Tuolumne River Mining Reach Restoration Project: Warner-Deardorff Segment No. 3 -Construction

Project Information

1. **Proposal Title:**

   Tuolumne River Mining Reach Restoration Project: Warner-Deardorff Segment No. 3 -Construction

2. **Proposal applicants:**

   Wilton Fryer, Turlock Irrigation District

3. **Corresponding Contact Person:**

   Wilton Fryer
   Turlock Irrigation District
   333 East Canal Drive Turlock, CA 95380
   209 883-8316
   wbfryer@tid.org

4. **Project Keywords:**

   Anadromous salmonids
   Fluvial Geomorphology
   Habitat Restoration, Instream

5. **Type of project:**

   Implementation_Full

6. **Does the project involve land acquisition, either in fee or through a conservation easement?**

   Yes

   If yes, is there an existing specific restoration plan for this site?

   Yes

7. **Topic Area**:

   Channel Dynamics and Sediment Transport

8. **Type of applicant:**

   Local Agency

9. **Location - GIS coordinates:**

Latitude: 37.65032028

Longitude: -120.6822592

Datum:

Describe project location using information such as water bodies, river miles, road intersections, landmarks, and size in acres.

Tuolumne River from RM 35.2 to RM 36.5, approximately 3 miles downstream of the Roberts Ferry Bridge, restoring 73 acres of riparian floodway along 1.3 miles of river channel.

10. **Location - Ecozone:**

    13.2 Tuolumne River

11. **Location - County:**

    Stanislaus

12. **Location - City:**

    Does your project fall within a city jurisdiction?

    No

13. **Location - Tribal Lands:**

    Does your project fall on or adjacent to tribal lands?

    No

14. **Location - Congressional District:**

    18

15. **Location:**

    California State Senate District Number: 12

    California Assembly District Number: 25

16. **How many years of funding are you requesting?**

    3

17. **Requested Funds:**
    a) Are your overhead rates different depending on whether funds are state or federal?

       No

       If no, list single overhead rate and total requested funds:

Single Overhead Rate: 0

Total Requested Funds: 10,839,000

b) Do you have cost share partners already identified?

Yes

If yes, list partners and amount contributed by each:

Tuolumne River Technical Advisory Committee 40,000

c) Do you have potential cost share partners?

No

d) Are you specifically seeking non-federal cost share funds through this solicitation?

No

If the total non-federal cost share funds requested above does not match the total state funds requested in 17a, please explain the difference:

The $40,000 in TRTAC funding contribution for this project is actually being spent as part of the earlier project Warner Deardorff Segment No 3 Design (1999-F02).

18. **Is this proposal for next-phase funding of an ongoing project funded by CALFED?**

Yes

If yes, identify project number(s), title(s) and CALFED program (e.g., ERP, Watershed, WUE, Drinking Water):

2001-C209 TR Mining Reach: Warner-Deardorff Segment No. 3 AFRP / CALFED

Have you previously received funding from CALFED for other projects not listed above?

Yes

If yes, identify project number(s), title(s) and CALFED program.

1997-M09	**TR Mining Reac: 7\11Segment No. 1**	**AFRP, CF-Cat III, TRTAC, CF-USBR**

1999-F02 TR Minng Reach: MJ Ruddy Segment No. 2 AFRP, CALFED, TRTAC

1997-M08 TR Special Run Pool 9 AFRP, CF-Cat III, TRTAC

1999-F01 TR Special Run Pool 10 Repair AFRP

2001-B201 TR Special Run Pool 10 Design CALFED

2001-C208 TR Fine Sediment Management CALFED

19. **Is this proposal for next-phase funding of an ongoing project funded by CVPIA?**

No

Have you previously received funding from CVPIA for other projects not listed above?

Yes

If yes, identify project number(s), title(s) and CVPIA program.

11332-0-J017 TR Course Sediment Management AFRP

20. **Is this proposal for next-phase funding of an ongoing project funded by an entity other than CALFED or CVPIA?**

No

Please list suggested reviewers for your proposal. (optional)

Kevin Faulkenberry DWR Fresno 559-230-3320

Jeffery Mount, PhD State Reclamation Board 916-653-5440

Kris Vyverberg DFG Sacramento 916-653-8711

21. **Comments:**

Doctors Healy, Dunne, and Kondolf were not listed as they served on the Adaptive Management Forum or are on the CALFED science panel and will be looking at the project in that capacity. The above reviewers were not contacted.

Environmental Compliance Checklist

Tuolumne River Mining Reach Restoration Project: Warner-Deardorff Segment No. 3 -Construction

1. **CEQA or NEPA Compliance**
   a) Will this project require compliance with CEQA?

      Yes
   b) Will this project require compliance with NEPA?

      Yes
   c) If neither CEQA or NEPA compliance is required, please explain why compliance is not required for the actions in this proposal.

2. **If the project will require CEQA and/or NEPA compliance, identify the lead agency(ies).** *If not applicable, put "None".*

   CEQA Lead Agency: Turlock Irrigation District
   NEPA Lead Agency (or co-lead:) none
   NEPA Co-Lead Agency (if applicable): US Fish & Wildlife Service

3. **Please check which type of CEQA/NEPA documentation is anticipated.**

   CEQA
   -Categorical Exemption
   XNegative Declaration or Mitigated Negative Declaration
   -EIR
   -none

   NEPA
   -Categorical Exclusion
   XEnvironmental Assessment/FONSI
   -EIS
   -none

   If you anticipate relying on either the Categorical Exemption or Categorical Exclusion for this project, please specifically identify the exemption and/or exclusion that you believe covers this project.

4. **CEQA/NEPA Process**
   a) Is the CEQA/NEPA process complete?

      Yes

   b) If the CEQA/NEPA document has been completed, please list document name(s):

      Tiered EA/IS Mitigated Negative Declaration: Gravel Mining Reach & Special Run Pools 9/10 Restoration and Mitigation Projects SCH# 98052070

5. **Environmental Permitting and Approvals** (*If a permit is not required, leave both Required? and Obtained? check boxes blank.*)

LOCAL PERMITS AND APPROVALS

Conditional use permit	Required
Variance	
Subdivision Map Act	
Grading Permit	
General Plan Amendment	
Specific Plan Approval	
Rezone	
Williamson Act Contract Cancellation	
Other	

STATE PERMITS AND APPROVALS

Scientific Collecting Permit	
CESA Compliance: 2081	
CESA Compliance: NCCP	
1601/03	Required
CWA 401 certification	Required
Coastal Development Permit	
Reclamation Board Approval	Required
Notification of DPC or BCDC	
Other	Required

FEDERAL PERMITS AND APPROVALS

ESA Compliance Section 7 Consultation	Required
ESA Compliance Section 10 Permit	
Rivers and Harbors Act	
CWA 404	Required
Other	

PERMISSION TO ACCESS PROPERTY

Permission to access city, county or other local agency land. Agency Name:	
Permission to access state land. Agency Name: State Lands Commission	Required
Permission to access federal land. Agency Name:	
Permission to access private land. Landowner Name: Sante Fe Agregates, Martin Ruddy,Bret, Kurt, Roger Warner, Walter Deardorff	Required

6. **Comments.**

State "Other" is possible lease with State Lands Commision Local Use Permit is modification of existing mining permit reclamation plan boundary with restorationarea boundary. Landowners have signed project concurance letters to allow project to proceed, but formal conservation and access easements will be required prior to construction.

Land Use Checklist

Tuolumne River Mining Reach Restoration Project: Warner-Deardorff Segment No. 3 -Construction

1. **Does the project involve land acquisition, either in fee or through a conservation easement?**

   Yes

   If you answered yes to #1, please answer the following questions:
   a) **How many acres will be acquired?**

      Fee: 74
      Easement: 0
      Total: 74

   b) Will existing water rights be acquired?

      No

   c) Are any changes to water rights or delivery of water proposed?

      No

2. **Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?**

   Yes

3. **Do the actions in the proposal involve physical changes in the land use?**

   Yes

   If you answered yes to #3, please answer the following questions:
   a) How many acres of land will be subject to a land use change under the proposal?

      74

   b) Describe what changes will occur on the land involved in the proposal.

      Existing mining permits will be extinguished and be replaced with riparian floodway. There is no conversion of agricultural lands involved in the restoration project.
   c) List current and proposed land use, zoning and general plan designations of the area subject to a land use change under the proposal.

