicken and Strong Ranch Slough at Bushy Lake, Sump 152 west of Bushy Lake, and Sump 151 near the Woodlake area.

**Implementation:** Not started.

**Monitoring:** Not started.

**Recommendations**

It is recommended that the evaluation be completed and the results implemented and the FISH Plan priority raised to second.

## 6.4.2. Contaminants

### ❖ Reference

**FISH Plan Section/Page:** 24/6-37

**FISH Plan Title:** Develop Collaborative Guidelines to Reduce the Application of Toxins on Lands that Have the Greatest Risk to Fish Populations, Where Possible.

### Progress Report

**Evaluation:** Not started

**Implementation:** Not applicable.

**Monitoring:** Not applicable.

### Discussion

Although development of comprehensive guidelines has not started, some activities are underway to reduce the inflow of toxins into the lower American River. The Central Valley Regional Water Quality Control Board has required, as part of its permit conditions, that the County Department of Water Resources study the feasibility of diverting dry season discharge from Chicken Slough and Strong Ranch Slough into the sewer system for treatment. The County is currently conducting this study or will begin it shortly, due in 2006. In addition, SAFCA has requested that the County study the feasibility of using the COE's proposed treatment wetlands at Cal Expo as an alternative means of improving water quality from these two urban watersheds prior to discharge into the Lower American River.

### Recommendations

It is recommended that the project remain in the FISH Plan as priority 3.

## 6.4.3. Harvest of Fish and Wildlife

### ❖ Reference

**FISH Plan Section/Page:** 25/6-37

**FISH Plan Title:** To assist with management decision-making, ascertain whether in-river illegal harvest of fall-run Chinook salmon and steelhead is acting as a stressor on those species in the lower American River.

### Progress Report

**Evaluation:** Completed. CDFG (Gary Hobgood) believes that with the present level of law enforcement, illegal harvest of Chinook salmon and steelhead is not of sufficient magnitude to act as a stressor on the populations of those species in the lower American River.

**Implementation:** Not applicable.

**Monitoring:** Not applicable.

### **Recommendations**

It is recommended that CDFG continue to enforce the regulations along the lower American River and to monitor whether illegal harvest becomes a significant stressor in the future.

## **6.4.4. Artificial Propagation of Fish**

### **❖ Reference**

**FISH Plan Section/Page:** 26/6-38

**FISH Plan Title:** Evaluate alternative ways for addressing temperature-related issues at the Nimbus and American River Fish Hatcheries that would not jeopardize the needs of instream spawning fall-run Chinook salmon and steelhead.

**Summary Description:** When the FISH Plan was developed, the temperature of water going to the hatchery occasionally became too warm for the fish in the hatchery. There was concern that by releasing colder water from Folsom Reservoir in the summer for purposes of the hatchery, it would deplete the cold water pool and there would not be sufficient cold water for spawning fall-run Chinook salmon and steelhead later in the year.

### **Progress Report**

**Evaluation:** Not applicable.

**Implementation:** Not applicable.

**Monitoring:** Ongoing. Water temperatures at the hatchery are monitored on a continuous basis.

### **Discussion**

Since the time the FISH Plan was developed, Reclamation has released cooler water to Lake Natoma for protection of in-river salmon and steelhead. As the water supply intake for the hatchery is located in Lake Natoma, the hatchery is receiving water at a temperature that is equivalent to what is released into the lower American River. The temperature of the water presently going to the hatchery meets temperature criteria for its efficient and effective operation.

### **Recommendations**

It is recommended that Reclamation continue to release water at a temperature that is protective of in-river salmonids, which is also protective of salmonids being collected, spawned, incubated, and reared in the hatchery.

## 6.4.5. Other Potential Management Actions

### ❖ Reference

**FISH Plan Section/Page:** 27/6-39

**FISH Plan Title:** Coordinate the permitting process for lower American River restoration actions through the River Corridor Management Plan, where possible.

### Progress Report

**Evaluation:** Not applicable.

**Implementation:** Ongoing.

**Monitoring:** Not applicable.

### Discussion

Although this activity is a 3<sup>rd</sup> priority, the coordination has been taking place through the Lower American River Task Force with very good results.

### Recommendations

It is recommended that this activity continue and that its priority be raised to 1.

### ❖ Reference

**FISH Plan Section/Page:** 28/6-39

**FISH Plan Title:** Conduct habitat suitability assessment for steelhead in the mile below Folsom Dam in Lake Natoma.

**Summary Description:** The assessment is specifically for where Chinook salmon and steelhead spawning habitat could be restored.

### Progress Report

**Evaluation:** Completed. The Department of Water Resources and Reclamation conducted the assessments (Department of Water Resources, Preliminary Analysis, Natural Fish Bypass Channel, Lake Natoma, June 2002), and Reclamation (e-mail from Brian Deason, March 17, 2005). The area was not found suitable for restoring Chinook salmon and steelhead spawning habitat.

**Implementation:** Not applicable.

**Monitoring:** Not applicable.

### Recommendations

Since the evaluation is complete and no habitat suitable for restoration was identified, it is recommended that this item be documented and eliminated from the FISH Plan.

## 6.4.6. Monitoring and Evaluation Components

### ❖ Reference

**FISH Plan Section/Page:** H/6-40

**FISH Plan Title:** Use existing aerial photographs as a baseline for monitoring activities requiring positional accuracy.

**Summary Description:** In addition to using existing aerial photographs, the project includes additional aerial photography at differing flow rates.

### Progress Report

**Evaluation:** Not applicable.

**Implementation:** Ongoing. Existing aerial photographs are being used as applicable and additional aerial photographs have been taken on a project specific basis, however a comprehensive set of aerial photographs at differing flow rates have not been taken.

**Monitoring:** Not applicable.

### Recommendations

Since a need for a comprehensive set of aerial photographs at differing flow rates has not been identified, it is recommended that existing aerial photographs continue to be used as applicable and that additional aerial photographs be taken as needed on a case-by-case basis.

### ❖ Reference

**FISH Plan Section/Page:** I/6-41

**FISH Plan Title:** Evaluate efficacy of installing and operating a fish counting weir to improve estimates of: (1) spawning stock escapement; and (2) juvenile outmigrant populations.

### Progress Report

**Evaluation:** Not started.

**Implementation:** Not applicable.

**Monitoring:** Not applicable.

### Recommendations

It is recommended that this item remain in the FISH Plan as priority 3.