



## Memorandum

Date: April 14, 1997  
To: Lower American River Technical Team Participants  
From: Cindy Darling *Cindy*  
Subject: Draft Report

Enclosed is the draft report from the technical team meeting held on March 13, 1997. I would appreciate any comments you have on the report by April 28. It will be easiest for us, if you mark any changes directly on the text. Please send your comments directly to Scott Wilcox at EA Engineering, Science and Technology at 3841 N. Freeway Boulevard, Suite 145, Sacramento, CA 95834 or via e-mail to Scott at [sdw@eaest.com](mailto:sdw@eaest.com) and me at [cdarling@water.ca.gov](mailto:cdarling@water.ca.gov).

This report, along with reports from the Sacramento River, North Bay, San Joaquin River, Delta, Suisun and Eastside Tributaries, and Water Quality technical teams will be integrated by the umbrella team so that proposals can be solicited starting in mid-May. All participants in the technical teams will be provided with a copy of the package soliciting applications for funding. This package will include the criteria used to evaluate the applications, the format for the applications, and instructions on how and when to submit them. We anticipate that applications will be due 5 to 6 weeks after the package is mailed out. If you know of any other parties who may be interested in submitting an application, have them mail us a brief letter with their name and address indicating that they want a copy of the package and we will add them to the mailing list.

I appreciate all of your time and efforts. If you have any questions or comments, please call me at (916) 653-5950 or via e-mail at [cdarling@water.ca.gov](mailto:cdarling@water.ca.gov).

Enclosure

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**CALFED Agencies**

**California**

The Resources Agency  
Department of Fish and Game  
Department of Water Resources  
California Environmental Protection Agency  
State Water Resources Control Board

**Federal**

Environmental Protection Agency  
Department of the Interior  
Fish and Wildlife Service  
Bureau of Reclamation  
Department of Commerce  
National Marine Fisheries Service

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**CALFED BAY-DELTA PROGRAM**

**AMERICAN RIVER**

**TECHNICAL TEAM MEETING REPORT**

*Prepared for*

**CALFED Bay-Delta Program**

**Ecosystem Roundtable**

**Water Forum**

**Lower American River Task Force**

**4 April, 1997**

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## 1. INTRODUCTION

The American River Technical Team meeting was held at the City of Sacramento Department of Utilities on March 13, 1997, and was jointly sponsored by the following organizations:

- CALFED Bay-Delta Program
- Water Forum
- Lower American River Task Force

A list of participants is included in Appendix A. A copy of the agenda and material provided to participants before the meeting is included in Appendix B.

The meeting began with a review of meeting ground rules and organization, provided by Eugenia Laychak from the California Center for Public Dispute Resolution. Eugenia served as the meeting facilitator, and helped ensure that the meeting objectives were met and that a clear set of decisions were made.

Cindy Darling gave a presentation on the CALFED Bay-Delta Program, including the specific objectives of the technical team meeting. The objective of the meeting was to bring together the best available technical knowledge and wisdom to help restore the fisheries resources and riparian habitat of the lower American River. The meeting focused only on the reaches of the American River from Nimbus Dam downstream to its confluence with the Sacramento River. The main topics of the meeting were: 1) identification of the stressors impacting the habitats and resources; and 2) types of specific action plans that can reasonably be expected to have near-term beneficial effects on the resources. It is understood that adaptive management planning will be the underlying strategic approach to all proposed actions, because nearly all technical experts involved in this planning process acknowledge scientific uncertainty associated with restoration of the fisheries and habitats, and there will be a need to change actions or approaches to solving problems as new information becomes available.

The larger programmatic goals driving this process are:

- The Anadromous Fish Restoration Program (AFRP) goal to make all reasonable efforts to double the run sizes of anadromous species; and
- The CALFED Bay-Delta Ecosystem Restoration Program plan to use natural processes that improve the ecosystem over the next 30-50 years.

The specific goals of the technical team meeting are focused on restoration actions that can be initiated in the near-term, specifically, the next three to five years. Longer term proposed projects and actions will be covered in other venues. This meeting of technical experts is

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intended to provide CALFED, the Water Forum, and the Lower American River Task Force with important input on what the technical experts believe are the most important near-term restoration actions to implement.