Category	Current	Proposed (if no change, specify "none")
Land Use	Aggregate mining and residual mining pits. Zoned A-40	Project area will be come riparian forest in an active river floodway.
Zoning	Zoned A-40	Swamp & Overflow
General Plan Designation	Agriculture & Mineral Resources	none

d) Is the land currently under a Williamson Act contract?

Yes

e) Is the land mapped as Prime Farmland, Farmland of Statewide Importance, Unique Farmland or Farmland of Local Importance under the California Department of Conservation's Farmland Mapping and Monitoring Program?

No

f) Describe what entity or organization will manage the property and provide operations and maintenance services.

TID will hold the easement (or fee title) and provide operations and management of the project area.

4. Comments.

The landowner is given the option of a conservation easement or fee title transfer of the project area to TID. The Water Code allows TID, as an irrigation district, to aquire the land in fee without having to redue the Williamson Act contract.

Conflict of Interest Checklist

Tuolumne River Mining Reach Restoration Project: Warner-Deardorff Segment No. 3 -Construction

Please list below the full names and organizations of all individuals in the following categories:

- **Applicants listed in the proposal who wrote the proposal, will be performing the tasks listed in the proposal or who will benefit financially if the proposal is funded.**
- **Subcontractors listed in the proposal who will perform some tasks listed in the proposal and will benefit financially if the proposal is funded.**
- **Individuals not listed in the proposal who helped with proposal development, for example by reviewing drafts, or by providing critical suggestions or ideas contained within the proposal.**

The information provided on this form will be used to select appropriate and unbiased reviewers for your proposal.

Applicant(s):

Wilton Fryer, Turlock Irrigation District

Subcontractor(s):

Are specific subcontractors identified in this proposal? Yes

If yes, please list the name(s) and organization(s):

Scott McBain, etal	**McBain & Trush**
Jennifer Vick, etal	**Stillwater Sciences**
Dave Peterson, etal	**HDR Engineering, Inc.**
Dick Grey	**Specialty Appraisals**
Curtis Alling, Etal	**EDAW, Inc**
Steve Long	**Cutler & Associates**
None	**None**
None	**None**
None	**None**
None	**None**

Helped with proposal development:

Are there persons who helped with proposal development?

Yes

If yes, please list the name(s) and organization(s):

Darren Mierau McBain & Trush

Jennifer Vick Stillwater Sciences

Comments:

Construction contractor is unknown at this time and information will be provided when a successful bid is awarded.

Budget Summary

Tuolumne River Mining Reach Restoration Project: Warner-Deardorff Segment No. 3 -Construction

Please provide a detailed budget for each year of requested funds, indicating on the form whether the indirect costs are based on the Federal overhead rate, State overhead rate, or are independent of fund source.

Independent of Fund Source

Year 1												
Task No.	Task Description	Direct Labor Hours	Salary *(per year)*	Benefits *(per year)*	Travel	Supplies & Expendables	Services or Consultants	Equipment	Other Direct Costs	Total Direct Costs	Indirect Costs	Total Cost
1	Design						166,000			166000.0		166000.00
2	easements						1,819,000			1819000.0		1819000.00
3	Project Management						60,000			60000.0		60000.00
4	ROW Services						45,000			45000.0		45000.00
		0	0.00	0.00	0.00	0.00	2090000.00	0.00	0.00	2090000.00	0.00	2090000.00

Year 2												
Task No.	Task Description	Direct Labor Hours	Salary *(per year)*	Benefits *(per year)*	Travel	Supplies & Expendables	Services or Consultants	Equipment	Other Direct Costs	Total Direct Costs	Indirect Costs	Total Cost
5	Construction						6,930,000			6930000.0		6930000.00
6	Construction Management						124,000			124000.0		124000.00
7	Constuction Contingency						693,000			693000.0		693000.00
3	Project Management						65,000			65000.0		65000.00
8	Permits						38,000			38000.0		38000.00
		0	0.00	0.00	0.00	0.00	7850000.00	0.00	0.00	7850000.00	0.00	7850000.00

Year 3												
Task No.	Task Description	Direct Labor Hours	Salary *(per year)*	Benefits *(per year)*	Travel	Supplies & Expendables	Services or Consultants	Equipment	Other Direct Costs	Total Direct Costs	Indirect Costs	Total Cost
9	Revegetation						606,000			606000.0		606000.00
10	Monitoring						180,000			180000.0		180000.00
7	Constuction Contingency						61,000			61000.0		61000.00
3	Project Management						52,000			52000.0		52000.00
		0	0.00	0.00	0.00	0.00	899000.00	0.00	0.00	899000.00	0.00	899000.00

Grand Total=10839000.00

Comments.
Tasks occuring in multiple years maintain the same Task Number.

Budget Justification

Tuolumne River Mining Reach Restoration Project: Warner-Deardorff Segment No. 3 -Construction

Direct Labor Hours. Provide estimated hours proposed for each individual.

None

Salary. Provide estimated rate of compensation proposed for each individual.

None

Benefits. Provide the overall benefit rate applicable to each category of employee proposed in the project.

None

Travel. Provide purpose and estimate costs for all non-local travel.

None

Supplies & Expendables. Indicate separately the amounts proposed for office, laboratory, computing, and field supplies.

None

Services or Consultants. Identify the specific tasks for which these services would be used. Estimate amount of time required and the hourly or daily rate.

Project costs are based on engineers estimate from prilimiary (30%) design drawings, experiance from costs of restoration projects currently under construction, and consultant contract proposals for work under this PSP.

Equipment. Identify non-expendable personal property having a useful life of more than one (1) year and an acquisition cost of more than $5,000 per unit. If fabrication of equipment is proposed, list parts and materials required for each, and show costs separately from the other items.

None

Project Management. Describe the specific costs associated with insuring accomplishment of a specific project, such as inspection of work in progress, validation of costs, report preparation, giving presentatons, reponse to project specific questions and necessary costs directly associated with specific project oversight.

Project Management cost represents 20% of TID Program Manager time based on past four years of managing prior projects.

Other Direct Costs. Provide any other direct costs not already covered.

None

Indirect Costs. Explain what is encompassed in the overhead rate (indirect costs). Overhead should include costs associated with general office requirements such as rent, phones, furniture, general office staff, etc., generally distributed by a predetermined percentage (or surcharge) of specific costs.

None

Executive Summary

Tuolumne River Mining Reach Restoration Project: Warner-Deardorff Segment No. 3 -Construction

LOCATION & SCOPE of WORK: Ecological Zone 13. The overall Mining Reach Project involves implementation of full-scale restoration on a 6.1-mile reach (River Mile 34.2 to 40.3) of the lower Tuolumne River below La Grange Dam. The Warner-Deardorff Segment represents the third element being reconstructed in the Mining Reach, restoring 73 acres of riparian floodplain habitat and 1.3 miles of inchannel riverine habitat for fall run chinook salmon from River Mile 35.2 to 36.5. The Warner-Deardorff Segment No. 3 Project was originally submitted under the 2001 PSP. However, only the design, easement appraisals, and pre project monitoring were funded at that time. This is a re-submittal of that project to allow completion of the easement acquisition, permitting for construction, the construction phase of the work including the riparian revegetation, and post project monitoring. BIOLOGICAL & ERPP OBJECTIVES: 1. Restore and increase habitat conducive to natural production of San Joaquin fall-run salmon. 2. Reconstruct natural channel geometry scaled to current channel forming flows, which allows active fluvial processes to maintain the restored aquatic habitat within a 500-foot wide riparian floodway. 3. Restore native riparian plant communities in their predicted hydrological regime within the floodway. 4. Reduce out-migrating juvenal salmonid losses through entrapment in adjacent fish predator habitat. CONCEPTUAL MODEL FOR RESTORATION OF THE MINING REACH: The problems that are the focus of the Tuolumne River restoration program fall into two major categories: (1) impairment of geomorphic and ecosystem processes caused by flow regulation, gold and aggregate mining, and land uses, and (2) reduction in fall-run chinook salmon population abundance and resiliency. Potential solutions are identified in ten interconnected conceptual models depicting the current understanding of the geomorphic functions in the river, the rivers chinook salmon population dynamics, effects of measures to improve geomorphic and ecosystem function, and the potential to increase chinook salmon population abundance and resiliency. APPROACH: The design objectives of the Mining Reach Project are to restore riparian habitats and salmonid habitats along a contiguous riparian floodway. These objectives, which will form the basis of testable hypotheses, include: 1. Improve salmonid spawning and rearing habitats by restoring an alternate bar (pool riffle) morphology, restoring spawning habitat within the meandering channel, and filling in-channel mining pits; 2. Improve juvenile salmon survival by preventing future connection between the Tuolumne River and off-channel mining pits; 3. Restore native riparian communities on appropriate geomorphic surfaces (i.e., active channel and floodplain terraces) within the restored floodway; 4. Restore habitats for special status species (e.g., egrets, ospreys, hawks, and herons); 5. Restore and improve isolation of off-channel aggregate extraction pits; 6. Restore a fully vegetated riparian floodway width that will safely convey regulated flood flows up to 15,000 cfs (the maximum regulated flow from Don Pedro Reservoir); 7. Allow the river channel the ability to migrate within the restored floodway to improve and maintain riparian and salmonid habitat; 8. Remove floodway Abottlenecks created by inadequate mining pit berms that are subject to failure at threshold flows, thus protecting the restoration project works and aggregate extraction operations and other human structures from future flood damage.