Available funding is sufficient to support a wide range of good projects. Available funding includes:

- \$60 million in Proposition 204 Category III funding
- \$10 million from the Metropolitan Water District for Category III projects
- \$143 million in President Clinton's FY-1998 budget

In addition, CALFED is coordinating with other funding sources such as Central Valley Project Improvement Act (CVPIA). The funds in the Category III program are designated for non-flow related ecosystem improvements such as fish screens, habitat restoration, and control of contaminants.

CALFED, in working with the Ecosystem Roundtable team, has identified priority species and habitats including salmon, steelhead, splittail, shaded riverine aquatic habitat and instream aquatic habitat. Other species and habitat types are important, and projects which provide multiple species benefits will be favored. Restoration of priority species and habitats is expected to significantly benefit other species and habitats of special concern.

Jonas Minton provided an overview of the Water Forum membership and objectives. The Water Forum represents a broad coalition of stakeholders representing agriculture, environmental, water districts, local government, and business interests in the Sacramento area working toward a regional water management agreement. It was emphasized that this group has the following "co-equal" objectives to:

- Provide a reliable and safe water supply for the region's economic health and planned development through the year 2030; and
- Preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River.

Tim Washburn provided an overview of the Lower American River Task Force, which is focused on ensuring that the American River flood control system works as designed, but that flood control system operations are integrated with the environmental features of the restoration plan. The task force is supportive of the effort to double the anadromous fish runs in the lower American River. It is recognized that flood control can be consistent with the maintenance of the ecosystem values of the American River Parkway.

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Paul Bratovich gave an overview presentation on the history and status of the American River and its aquatic resources (Appendix C).

## 2. SPECIES

The following four species of fish were considered by the American River technical team.

Steelhead: Steelhead are an important native anadromous fish in the American River watershed. They are very important to recreational fishery interests and are proposed for listing as endangered under the Federal Endangered Species Act.

Chinook Salmon: Chinook salmon in the American River are now limited to a fall-run that spawns below Nimbus Dam. Fall-run provide an important recreational fishery in the lower American River, and contribute to ocean fisheries. Although historically the river supported a spring-run population, that run has been eliminated.

Sacramento Splittail: The Sacramento splittail is proposed for listing as threatened under the Federal Endangered Species Act, and is a species of special concern in California. It is a native species found in the lower American River.

Striped Bass: Striped bass is an important recreational fish species, especially in the lower reaches of the American River near its confluence with the Sacramento River. Though it is not a native species, recreational interest is very high.

## 3. STRESSORS AND LIMITING FACTORS

The discussion of stressors was focused on steelhead and chinook salmon, but also considered splittail and priority habitats. The following is a general discussion of the stressors identified by the group. After identifying the list of stressors, the group identified the relative importance of each stressor on the priority species and habitats. They used a scale of 0 to 3 as follows:

- 0 = little or no impact or importance
- 1 = low impact or importance
- 2 = moderate impact or importance
- 3 = high impact or importance

Table 1 lists a summary of each of the stressors and the rank assigned by the group for the priority species and habitats.

TABLE 1. STRESSORS IN THE AMERICAN RIVER (0 = little or no impact; 1 = low impact; 2 = moderate impact; 3 = high impact; SH = steelhead; CS = chinook salmon)

ERPP Stressor Group	Species				Habitat		Comments
	Steelhead	Chinook Salmon	Sacramento Splittail	Striped Bass	Shaded Riverine Aquatic Habitat	Seasonal Wetland and Aquatic Habitat	
<b>High Water Temperature</b>							
Spawning	0	3					CS - Spawning is delayed until temperatures are below 60°F.
Incubation	1	1					SH - Due to temperatures in March-April.
Rearing	3	2					SH - Due to temperatures in July - September.
<b>Inadequate Flow</b>							
Base flow	3	3			2-3	2-3	Due to insufficient current minimum flow regulatory requirement.
Attraction flow	3	3					
Flow fluctuation (stranding)	3	3	3				Due to physical stranding associated with rapid flow reduction.
<b>Inadequate Spawning Habitat</b>							
Gravel armoring	1	1					Most of area not a problem.
Permeability	1	1					Most of area not a problem.
Gravel recruitment	1-2	1-2					Not a problem within next five years. Gravel is still recruited from the banks. Over long-term, Nimbus Dam preventing recruitment.
Flooded vegetation	N/A	N/A	3				

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TABLE 1. (Continued)

ERPP Stressor Group	Species				Habitat		Comments
	Steelhead	Chinook Salmon	Sacramento Splittail	Striped Bass	Shaded Riverine Aquatic Habitat	Seasonal Wetland and Aquatic Habitat	
<b>Inadequate Rearing Habitat</b>							
Shaded riverine aquatic	2	2					SRA provides important habitat. Some areas have lost SRA and riparian habitat.
Instream cover/woody debris	2	2					SH - Adds habitat complexity.
Floodplain/littoral zone	3	3	3				SH - Problem stems from lack of continuity of side channels with main river channel.
Wetland/sough	3	3	3				SH - Habitat complexity improves survival. Good habitat if connected with main channel.
<b>Water Diversions</b>	2	2					Due to entrainment issue at Fairbairn.
<b>Hatchery Practices</b>							
Behavioral influences	3	3					
Timing selection	3	3					
Genetic dilution	3	3					SH - Dilution due to spawning stock imported from other areas.
Disease	3	3					
<b>Migration Barriers</b>							
Nimbus Dam	3	3					
Folsom Dam	3	2					

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TABLE 1. (Continued)

ERPP Stressor Group	Species				Habitat		Comments
	Steelhead	Chinook Salmon	Sacramento Splittail	Striped Bass	Shaded Riverine Aquatic Habitat	Seasonal Wetland and Aquatic Habitat	
<b>Overharvest</b>							
Sport	1	3					
Commercial	N/A	3					CS - Affects fishery, but addressed by other groups.
Poaching	1	3					Need better enforcement.
<b>Predation</b>	2	2			2		SH - Predation by striped bass; beaver impact on SRA.
<b>Flood Control</b>							
Bank protection	2	2			3		
Lower levee maintenance	0-1	0-1			1	1	Few levees actually along river channel.
Upper channel maintenance	2	2			3		
<b>Channel Morphology</b>							
Change in sediment supply	2	2			3	3	SH - Related to SRA and seasonal wetlands due to lowering of river bed over last 50 years and loss of recruitment of young riparian vegetation.
<b>Water Quality (Non-Temperature)</b>	1	1					May be a problem due to point and non-point sources of pollution. Nitrogen gas super-saturation.
<b>Habitat Management (i.e., fire, etc.)</b>	N/A	N/A			2	2	Fire is problem for riparian vegetation.

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## Flows

Flow, in addition [and related] to temperature, is the most important stressor in the system. Flow concerns include base flow for spawning and rearing, as well as flow fluctuations which can dewater redds and strand fry and juvenile fish. Flow issues are being addressed through cooperative efforts among the U.S. Bureau of Reclamation (USBR), U.S. Fish and Wildlife Service (USFWS), and the California Department of Fish and Game (CDFG).

## Temperature

Temperatures in the lower American River are generally very high in the summer months, even in the deeper pools. Although the vast majority (more than about 95%) of chinook salmon fry leave the river within a few weeks after emergence, steelhead juveniles remain in the system for rearing. Given present limitations on cold water availability in Folsom Reservoir, operations management strives to achieve temperatures less than 70°F for steelhead throughout the summer. Adult fall-run chinook salmon can be found in the lower American River as early as July and August, but do not spawn until temperatures drop below 60°F.

## Gravel Recruitment

The availability of physical spawning habitat does not appear to be an immediate problem because there are adequate amounts of appropriately-sized gravel in the lower American River for spawning. Most spawning takes place in the upper 8 miles of the lower American River. In some areas there is an impermeable clay lens that limits upward percolation of water, which could reduce the viability of the eggs. There is still a large amount of gravel along the banks and in the bars of the lower American River that provides a source of gravel. Although there is not presently a gravel deficit problem, the lack of new gravel recruitment could become a problem in the future.

## Flooded Vegetation

Flooded vegetation can provide splittail spawning habitat. Lack of flooded vegetation is not an issue for salmonid spawning. However, steelhead and chinook salmon can be lost due to stranding if the water recedes too quickly or the backwater areas do not drain into the main channel effectively.

## Rearing Habitat

Shaded riverine aquatic (SRA) habitat provides diverse and complex instream aquatic habitat for juvenile steelhead and chinook salmon: This habitat may be particularly important for juvenile

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steelhead by providing predator escape cover, as their vulnerability to predation may increase during warm summer conditions.