Proposal

Turlock Irrigation District

Tuolumne River Mining Reach Restoration Project: Warner-Deardorff Segment No. 3 -Construction

Wilton Fryer, Turlock Irrigation District

TUOLUMNE RIVER MINING REACH RESTORATION PROJECT:
WARNER-DEARDORFF SEGMENT No. 3 - CONSTRUCTION

A PROJECT DESCRIPTION: Project Goals & Scope of Work

1. PROBLEM STATEMENT

The fall run chinook salmon in the tributaries of the San Joaquin River is currently listed as a species of concern by the USFWS. The Tuolumne River is the largest tributary of the San Joaquin River and the Don Pedro Project is the largest reservoir located above the fall-run chinook salmon spawning reach on the Tuolumne River. Don Pedro Reservoir is owned by the TID and the MID and is licensed by the Federal Energy Regulatory Commission (FERC). The Tuolumne River supports a population of fall-run chinook salmon, whose numbers have fluctuated from 40,000 fish in 1985, to a low of 100 fish in 1991, and is on another upward swing with 7,000 fish in 1997, 8,900 in 1998, 7,900 in 1999, and 18,000 in 2000. Given the large potential to make significant improvements in wild salmon production and the success of the stakeholder organization – Tuolumne River Technical Advisory Committee in promoting river-wide restoration goals, the CALFED – ERP has designated the Tuolumne River as one of three Demonstration Streams in the Central Valley. The problems that are the focus of the Tuolumne River restoration program fall into two major categories: (1) impairment of geomorphic and ecosystem processes caused by flow regulation, gold and aggregate mining, and land uses, and (2) reduction in fall-run chinook salmon population abundance and resiliency.

Anadromous salmonid populations in the lower Tuolumne River require adequate ecosystem health to achieve and sustain their potential productivity. Restoring and maintaining dynamic geomorphic processes are crucial for insuring healthy river ecosystems with natural productive salmonid populations. Complete restoration of a river ecosystem is infeasible for alluvial rivers regulated by large dams. Limiting factors, such as limited available spawning riffles and associated habitat, periodic entrapment of juvenile salmon in mining pits during high river flows, sediment management, etc., must be identified for prioritizing actions that would best improve the ecosystem, particularly salmonid habitat.

One of many stressors identified in recent studies on the Tuolumne River that limit salmonid populations are the aggregate extraction pits, which are a byproduct of extensive in-stream and off-channel mining. Many of these instream and off-channel pits have negatively impacted salmonid populations by stranding juveniles in ponds and fostering large populations of non-native predator fish (bass). Additionally, spawning and rearing habitats have been negatively impacted by either complete removal during aggregate extraction, degradation by channel encroachment from dikes along mining pits, or fine sediment infiltration. Many of the off-channel pits have only a small berm of undisturbed native material separating them from the river. Common floods (e.g., 1983, 1986, 1995, & 1998) of less than 8,000 cfs regularly breach some of these brims resulting in entrapment of salmon fry and smolts.

1a. Geographic Location

The overall Mining Reach Project is a full-scale restoration implementation project in Ecological

Zone13, East San Joaquin Basin along a 6.1-mile length of channel located on the lower Tuolumne River, between river mile 34.2 and river mile 40.3, approximately 23 miles east of Modesto in Stanislaus County. This PSP is for the Warner-Deardorff Segment No. 3, the third portion of the Mining Reach Project, and encompasses 73 acres of riparian floodway along a 1.3-mile channel between river mile 35.2 and 36.5.

1b. Tuolumne River Restoration Program

The Tuolumne River Technical Advisory Committee (TRTAC) was formed under the auspices of the 1995 Don Pedro Project Settlement Agreement (FERC License No. 2299). The TRTAC has goals that include restoring self-sustaining instream aquatic habitat and shaded riverine aquatic habitat for the primary benefit of San Joaquin fall-run chinook salmon in the Tuolumne River below La Grange Dam. To help guide their actions and those of others planning restoration projects, the TRTAC has developed a *Habitat Restoration Plan for the Lower Tuolumne River Corridor* (McBain & Trush 2000). This Habitat Restoration Plan details the science behind an integrated, long-term fish and riparian habitat restoration and monitoring program that utilizes adaptive management for enhancing the natural production of salmon in the Tuolumne River below La Grange Dam. The development of the Habitat Restoration Plan represents a systematic description of the current state of the science for the Tuolumne River based on over $10,000,000 of District funded monitoring, system modeling, and related studies conducted since 1971 and application of relevant information from studies and projects on other gravel bedded rivers. The results of the District monitoring and studies can be found in the annual reports to FERC.

The Habitat Restoration Plan divides the Tuolumne River into seven basic reaches, each representing where specific types of restoration projects could be applied within that reach based on the fluvial, riparian, and fishery life stage characteristics applicable to that stream segment. Some of these projects focus on restoration of geomorphic processes, others on riparian forest restoration and predator reduction, and still others deal with gravel re-introduction, cleaning, and sediment management for improvement of spawning and juvenal salmon survival. A more refined *Tuolumne River Design Document* specific for the Mining Reach Project and Special Run Pools 9 & 10 is being developed by McBain & Trush that incorporates lessons learned from current projects on Clear Creek, the Merced and Tuolumne rivers, and expands on information from the Habitat Restoration Plan.

1c. Goals and Objectives

The overarching goal of the TRTAC restoration program is a goal commonly shared by the CALFED and AFRP programs, which is to re-establish critical geomorphic and hydrologic processes, a natural channel morphology, and healthy habitat conditions, within contemporary regulated flow and sediment conditions. This is considered the most promising strategy for recovery and maintenance of salmonid populations along with the associated native flora and fauna of the river. Because this strategy will be carried out under regulated conditions, i.e., reduced flow and sediment supply regimes, this goal thus targets a scaled-down version of the former river, but with dynamic fluvial processes (sediment transport and scour, floodplain inundation, channel migration) that function to maintain the habitat characteristics favored by chinook salmon and other fish, avian, and wildlife populations.

1d. Hypotheses

The design objectives of the Mining Reach Project are to restore riparian habitats and salmonid habitats with a continuous riparian floodway through this 6.1-mile reach of the Tuolumne River between river mile 34.2 and 40.3. These objectives, which will form the basis of testable hypotheses, include:

1. Improve salmonid spawning and rearing habitats by restoring an alternate bar (pool riffle) morphology, restoring spawning habitat within the meandering channel, and filling in-channel mining pits;
2. Improve juvenile salmon survival by preventing future connection between the Tuolumne River and off-channel mining pits;
3. Restore native riparian communities on appropriate geomorphic surfaces (i.e., active channel and floodplain terraces) within the restored floodway;
4. Restore habitats for special status species (e.g., egrets, ospreys, hawks, and herons);
5. Restore and improve isolation of off-channel aggregate extraction pits that were connected to the Tuolumne River by the January 1997 flood;
6. Restore a fully vegetated riparian floodway width that will safely convey regulated flood flows up to 15,000 cfs (the maximum regulated flow from Don Pedro Reservoir);
7. Allow the river channel the ability to migrate within the restored floodway to improve and maintain riparian and salmonid habitat;
8. Remove floodway Abottlenecks" created by inadequate mining pit berms that are subject to failure at threshold flows, thus protecting the restoration project works and aggregate extraction operations and other human structures from future flood damage.