#### Instream Woody Debris

Woody debris provides good instream aquatic habitat, but is routinely removed from the river because of safety concerns. It would be desirable to leave woody debris in the river as aquatic habitat, to the extent feasible.

#### Floodplain/Littoral Zone

Floodplain habitat can provide important rearing habitat and flow velocity refuge for juvenile fish during high flows. Littoral zone areas also provide habitat complexity and diversity which benefits steelhead, chinook salmon, and splittail. However, if these habitat areas are not properly connected to the river, large numbers of fish can be stranded and lost as flows recede to the main channel.

#### Wetland/Sloughs

Wetlands and slough areas increase habitat complexity and diversity, and can improve rearing success. These habitats benefit several aquatic and terrestrial species. The absence of wetlands and sloughs was considered to be a very important stressor.

#### Water Diversions

Two diversions are present in the lower American River. Carmichael Water District uses a Rainey collector, eliminating entrainment. The Fairbairn diversion needs to be evaluated for improvement of the existing fish screens. The potential to entrain juvenile fish at water diversions was identified as a stressor of moderate impact or importance.

#### Hatchery Practices

There is some question about whether the naturally spawning steelhead are indigenous to the American River, due to the influence of hatchery practices. Eggs have been imported from Washington State, Oregon State, and various locations in California. Native steelhead spawning with returning hatchery steelhead may have compromised the genetic integrity of the native run. Additionally, hatchery practices have influenced behavior of the fish, timing of spawning, and have increased the occurrence of disease among the population.

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### Migration Barriers

The dams at Nimbus and Folsom are the most important barriers and the main stressors for steelhead because they block the historic habitat, and the lower river is not currently capable of consistently providing high quality steelhead rearing habitat. These migration barriers were identified as critical stressors of high impact or importance to steelhead.

### Exotics

Exotic plants and animals were not viewed by the technical team as a major stressor.

### Flood Control

Bank protection and channel maintenance issues were considered moderate stressors, mainly for priority habitats such as SRA. Levee maintenance along the lower American River was seen as a minor stressor, because most of the levees in this area are set back from the river bank.

### Sediment Supply

Over the last 50 years many changes have occurred in the amount of gravel transported down the river. Changes in sediment supply are associated with formation of SRA and wetland/slough habitats. Channel morphology and maintenance are problems related to sediment supply, but they are not viewed as the main stressors.

### Water Quality

Water quality issues are related to a number of point and non-point sources of pollution along the lower American River, but available information does not indicate that water quality (other than temperature) is a problem. There has been some concern about nitrogen gas supersaturation based on operation of the hatchery, but this is not seen as a major stressor.

### Harvest by Sport, Commercial and Poaching

There is sport fishery for steelhead in the lower American River. The sport fishery is not considered a greater stressor than poaching. Greater effort by CDFG should be directed to stop poaching. Although the commercial fishery for chinook salmon was identified as an important stressor, it was considered to be beyond the scope of actions in the lower American River.

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## Predation

Predation by striped bass and squawfish was identified as a moderate stressor for steelhead and chinook salmon. The impact of beavers on the riparian forest was considered to be a moderately important stressor.

### **4. PRIORITIZED ACTIONS**

The team discussed the types of actions needed to alleviate the stressors. Twenty-two potential fishery restoration/enhancement actions for the lower American River had been previously identified and distributed to the technical team. The group discussed these as well as other types of actions. Each of the actions are listed in Table 2. Example project descriptions related to these actions can be found in Appendix E.

There was little discussion of action plans for splittail, since it was generally felt that improvements to the lower American River to benefit steelhead and chinook salmon would also benefit splittail. For example, splittail require flooded vegetation for spawning and rearing. Thus, improvements in SRA, floodplain/littoral zone, wetlands/sloughs, and flow fluctuations would benefit splittail.

#### **4.1 Flow Standards**

There was a very strong consensus on the need for the final promulgation of the flow standards. Although projects funded by Category III must be non-flow related, the technical team emphasized the importance of flow standards to any restoration project.

#### **4.2 Flow Fluctuation Criteria**

There is a collaborative effort by the Water Forum, USFWS, CDFG, and USBR to develop flow fluctuation criteria. The technical team placed a very high priority on completing the necessary studies and implementing new flow fluctuation criteria.