2. PROJECT JUSTIFICATION & CONCEPTUAL MODELS

2a. FERC Project Implementation Mandate

In 1995, through the FERC relicensing process for the Don Pedro Project, the Districts and the City and County of San Francisco (CCSF) entered into a FERC Settlement Agreement (FSA) with the USFWS, CDFG, and several environmental groups. This FSA establishes minimum flow requirements for the Tuolumne River downstream of the Don Pedro Project and sets forth a strategy and implementation procedures for recovery of the lower Tuolumne River chinook salmon population. Using adaptive management, the FSA goals are to: (1) increase the abundance of wild chinook salmon in the Tuolumne River, (2) protect any remaining genetic characteristics unique to the Tuolumne River chinook salmon population, and (3) improve salmon habitat in the Tuolumne River. The FSA directed the TRTAC to develop and implement ten priority restoration projects by 2005. Through development of the Restoration Plan and other planning efforts, the TRTAC has identified these ten projects, with the four segments of the Mining Reach Project being the first four projects so identified.

2b. Conceptual Models

In June 2001 UC Davis Center for the Environment and AFRP sponsored an Adaptive Management Forum specifically reviewing the science behind the large-scale restoration projects on the Tuolumne River. The TRTAC Monitoring Subcommittee, with assistance and peer review by panel

members from the Adaptive Management Forum, developed six interconnected conceptual models depicting their current understanding of the science and geomorphic functions in the river, the river's chinook salmon population dynamics, effects of measures to improve geomorphic and ecosystem function, and the potential to increase chinook salmon population abundance and resiliency. These conceptual models are presented in the report *AFRP / CALFED Adaptive Management Forum: Tuolumne River Restoration Summary Report* (AMF Summary Report, Stillwater Sciences 2001). Attachment No. 1 has the summary diagrams depicting these Conceptual Models developed during that forum. Several of the conceptual models were developed for predation reduction projects, such as Special Run Pools 9 & 10 located below the Mining Reach Project. Other models, that deal with sediment management as it affects spawning, emergence, rearing, and survival of juvenal salmon, are being incorporated into the current Course and Fine Sediment Management Projects being conducted up stream of the Mining Reach Project.

The four models S-1, G-1, P-1, and P-2 are most applicable to the Mining Reach Project.

Model S-1. Overarching model of factors affecting chinook salmon population abundance in the Tuolumne River. This conceptual model depicts the factors affecting each chinook salmon life history stage, within and outside of the Tuolumne River basin. Within the basin, research and monitoring have identified three primary factors that limit chinook salmon population abundance. These factors are: (1) redd superimposition; (2) low survival-to-emergence resulting from low substrate permeability; and (3) low outmigrant survival resulting from spring flow conditions, predation by largemouth bass, and water temperature.

Model G-1. Overarching model of the effects of dams and mining on geomorphic inputs and processes, habitat structure, and population response. This model illustrates linkages between physical inputs, physical processes, habitat structure, and biological responses and the effects of dams and mining on these linkages. In this model, dams have altered seasonal flow patterns in the lower river, reduced peak flow magnitude, reduced fine sediment supply, and eliminated coarse sediment supply.

Model P-1. Effects of reconstruction of Special Run-Pools (SRPs) on geomorphic process, riparian vegetation, and chinook salmon survival. In this model, filling in the SRPs and constructing a channel and floodplain that are scaled to contemporary flow conditions in the Tuolumne River improves in-channel and floodplain geomorphic and riparian processes and chinook salmon survival. Constructing an appropriately scaled channel increases the frequency of bed mobilization and restores sediment transport continuity. Combined with ongoing maintenance to provide a coarse sediment supply, the project balances sediment supply and transport capacity and allows the river to create and maintain active alluvial features, such as bars and riffles.

Model P-2. Effects of reconstruction of the Gravel Mining Reach on geomorphic processes, riparian vegetation, and chinook salmon survival. In this model, reconstructing a channel and floodplain that are scaled to contemporary flow conditions combined with planting native riparian vegetation on the reconstructed floodplain and maintaining coarse sediment supply improves in-channel and floodplain geomorphic and riparian processes and improves chinook salmon spawning and rearing habitat. Constructing an appropriately scaled channel and maintaining coarse sediment supply balances sediment transport capacity with sediment supply and provides a channel and floodplain that function under contemporary, regulated flow conditions. By providing conditions that allow the channel

to construct bars and riffles, the project improves salmon spawning, incubation, and rearing habitats.

Prior to the Adaptive Management Forum, the Habitat Restoration Plan identified 10 "Attributes of Alluvial River Integrity" that when in balance will provide for a dynamic riverine ecosystem. The *Attributes* were first introduced for the Trinity River Maintenance Flow Study (McBain and Trush 1997), and later incorporated in the Trinity River Flow Evaluation Study (USFWS and HVT, 1999), and finally published in the Proceedings of the National Academy of Sciences (Trush et al. 2000). The *Attributes* are essentially a set of hypotheses that describe the critical geomorphic processes that form and maintain alluvial rivers. Combining the *Attributes* with the Conceptual Models developed for the AMF, provides a basis of understanding of river ecosystems to: 1) to improve our understanding of how rivers function, 2) illustrate how human alterations to the environment may have affected the fundamental geomorphic and ecological processes of a particular alluvial river, and 3) develop quantitative and measurable restoration objectives. These attributes form the basis for the conceptual design objectives outlined above that will be used in the restoration and monitoring of the riparian floodway channel in the Mining Reach projects. The *Attributes* are as follows: 1) Spatially complex channel shape; 2) Variable streamflow patterns; 3) Frequently disturbed riverbed surface; 4) Periodic riverbed scour and fill; 5) Balanced fine and course sediment volumes; 6) Periodic channel migration and/or avulsion; 7) A functional floodplain; 8) Infrequent channel resetting floods; 9) Self-sustaining, diverse riparian corridor; and 10) Naturally fluctuating groundwater table.

Based on the Attributes and our current understanding of alluvial rivers, one can describe the linkages between **physical inputs** (e.g., sunlight, streamflow, sediment), **physical processes** (e.g., sediment transport, bank erosion, fine sediment deposition), **habitat structure** (e.g., shallow-gradient riffles, well-sorted and clean spawning gravels) and **biological responses** (e.g., healthy incubation, low density-dependent mortality). Then the effects of dams, streamflow and coarse sediment regulation, mining, and other human alterations can be related to these linkages. In the Tuolumne River, dams have eliminated coarse and fine sediment supply (Attribute 5), reduced the magnitude, duration, and frequency of peak flows (Attributes 2, 3, 7, 8), and altered seasonal flow patterns (Attribute 2). In addition, aggregate mining and gold dredging have reduced coarse sediment supply to the river by removing stored sediment from the channel and floodplain (Attribute 1) and trapping coarse sediment that is in transport on the bed. These reductions in key inputs to the system (i.e., sediment and water) have reduced sediment transport (Attribute 3, 4), channel migration and avulsion (Attribute 6), and floodplain inundation (Attribute 7) and have resulted in channel incision, bed armoring, channel narrowing (through riparian vegetation encroachment), and abandonment of pre-dam floodplains. In addition, mining has left extensive pond complexes along the channel margins that entrap emigrating juvenile salmonids. These alterations in habitat structure have cumulatively reduced the quantity and degraded the quality of salmonid habitat.

3. APPROACH & STRATEGY

The ecosystem-based approach to restoration stemming from the conceptual models developed for the Tuolumne River centers on re-establishing the critical geomorphic and hydrologic processes that sustain alluvial rivers. The ERP and Strategic Plan support this approach by "proposing an integrated-

systems approach that attempts to protect and recover multiple species by restoring or mimicking the natural physical processes that create and maintain diverse and healthy habitats" (Strategic Plan pg 2-6). The *Attributes* provide a framework of geomorphic processes required to meet this goal, but also generates information useful in an adaptive management framework.

The floods of January 1997 significantly impacted the riverine environment and aggregate mining in the Mining Reach and highlighted the need to design a continuous 6.1-mile model riparian habitat floodway with a system of setback dikes. The use of setback dikes allows an increase in the flow capacity of the channel and removes known bottlenecks in the river system. That expanded flow capacity can increase reservoir operational flexibility for flood control while providing significant ecological and fishery benefits by enabling a wider range of flows to be passed through all 52 miles of the lower Tuolumne River.

The general location and layout of restoration treatments and activities for the four respective Mining Reach Project segments are found in Attachment No. 2 which shows four maps, Figures 8 through 11 from the Mining Reach Project EA/IS, diagramming how the typical design and restoration treatments are integrated within the entire Mining Reach Project. The project starts at the upstream end with the 7-11 Segment No. 1 (RM. 37.6-40.3), then the M. J. Ruddy Segment No. 2 (RM. 36.5-37.6), followed by the Warner-Deardorff Segment No. 3 (RM. 35.1-36.5), and finishing with the Reed Segment No. 4 (RM. 34.2-35.1). The Mining Reach Project will return this 6.1 mile reach of river to a more natural, dynamic channel morphology that will improve, restore, and protect instream aquatic habitat and shaded riverine aquatic habitat required for San Joaquin fall-run chinook salmon productivity and will help restore natural hydrological and geomorphic processes within the reach. Portions of the 6.1-mile long reach will be widened and reformed into a 500-foot wide riparian floodplain recreating a riffle and run pattern that would follow the restored meander channel of the river. Native vegetation will be planted on restored river terraces in a species composition determined by channel morphology and hydrologic regime, similar to that found on undisturbed segments of the river. The riparian reforestation is intended to provide food and shade for juvenile salmon. Terrestrial species will also benefit from a more continuous corridor of riparian habitat in the restored areas. The wider river channel will allow channel meander to provide a sustainable and dynamic river morphology, i.e., flood flow-related channel-bed movement with periodic scour, that partially or fully restores the processes associated with natural salmon production and survival. The current configuration of dikes in the Mining Reach form the principle bottleneck restricting the controlled release of higher flows in the river. As a result of the Mining Reach Project, the channel capacity in the project area will increase from 7,000 cfs to 15,000 cfs, the maximum regulated flow that can be released from Don Pedro Reservoir. This higher flow capacity will enable fluvial processes to occur that are beneficial to the floodplain sustainability yet can occur without damage to adjacent aggregate mining operations.

The Mining Reach Project is divided into four segments solely for the purpose of constructing manageable sized pieces and to allow adaptive management adjustments in design based on prior year construction experiences. The CEQA / NEPA mitigated EA/IS for all four segments has been completed through prior USFWS-AFRP funding with a TID-MID-CCSF contribution towards

permitting costs. AFRP and CALFED have funded design, construction, revegetation, and monitoring for first two segments and preliminary design for this segment. The sequence of segments to be constructed and the associated sources of funding are intended to allow finished work to remain structurally sound against a designed flood event of 15,000 cfs in case subsequent funding is delayed or not forthcoming. The design for the Mining Reach Project is intended to tie into the downstream Reed restoration project, previously designed by DFG and funded by the 4-Pumps program, that was originally scheduled for construction in 1997.

This proposal seeks CALFED and\or AFRP funding sources available after March 2002 for completion of the Mining Reach Project, Warner-Deardorff Segment No.3. This project is a continuation of the Mining Reach Project construction currently funded by AFRP and CALFED. Currently AFRP has funded pre-construction; project specific monitoring started in the spring of 1998. Construction of the 7/11 Segment No. 1 has experienced delays with easements and is now anticipated to start in the fall of 2001. Permitting, construction design, and acquisition of conservation easements for the upstream MJ Rudy Segment No. 2 will start in fall of 2001 under existing AFRP and CALFED contracts. Construction of the upstream MJ Ruddy Segment No. 2 is anticipated to start in April 2002. Construction of Warner-Deardorff Segment No. 3 restoration would start in the summer of 2003. With funding from this PSP, permits and conservation easements will be acquired from summer 2002 to spring 2003. This project ties into the permanent floodplain channel reconstruction at the downstream end of the setback dike work to be constructed in the MJ Ruddy Segment. The setback dikes will require significant quantities of imported materials to fill in deep pit areas created by past gravel mining, but this will re-create a riffle and run pattern that follows the restored meander channel of the river. In addition, the project will need to purchase significant quantities of aggregate mineral rights under the old existing mining permits that encroach into the river floodway channel. The floodway channel will be reformed into a 500-foot wide riparian floodplain complete with native vegetation in a mix similar to that found along undisturbed segments of the Tuolumne River. The bank full channel will be hydraulically sized for a flow of 5,000 cfs under currently regulated flows to be an active riverine channel with full-grown riparian vegetation. These regulated flows periodically could reach as high as 15,000 cfs for short periods without breaching the setback dikes constructed for the project. It is anticipated and planned that during such high flow events there will be some movement of the channel within the flood plain to expose added spawning materials and clean existing spawning gravels. To minimize long-term future maintenance expenditures, this restoration work is being designed with the intent to provide a self-maintaining riparian floodway channel once the revegetation is completed and established.

4. FEASIBILITY

Monitoring and related fishery studies on the Tuolumne, conducted by the Districts and DFG since construction of the Don Pedro Project in 1971, have formed the basis for refining information on the stressors impacting fall run salmon and the types of restoration projects that should benefit the Tuolumne. The 4-Pumps program funded a small-scale inchannel project on reforming riffle pool sequences in a portion of the upstream MJ Ruddy Segment No. 2 in 1991. Unfortunately, this restoration work was destroyed in the 1997 flood when 60,000 cfs went through a channel designed for 11,000 cfs. Design lessons from that 4-Pumps project have been incorporated into the larger scale

designs of the current projects because the intended fluvial processes did occur at the design bank full flows of 5,000 cfs that will be found in the current project. Limited revegetation success occurred in the 4 Pumps project area. The revegetation plan for the Warner-Deardorff Segment No. 3 has been expanded and refined based on the lessons learned. Vegetation module types will be planted to better match the benches and zones associated with channel morphology. Topsoil will be incorporated in higher benches to provide an improved soil matrix for early survival.

This is the fourth of ten restoration projects being proposed for the Tuolumne River based on the Habitat Restoration Plan developed by the TRTAC. The staff will continue to work closely with the affected landowners and mining operators in the development of site-specific adjustments during the design phase to create final plans. The firm of EDAW, Inc. was hired to assist with the CEQA, NEPA, and permitting work. The NEPA work was jointly prepared with the USFWS and coordinated with the AFRP program. A mitigated EA/IS was jointly developed between TID, as project manager & lead agency, and the USFWS as the Federal funding agency. The EA/IS was tiered off the 1995 EIS for the FERC Settlement Agreement for the Don Pedro Project. Public and agency comments were heard in July and August 1998 and the comments focused on economic issues of compensation for conservation easements and lost availability of aggregate supplies. No environmental comments were received. An addendum to the proposed mitigation measures addressing the comments received was finalized and adopted in July 1999 and is listed as State Clearing House #98052070. The mitigation is designed to avoid a take of listed species such that take permits under ESA \ CESA should not be required. A programatic Section 7 consultation process was completed with USFWS for the 7\11 Segment and SRP 9 regarding elderberry that will be the format to be used on all remaining segments in the Mining Reach and Special Run Pool 10. The State Reclamation Board and the TID have developed an MOA that utilizes the findings from the Section 7 consultation for each Mining Reach Project segment, where by the Reclamation Board will now allow restoration project planting of elderberry shrubs within the designated floodway. The riparian planting plans include modules of elderberry within the floodway.

The reconstruction work in the flowing water of the river with heavy equipment is anticipated to be limited for fishery reasons to an annual opportunity window of 120 days from 1 June through 30 September of each season when the fall run salmon are normally not in the river. Construction out of the water will occur throughout the year with appropriate erosion control measures. The restoration plantings are also seasonally restricted to the winter months when planting materials are dormant. Construction design, revegetation design, permitting, monitoring, and acquisition of conservation easements are being done for each segment of the Mining Reach as funding becomes available. The funding requests may be divided among different construction, revegetation, and monitoring tasks of the project for ease of tracking and administering differing funding sources.

Some of the dike and reconstruction materials are anticipated to be supplied by mining from existing tailings deposits that are located at the upstream end of the mining reach and are regulated under County use permits. One benefit of using these tailings is that it may be possible to restore additional floodplain habitat during the mining of these excavation areas. Significant quantities of materials will be

purchased from existing active mining areas on the backside of the setback levees to reduce haul costs. If most of the materials are locally available they can be hauled to the project site on private roads, so the impact on public roads should be minimized. The project EA/IS identified and addressed mitigation for utilization and transportation of the various sources of restoration materials locally available for this project. Additional materials for the major setback levees may need to be imported into the site. There are additional deposits of dredger tailings along the Tuolumne River and near Snelling along the Merced River. We have an option to utilize some of the clean rock materials from January 1997 flood debris excavated from La Grange reservoir, however the haul cost is currently much higher than other sources.