#### **4.3 Dry Year Pulse Flow Evaluation**

Many years of study are inconclusive and it seems that the fish do not respond to pulsed flows. Therefore, no action was recommended.

TABLE 2. DRAFT PROJECT LIST (H = high; M = medium; L = low; S = study; P = project).

Actions	Rank	Study or Project	Comments
1. New Flow Standards	H	P	Strong support for promulgating new flow standards.
2. Flow Fluctuation Criteria	H	P	Studies to implement criteria in progress. Need to implement results. Develop operations criteria.
3. Dry Year Pulse Flow Evaluation	N/A	S	Do not pursue. Has been studied for several years.
4. Dry Year Flow Augmentation	H	P	Acquisition of water from PCWA during dry years could provide significant benefit.
5. Roseville Reclamation Pipeline	L	P	Still a conceptual project; can create new wetlands in Folsom, could substitute for diversion from lower American River.
6. Folsom Temperature Control Device (TCD)	H	P	USBR will fund and construct.
7. Folsom Reservoir Cold Water Pool Management	H	P	Need to develop protocols and commit government funding. Being developed and funded as part of P.L. 101-514 (206) implementation.
8. Thermal Refugia Utilization	L	S	Limited opportunities for restoration.
9. Wetland/Slough Complex Restoration	H	S,P	Good sites in lower river. - Cal Expo site (multiple species benefits) - Merinne Trailer Park - Uruttia (122.8 acres) - Camp Pollack Upstream areas need careful evaluation.
10. Instream Cover (Woody Debris)	H	P	Manage woody debris for instream aquatic habitat.
11. Shaded Riverine Aquatic Habitat Protection / Management	H	P	See above comments.
12. Spawning Habitat Management	H	S,P	Currently being addressed through other sources.
13. Flood Control Channel Improvement	H	P	Possibility of working cooperatively with the Corps of Engineers. Needed specific investigation for all sites. Improve existing revetment sites: - 1986 repair site (River Park) - River mile 2.3 - River mile 4 - Downstream of H Street (left bank) - River mile 15 (downstream of A. Hoffman Park) - River mile 8.55
14. Tailrace Habitat Utilization (below Nimbus)	H	S	Need for feasibility study.
15. Fish Screen Improvement (Fairbairn WTP)	L	S,P	Application submitted for CVPIA grant.

TABLE 2. (Continued)

Actions	Rank	Study or Project	Comments
16. Reintroduction of Steelhead Above Folsom Dam	H	S	Evaluate technical feasibility.
17. Identify Off-Site Mitigation	L	S	
18. Mitigation/Enhancement Monitoring Plan	L	S	Given low priority because of other potential funding sources.
19. Consultation/Technical Assistance	L	N/A	Given low priority because of other potential funding sources.
20. Hatchery Temperature Control	H	P	Tied to temperature control at Folsom Dam.
21. Hatchery Management Practices	H	P	High priority to reduce conflicts with natural production. Improve genetic practices.
22. Increase Artificial Production	L	P	Low priority because of the goal of increasing natural spawning and rearing habitat.
23. Angling Regulations	L	N/A	Covered by other agencies.
24. Fire Management	M	P	Enforcement, response time improvements, education of fire people and community. Previous plan implementation (status). Construction of natural fire breaks using wetlands.

#### 4.4 Dry Year Flow Augmentation

It was noted that Placer County Water Agency has water supply opportunities that should be seriously considered for acquisition. Augmentation of flow during dry years could provide significant benefits from both a physical flow and water temperature perspective.

#### 4.5 Roseville Reclamation Pipeline

This proposal is only at the conceptual level now, and there is a need for more study. Impacts are still not known. The group felt that this was a very low priority, in that it is outside the three- to five-year timeframe for project implementation.

#### 4.6 Folsom Dam Temperature Control Device (TCD)

The technical team strongly supported the need for construction of the Folsom Reservoir Temperature Control Device (TCD). The present water intake draws water from the hypolimnion, thereby reducing the volume of cold water in the reservoir available in the fall. A functional TCD would allow increased storage of cold water for release in the warm periods from July through October to benefit chinook salmon and steelhead. The USBR is almost certain to

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fund this project. Thus, the American River technical team places this project as a high priority project, even though additional funding may not be required.

#### 4.7 Folsom Reservoir Cold Water Pool Management

This project proposal is a modeling and evaluation project to develop real-time operational protocols to optimally manage available cold water in Folsom Reservoir. The project was given a high priority rating because of the importance of managing a limited amount of cold water, especially in dry (i.e., warm) years.

#### 4.8 Thermal Refugia Utilization

This project was given a low rating due to a lack of information and the lack of opportunity for restoration actions for this type of habitat.

#### 4.9 Wetland/Slough Complex Restoration

Wetland/slough complexes, SRA habitat, and woody debris were grouped together for purposes of restoration projects. The group identified these actions as a high priority because of the benefits of adding instream aquatic habitat and the potential to benefit several aquatic and terrestrial species, as well as the opportunities for implementing these types of projects. The group agreed that all habitat improvement projects should include long-term monitoring and an operation and maintenance (O&M) component.

There was consensus that there is a need for more information regarding floodplain management and habitat restoration in the floodplain. Parts of the lower American River are still eroding banks in the process of creating meander. Some parts of the river have not changed even in very large flow events. In some areas there has been a very significant loss of riparian forests.

There is a need to carefully study areas that are targeted for restoration activities. The preferred approach will be to do an option analysis or feasibility study followed by a pilot project with long-term monitoring and evaluation. The flow rate at which habitat modification projects become most valuable will need to be identified. A habitat modification project at low flows may be a great enhancement, but at high flows it could become ineffective or even add to stranding problems. Restored habitat areas should be designed so they do not present a stranding hazard and should be implemented only after careful design. Once implemented, they could be carefully evaluated to determine the effects to fish and the river channel.

Potential sites for wetland/slough complex restoration include Cal Expo, Merrine Trailer Park, Uruttia, and Camp Pollack. The Cal Expo site may have up to 900 acres available for habitat restoration that could benefit multiple species.

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Projects in the upper reaches were identified as a much lower priority. These sites need to be evaluated in terms of the need for habitat restoration, and the technical feasibility of restoration actions.

#### 4.10 Woody Debris Management

Woody debris has high value as instream aquatic habitat. It adds complexity to the system and protection from predators. Currently, debris in the river is removed because of safety concerns. Restoration actions should possibly be focused on modifications to the existing management practices rather than adding additional materials to the river. The best locations for changes in management are above the Sunrise Boulevard bridge where most anadromous fish rearing takes place, and recreational conflicts are not as great.

#### 4.11 Shaded Riverine Aquatic Habitat Protection/Management

The discussion of shaded riverine aquatic habitat was lumped together with the discussion of wetland/slough complex restoration and woody debris management. See previous comments.

#### 4.12 Spawning Habitat Management

Spawning habitat management was given a high rating, but it may not be necessary to consider it for CALFED funding. The CVPIA program is presently evaluating existing techniques for spawning habitat monitoring and management. The group recommended that any spawning habitat improvements avoid disruption of the existing successful spawning areas.

#### 4.13 Flood Control Channel Improvements

These projects would involve habitat improvements on existing bare revetments. This category would not include any mitigation required for new bank protection work. There was much support for this type of project. These projects were considered very cost-effective. Appendix D describes several example projects. There is great potential to obtain matching funds for these kinds of projects from other organizations such as the U.S. Army Corps of Engineers. Project sites for immediate consideration include:

- Repairs above Business 80
- River mile 2.3
- The 1986 repair site at river mile 4
- Downstream of H Street on the left bank
- River mile 15 downstream of Ancil Hoffman Park
- River mile 8.55

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#### 4.14 Tailrace Habitat Utilization

A study is needed to evaluate the potential to improve the utility of tailrace habitat for steelhead below Nimbus Dam. Although this project received a high ranking, it was not discussed extensively.

#### 4.15 Fish Screen Improvement (Fairbairn WTP)

There was recognition that the fish screen at the Fairbairn WTP water intake does not meet current screening criteria. The City of Sacramento has applied for a grant under the Anadromous Fish Screen Improvement Program for engineering feasibility and environmental documentation.

#### 4.16 Reintroduction of Steelhead Above Folsom Dam

This study received a high ranking. The dams are major barriers to migration and the re-establishment of natural runs. Before dam construction, steelhead used the lower American River primarily for migration, rather than spawning and rearing. Now a stretch of river that was not used for rearing by steelhead must be managed to maintain the population. The group felt reintroduction of steelhead above Folsom would require careful evaluation. Though the technical issues are daunting, there are limited options available to meet the objective of improving natural propagation success. The first step would be a feasibility study to evaluate reintroduction of steelhead in the upper reaches of the American River. This study would need to include a technical evaluation of upstream and downstream passage issues, and of habitat availability. The study would also need to evaluate the substantial policy issues this action would raise.