Creation of the riparian floodway habitat zone by the setback dikes will require the long-term maintenance of project improvements. TID and MID will jointly hold conservation easements from willing sellers that protect the public investment, but at the same time protect the land owner's property and water rights. The finalization of the EA\IS required resolution of the complex compensation issues involved with the acquisition of the conservation easements in the Mining Reach, starting with the 7\11 Segment. The terms of the District's control of the conservation easements has taken time to resolve with the landowners due to their concerns over potential liability and public access to their remaining land. The landowners have agreed to the same process for easement acquisition in all four segments in the Mining Reach. Perpetual maintenance of project facilities will be by the Districts. Elimination of any overlapping jurisdictional boundary between the restoration project works and the existing mining company SMARA reclamation plans will require revisions in the reclamation plan boundaries that are a part of the County Use Permits issued to the mining companies.

The following is a list of the agencies and associated permits to be acquired, with the assistance of the firm EDAW, in each of the four Mining Reach Project segments.

1) A Nationwide 27 Permit from the USACE, including a 404 wetlands delineation.
2) A1600 Series Streambed Alteration Agreement from CDFG.
3) A Mining Lease and Boundary Delineation finding from the State Lands Commission.
4) Modification of the Stanislaus County use permits for the mining operations.
5) A RWQCB 401 Water Quality Permit.
6) An Encroachment Permit from the Reclamation Board.

5. MONITORING PLAN & PERFORMANCE MEASURES

A detailed project specific mitigation and monitoring program was developed as part of the EA/IS for the entire Mining Reach Project and is applicable to the Warner-Deardorff Segment No. 3 as the third element of that project. Table 1 shows the type of monitoring to be performed based on specific sized hydrologic events. Uncertainty in the actual sequence of runoff events can affect the final schedule in the monitoring program. The monitoring period for the project will need to be longer than the three year limitation for CALFED funding. Added funding will be needed in subsequent years through future PSPs or through an extension granted for the monitoring portion of the CALFED funds that are awarded with the PSP 2002. Table 2 outlines the monitoring and data collection that will used to track the restoration activities. The monitoring activities can be grouped into three basic areas.

1. Physical & Geomorphic Processes:

Pre and post construction changes will be recorded from the as-built engineering drawings. This assures that the desired channel contours and cross sections were built as designed and these as-built records can be used to assess future geomorphological changes after major flood events. Permanent survey benchmarks are being established throughout the project to facilitate monitoring. Tracer rock studies will be used to monitor bedload movement and verify estimates of sediment transport developed from pre-project monitoring studies.

2. Riparian habitat:

Revegetation will require annual inspections during the first few years to confirm survival of planted materials, perform replanting if deemed necessary, and to assess natural changes in the vegetation mix. Monitoring vegetation would then be reduced to evaluations after significant flood events. The revegetation design uses 50-foot wide (0.04 acre) hexagonal planting modules that are designed to facilitate monitoring because the center point for any "hex" can be relocated at a later date from the as-built drawings to allow for post project monitoring. There are 18 different hexagonal planting units classed by predominant vegetation type. These planting units are grouped together to recreate the diverse mosaic patches and strings of vegetation found on undisturbed areas of the Tuolumne.

3. Fishery Resources changes:

This will involve evaluation of pre and post project changes in habitat conditions and populations for both fish predators and salmon. Monitoring criteria would include items such as flow velocity, temperature, comparisons of estimated transit time through the old vs. new stream channel, combined with sampling observations of fish populations and spawning riffle conditions. Temperature and production models developed for the Tuolumne River, as part of the FERC riverwide monitoring program, will be used in the fishery resource evaluations.

Pre project monitoring started in 1998 to provide two seasons of baseline conditions for project evaluation. Bedload transport sampling was conducted in March 2000 under separate TRTAC funding and the results will be applied to refining the physical process monitoring.
Post project monitoring will start after the completion of the 7\11 Segment No. 1 and will progressively increase in aerial extent as more segments are restored. The project specific monitoring was designed to compliment and not duplicate the riverwide fishery monitoring requirements required in the FERC Settlement Agreement (FSA). Annual project monitoring summaries will be provided to the TRTAC.

The first level of peer review for monitoring comes from the biologists that make up the regular representation on the TRTAC. There is a Monitoring Subcommittee of the TRTAC charged with close technical review of the FSA and project specific monitoring. The firms of Stillwater Sciences and McBain & Trush provide technical design of monitoring programs and analysis of the results. Outside peer review of the TRTAC monitoring programs took place in December 1998 when the UC Davis Centers for Water and Wildland Resources prepared a peer review evaluation of competing fry and smolt survival methods currently used on the Tuolumne River. The June 2001 Adaptive Management

Forum sponsored by AFRP and UC Davis - Center for the Environment has also provided peer review comments for the monitoring associated with the conceptual models developed for the projects.

6. DATA HANDLING & STORAGE

The project elements to be monitored are shown in Table 1. Table 2 summarizes the general hypothesis, monitoring parameters, and data evaluation approach for each parameter that will be in the project specific monitoring program for the Mining Reach Project. Reports and analysis will be prepared by the firm contracted to conduct the monitoring and these will be submitted to the TRTAC for review. These monitoring reports will be part of the annual Status Report submitted to FERC along with the associated riverwide monitoring conducted by the Districts. Copies of project related monitoring reports would also be submitted to the CALFED funding administrator as part of the deliverables under the CALFED contracts.

7. EXPECTED PRODUCTS & OUTCOMES

The Warner-Deardorff Segment No. 3 is full-scale implementation of a restoration project that entails easement acquisition, permitting, construction, and post project monitoring. In addition to the project related monitoring in outlined in Section 5, the typical deliverables for the actual construction include engineering design drawings (partially funded under the prior PSP for the MJ Ruddy Segment No. 2), construction bid specifications, biological surveys and associated permits from the regulatory agencies, appraisals for land acquisition and conservation easements, and recorded easement documents.

Completion of the restoration construction, including the riparian revegetation of the project area, will be the primary physical product from this project. Evidence of project functional success will be shown if monitoring confirms desired fluvial and geomorphic processes occur in the restoration area during the intended flow event. An indication of success for fishery related processes include estimates of increased numbers of redds and other improvements in spawning & emergence related activities.

8. PROJECT SCHEDULE

The project timeline in Attachment No. 3 shows the schedule of major activities for the Warner-Deardorff Segment in relation to the four Mining Reach Projects and the two SRP projects. Preliminary design and permitting work started on this project in June 2000 as part of the design and permitting already funded for the upstream MJ Ruddy project. This PSP will fund permitting and ROW acquisition in 2002 and construction starting in spring 2003. A delay in funding or development of a cooperator agreement with the funding administrator can have serious impacts on construction. There is a limited period between 1 June and 30 September when inchannel restoration work is allowed by the regulatory agencies. All the Rights-of-Way and permitting must be completed prior to the start of construction and the design work must proceed these two tasks.

TABLE 1 Mining Reach Monitoring Elements: schedule based on a sequence of hypothesized flows.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Hypothetical annual peak discharge in cfs		***3650***	***7280***	***2980***	***1200***	***10400***	***8010***	***6870***		
CONSTRUCTION	PHASE I	PHASE II	PHASE III	PHASE IV						
MONITORING ELEMENTS										
PHASE I										
GEOMORPHOLOGY	pb	ab,rx	n, rx, xs, thal			rx*, xs, thal	xs, thal	xs, thal		
FISHERIES	map	map, sss	Sss	sss	sss	Sss	sss	sss#		
RIPARIAN		ab, pp, $	bio, $	pp	pp	Bio	pp, bio			
PHASE II										
GEOMORPHOLOGY	pb		ab, n, rx, thal			rx*, xs, thal	xs, thal			
FISHERIES		map	map, sss	sss				sss#		
RIPARIAN			ab, pp, bio, $	$	pp	pp, bio	bio	pp, bio		
PHASE III										
GEOMORPHOLOGY	pb			ab, rx, thal		rx*, n, xs, thal	xs, thal	xs, thal		
FISHERIES			Map	map, sss	sss			sss#		
RIPARIAN				ab, pp, $	$	pp, bio	pp, bio	bio	pp	
PHASE IV										
GEOMORPHOLOGY	Pb				ab, rx	rx*, xs, thal	n, xs, thal	xs, thal		
FISHERIES				map	map, sss	Sss		sss#		
RIPARIAN					ab, pp, $	$	pp	pp		pp