#### 4.17 Identify Off-Site Mitigation

Identification of off-site mitigation opportunities was given a low priority as a restoration action.

#### 4.18 Mitigation/Enhancement Monitoring Plan

There is clearly a need to have ongoing monitoring of the fisheries resources in the river and the long-term impact of mitigation and enhancement actions. This project was seen as a study that may be covered by other funding sources, and therefore was given a low priority.

#### 4.19 Consultation/Technical Assistance

This action includes the very important provision of technical expertise and coordinated efforts among various entities addressing management, mitigation and restoration actions in the

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American River. This project was given a low priority because it may be funded through other sources.

#### 4.20 Hatchery Temperature Control

Significant mortality of steelhead eggs occurs each year due to high temperatures. Temperatures at the hatchery are linked to release water temperatures at Folsom Dam. Any improvement at Folsom Dam would improve temperatures at the hatchery. This project was given a high priority.

#### 4.21 Hatchery Management Practices

The group expressed concern regarding operation of Nimbus Hatchery. While the goal of the hatchery is to increase production, protection of the native stock should be given a high priority. The technical team recommended that genetic practices be improved, that all hatchery fish be tagged, and that hatchery operations be modified to reduce conflicts with natural production.

#### 4.22 Increase Artificial Production

This was ranked as a low priority because the goal is to increase natural spawning and rearing habitat.

#### 4.23 Angling Regulations

Development, implementation and enforcement of angling regulations are the responsibility of CDFG. No actions were recommended to address this problem.

#### 4.24 Fire Management

The technical team identified the need for fire protection measures, public education, and law enforcement. Wetlands and sloughs can be used as natural fire breaks in some areas. These actions were identified as a medium priority.

**Appendix A**

**Attendee List**

<p style="text-align: center;"><b>AMERICAN RIVER TECHNICAL TEAM</b>  <b>Sacramento Water Forum Office</b>  <b>March 13, 1997</b></p>		
<b>Name</b>	<b>Affiliation/Address</b>	<b>Phone#/Fax/email</b>
Curtis Alling	EDAW 10423 Old Placerville Road, #100 Sacramento, CA 95827	916-362-3206 916-362-2206 edawsac@ix.netcom.com
Sydney Coatsworth	EDAW 10423 Old Placerville Road, #100 Sacramento, CA 95827	916-362-3206 916-362-2206 coatswos@sacramento.edaw.com
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Kris Vyverberg	Cal. Dept. Fish and Game, Environmental Services Division Stream Flow and Habitat Evaluation Program, Room 1341 1416 9th Street Sacramento, CA 95814	916-653-8711 916-653-2588
Felix Smith	Water Forum and Save the American River Association 4720 Talus Way Carmichael, CA 95608	916-966-2081
Tom Whitney	Sierra Club 2417 Castro Way, Apt 9 Sacramento, CA 95818	916-736-2749

Name	Affiliation/Address	Phone#/Fax/email
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Eugenia Laychak	CCPDR 980 9th Street Sacramento, CA 95814	916-444-2161 916-444-2162

Name	Affiliation/Address	Phone#/Fax/email
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Matt Davis	U.S. Army Corps of Engineers 1325 S. Street Sacramento, CA	916-557-6708 916-557-7856
Gary Kukkola	Sacramento County Parks and Recreation 4040 Bradshaw Road Sacramento, CA 95827	916-875-6283 916-875-6632
Bob Nuzum	East Bay Municipal Utility District 375 11th Street Oakland, CA	510-287-0407 510-287-0541

Name	Affiliation/Address	Phone#/Fax/email
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Jerry Bielfeldt	USFWS, Ecological Services 3310 El Camino Avenue Sacramento, CA 95821	916-979-2733
John Brooks	USFWS, Ecological Services 3310 El Camino Avenue Sacramento, CA 95821	916-979-2733
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Don Castleberry	USFWS, AFRP 4001 N. Wilson Way Stockton, CA 95205	209-946-6400 209-946-6355 don_castleberry@fws.gov
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**Appendix B**

**Agenda and  
Background Information**