Geomorphology symbols: pb = pre-built channel topography; ab = as-built channel topography; n = Manning's "n" hydraulic calculation; rx = bed mobility with tracer rocks; thal = channel vertical adjustment with thalweg profile; xs = channel planform adjustment with cross-section profiles; * = bed mobility observed; Fisheries symbols: ef = bass abundance by electrofishing; sv = smolt survival estimate; map = habitat mapping; sss = annual spawning and seining surveys; # denotes that spawning surveys will occur annually by CDFG Riparian symbols: pb = pre-built vegetation; ab = as-built vegetation; pp = project performance plots; bio = bioengineered bank protection; $ = last year of irrigation

TABLE 2 Turlock Irrigation District AFRP – CALFED Project Monitoring Plan Summary

Project: Tuolumne River -- Warner / Deardorff Segment of Mining Reach 20 Sep 01

Summary of Ecological & biological objectives, hypotheses, and monitoring parameters and approaches:

1) Objective: Restore and increase habitat for natural salmon production			
Hypothesis	Monitoring Parameter	Data Evaluation Approach	Comments
A. Restore alternate bar (pool riffle) morphology.	Pre vs. post construction and topographic changes.	Measure channel cross sections after construction from as-built drawings.	As-Built drawing becomes starting point for fluvial process monitoring.
B. Restore spawning habitat.	Area of riffles created from channel re-construction	Evaluate use during spawning period, redd counts, etc.	

2) Objective: Reconstruct a natural channel geometry scaled to current channel forming flows			
Hypothesis	Monitoring Parameter	Data Evaluation Approach	Comments
A. Geomorphological & fluvial process occur at channel forming flows (approx. 5,000 cfs)	Channel thalweg movement	Measure cross sections after flow events of predetermined magnitude.	Frequency of occurrence subject to random timing of flow events. Target three samples.
	Bed load mobility	Monitor movement of tracer rocks, D84 & D50 size, after flow events of predetermined magnitude.	
	Bed load mobility	Take surface pebble counts and subsurface bulk samples to evaluate size distribution.	
	Bed load mobility	Calculate effective Manning's "n" during flow events	
B. Floodway will convey design flow (15,000 cfs in this reach of the river) without damage.	Post event channel changes; particularly vegetation and project facilities.	Visually inspect after flow event.	Frequency of occurrence subject to random timing of flow events. Target three samples.
	Dike Maintenance & Operation	To be developed by end of	Coordinate with County SMARA

	Plan	construction.	reclamation plans

3) Objective: Restore native riparian plant communities within their predicted hydrological regime			
Hypothesis	Monitoring Parameter	Data Evaluation Approach	Comments
A. Composition and distribution of native riparian vegetation can be re-established.	Survival: 90 % 1st year, 70 % 2nd year, & 60 % 3rd year with 10 % increase in cover in same period.	Set up permanent plots to track survival. Evaluate vigor, size, species dominance, canopy coverage, etc.	Plants will be irrigated for year 1 & 2
B. Establish different plant series on appropriate reconstructed geomorphic surfaces.	Pre & Post construction vegetation mapping.	Up to 20 separate plant series (landscape types) will be used to re-create plant community diversity within floodplain.	Protection from beavers will be necessary.
C. Bio-engineering is effective bank stabilization	Survival of vegetation plantings.	Evaluate vigor, size, species dominance, canopy coverage, etc.	
	Stability of bank	Document changes in bank stability after specified flow events.	Frequency of occurrence subject to random timing of flow events. Target three samples.

4) Objective: Reduce salmon fish predator habitat			
Hypothesis	Monitoring Parameter	Data Evaluation Approach	Comments
A. Reduce potential to breach dikes and connect off-channel mining pits to the main river channel.	Pre vs. post project construction changes.	Measure channel cross sections after construction. Using as-built drawings and topographic and photogrametry data.	Proposed setback dikes are wider and higher than current dikes.

B. ECOLOGICAL & BIOLOGICAL BENEFITS

1. ERP GOALS and CVPIA PRIORITIES

The Mining Reach projects address the ERPP objectives and visions for the Tuolumne River Ecological Unit identified on pages 409 & 410 of the ERPP Vol. II. These include restoration of stream & riparian habitat; ecological processes; gravel recruitment, transport, and cleaning processes; a diverse self-sustaining riparian corridor; and predator reduction.

2. RELATIONSHIP TO OTHER ECOSYSTEM RESTORATION PROJECTS

The types of restoration projects along the 52 miles of the lower Tuolumne River are based on the anticipated fluvial & geomorphological processes and the fall run chinook salmon life stage associated with that reach of the river. The Habitat Restoration Plan developed by the TRTAC describes this in more detail with seven reaches and associated project types. A summary description of the Habitat Restoration Plan, pages 9 and 10, can be found on the TID web site, www.tid.org. The goal of the restoration projects is to have higher numbers of returning salmon combined with more stable levels of natural fall-run salmon production. This is to be achieved through improvements in spawning conditions in the upper reach of the river combined with increased and improved spawning areas and habitat in the Mining Reach area plus reduced predation in the SRP areas.

The Warner-Deardorff Segment No. 3 is the third of four segments in the 6.1 mile long Mining Reach Project. The projects in this reach are characterized by creating wider functioning floodplains and improved riffle pool channel forms that benefit fry and smolt survival and provide improved spawning areas. The floodplains also provide improved connectivity of riparian forest species. Downstream, at river mile 25.1 to 26.0, the TRTAC is sponsoring two predator isolation projects, SRP 9 & SRP 10. The principle focus of these projects is on improving survival of out-migrating salmon fry and smolts. Construction of SRP 9 began in June 2001 and will be completed by the end of the year, including the revegetation. The SRP projects involve refilling inchannel-mining pits to reduce the lake-like bass habitat and returning the channel to a pre mining riffle pool sequence with riparian planting on the recreated floodplain.

Upstream of the Mining Reach near La Grange, the restoration projects focus on improving spawning conditions, including improvements in the quantity and quality of the spawnable gravels. The DFG has a multiphase gravel introduction project that started in 1999. The AFRP and CALFED have funded development of long-term course and fine sediment management plans for this area. A TRTAC sponsored project for long term aggregate acquisition to supplement restoration material needs is being submitted as a separate 2002 PSP.

In the Tailings Reach between the Mining Reach and the Spawning Reach, the Friends of the Tuolumne (FOTT) have acquired lands known as Bob Cat Flat and two riffle improvement projects at river mile 43 and 44 are under development for separate PSP submittals. The project at RM 43 has 4-Pumps funding and will be administered by TID for the FOTT.

Downstream of the SRP projects there are riparian habitat projects like the Grayson River Ranch sponsored by the Friends of the Tuolumne and funded by AFRP and NRCS. The Stanislaus County Parks Department in conjunction with the cities of Modesto, Ceres, and Waterford are using the concepts and criteria developed in the Habitat Restoration Plan in the preparation of a comprehensive river parkway planning effort.

3. REQUEST FOR NEXT PHASE FUNDING

The Warner-Deardorff Segment No. 3 of the Mining Reach Project was originally submitted for the PSP 2001 funding cycle. The only portions of the project funded under the 2001 PSP were preliminary (30%) design, permits, and appraisals. There have been no changes in project scientific merits and adaptive management framework from that proposal to the current proposal. The current proposal does have a more extensive description of the conceptual models developed for the Adaptive Management Forum. The overall costs of the project have increased based on the recent costs of materials for the SRP 9 project and the contract for the 7/11 Segment No. 1 of the Mining Reach Project combined with better survey information on the quantities of materials required.

The status of the Warner-Deardorff Segment No. 3 is as follows. The design has proceeded to the preliminary stage and is out for review. Preliminary special status species surveys have started and this will be used for the regulatory permits required for construction. Work has started on the appraisal background valuations and ROW mapping.

4. STATUS OF PRIOR CALFED-AFRP FUNDED PROJECTS

A) Mining Reach – 7/11 Segment No.1 (CF1997-M09): The design and permitting is complete. Appraisals for conservation easements are complete and the valuation offers accepted by the landowners in February 2001. However, three landowners have since asked for changes in the language of the easement documents, effectively holding up construction that was slated to be started this spring. The construction contract for the work has been negotiated, but execution of the contract is pending resolution of the easement terms. Construction is anticipated to start in October 2001.

B) Mining Reach – MJ Ruddy Segment No.2 (CF1999-F02): The engineering design drawings have been completed to the preliminary (30%) stage and are currently out for comments. The special species surveys required for the regulatory permits have been started. Appraisal work has begun on the conservation easements. The preliminary design engineering for the Warner-Deardorff Segment of the Mining Reach was started with the MJ Ruddy Segment so that regulatory permits for both projects could be obtained simultaneously, saving approximately $80,000 in CEQA, NEPA, and permitting costs.

C) Special Run Pool 9 (CF1997-M08): The first of two years of pre-project monitoring was completed in the summer of 1999 and the project design was completed in late 2000. In addition to the CALFED-AFRP funded restoration work in SRP 9, the Turlock Irrigation District funded the design and construction of intake screens for an infiltration gallery under the restored river channel. The infiltration gallery is intended to allow a portion of the irrigation water normally diverted from the river at

La Grange Dam, to be left in the upper 26 miles of the river before being diverted into a nearby canal. Construction of the SRP 9 Project started in June 2001. The earthwork will be completed in early October and the revegetation planting is scheduled for December 2001.

D) Special Run Pool 10 (CF1999-F01): This project has three parts. During the construction of SRP 9, the breach in the dike separating SRP 10 and a large off-channel mining pit was filled in to eliminate a significant source of bass predation on juvenal salmon. Also a second year of the pre-project monitoring was performed on SRP 9 and SRP 10 under funding for the SRP 10 Breach Repair Project. In the 2001 PSP (CF2001-B201), only the design work for the full scale SRP 10 Project restoration was funded. The cooperator agreement between the funds administrator, National Fish & Wildlife Foundation (NFWF), and TID to allow that work to start is anticipated will be in place by mid October 2001.

E) The Course Sediment Plan, Funded separately by AFRP (CVPIA 3406(b)(1) program), involving gravel quality improvements in upper reaches of the river near La Grange, started in October 2000. This project looks to identify the best places to increase supplies of course sediment in the upper reaches of the Tuolumne River and where to reduce the sources of fine sediment entering the primary spawning areas of the river. The work is approximately 40% complete. One outcome of this study will be an aggregate acquisition and wetlands restoration project submittal for the PSP 2002.

F) The Fine Sediment Management Plan (CF2001-C208) is the companion project with the Course Sediment Management Plan. The cooperator agreement between NFWF and TID has just been completed and work should start in October 2001.

5. SYSTEM-WIDE ECOSYSTEM BENEFITS

The Mining Reach Project involves widening the channel to create a 500-foot wide riparian floodway. This removes a major bottleneck in the flow capacity of the river by allowing the channel to convey a flow of 15,000 cfs, up from the current capacity of 7,000 cfs. The maximum regulated release from Don Pedro is 14,500 cfs. Enabling these higher flows to be released without damaging the adjacent aggregate mining operations also allows a wider extent of periodic fluvial processes to occur over the entire river below La Grange Dam that cannot occur under current operations. A key element in the restoration design is to return dynamic fluvial processes to the river channel, but at a scale that fits the current regulated hydrologic regime. The aggregate in this reach of the river historically was mobilized by larger unregulated flows. Under the current conditions it takes a bankfull discharge of 5,000 cfs to mobilize the D84 sized rock. With a 15,000 cfs capacity, more extensive channel bed mobilization and associated fluvial process can periodically occur to benefit aquatic and riparian resources.

6. LAND ACQUISITION

There are four parcels that will be affected by this project. All four landowners signed "project concurrence" forms when the original PSP 2001 was submitted and these are on file with CALFED. These landowners were involved with the rest of the landowners in the Mining Reach that we have been

working with since 1997. They also participated in the Public Outreach programs conducted in 1998. The portion of their lands covered by this project are covered under a pre-SMARA county use (mining) permit #1211, only about 40 acres owned by the three Warner brothers was mined. This mined area now forms a pond that is the primary source of entrapment for out migration of salmon fry because the pond dikes are usually the first to breach in the Mining Reach. Mr. Deardorff has provided the District with proprietary information on the aggregate and mineral quantities and prices for his unmined portion of the project and these were incorporated in the project budget. There are no orchards or other farmable agricultural lands involved in the Warner-Deardorff Segment of the Mining Reach Project. There are remnants of a heron rookery on a portion of the Deardorff parcel that will need consideration in the final riparian floodway revegetation design. Mr. Deardorff has indicated that if the restoration project is not funded he will proceed to mine his portion of the project area in conjunction with another portion of his property that is to be converted to mining with in the next few years.

C APPLICANT QUALIFICATIONS

Since 1971, TID, MID, and CCSF have, in cooperation with DFG and USFWS, monitored river conditions and developed programs that enhance the natural production of fall-run chinook salmon in the Tuolumne River. The project manager for these activities has been TID.

1. TRTAC and Other Local Support for Project

The firm of McBain & Trush was retained in 1996 by TID through the TRTAC to develop an integrated, long-term salmon and riparian habitat restoration plan for the Tuolumne River below La Grange Dam using fluvial geomorphology principles. They prepared preliminary designs for specific restoration projects, which had been approved by the TRTAC participants as high priority projects. The Mining Reach had long been identified as a portion of the river that had been substantially altered by past and present aggregate mining operations. In the aftermath of the January 1997 flood, the TRTAC participants identified the 6.1 mile long flood-impacted Mining Reach as an important time-sensitive opportunity to reconstruct this portion of river channel to restore more natural geomorphic processes and riparian forest conditions.

2. Project Management

The Program Manager is Wilton Fryer, P.E. Mr. Fryer graduated from the University of California at Davis with a BS in Soil & Water Science, an MS in Irrigation Science, and later an ME in Civil Engineering with an emphasis in water resources. He is currently registered as both a Civil Engineer and an Agricultural Engineer. Accomplishments: Development and implementation of the Oakdale Irrigation District Irrigation Master Plan; Directed a $22 million canal rehabilitation project for OID where 54 miles of dirt canals were replaced with pipe; Development of the OID domestic water service system; Designer and project manager for a replacement water treatment plant for the TID La Grange Domestic Water System; Restoration program manager for TID since July 1996.

Tim Ford has been the staff aquatic biologist for both TID and MID since 1981. Mr. Ford graduated from the University of California at Davis with BS in Wildlife & Fisheries Biology in 1977. He worked as a Biological Technician for the Modoc, Tahoe, and Stanislaus National Forests prior to

working for the Districts. Mr. Ford is tasked with planning, coordinating, and conducting the aquatic resources program for the Districts, and his responsibilities at TID include field studies, monitoring programs, program development, consultant supervision, and coordination with Don Pedro project operations. TID staff will provide contracting support and financial service support as needed.

3. Consultants

Consultants retained during the first phase of the Mining Reach and SRP 9 projects continue to be retained for subsequent phases of the projects to insure continuity in the design and analysis. The engineering firm of HDR Engineering, Inc. has been retained to prepare detailed construction plans and specifications, conservation easement related maps and documents, and oversee construction management. The firm of EDAW Inc. has been retained to perform the CEQA and NEPA environmental work, prepare biological surveys, and to obtain necessary State and Federal permits. The firm of HART, Inc., will provide revegetation design and the supply of native plant materials. The firm of Specialty Appraisals provides certified appraisals for acquisition of conservation easements.

The firm of McBain & Trush has performed project concept design work, and will continue to provide oversight during the detailed civil construction design work, revegetation design and implementation, and fluvial process monitoring. McBain & Trush is a professional consulting partnership specializing in applying fluvial geomorphic and ecological research to river management and restoration, particularly in regulated river ecosystems. The principals on this project are Scott McBain, Dr. William Trush, and John Bair. Scott McBain is a hydraulic engineer and fluvial geomorphologist with an MS in Civil Engineering from the University of California at Berkeley. He specializes in effects of high stream flows on channel morphology, bedload transport, watershed sediment yields, and stream restoration. Dr. William Trush is an adjunct professor in the California State University Humboldt (CSUH) Fisheries Department, specializing in anadromous fish ecology, anadromous fish interactions with fluvial geomorphology, channel maintenance flows and hydrology, riparian ecology, and stream restoration and management. He is also Director of the CSUH Institute for River Ecosystems. John Bair is a riparian botanist with an MS in Environmental Systems from CSUH. He specializes in riparian interactions with geomorphic processes and riparian restoration.

Stillwater Sciences is a firm of biological, ecological, and geological scientists. The company specializes in the integration of biological and geomorphic information to understand critical ecological processes and identify effective measures for maintaining and restoring functioning ecosystems. In addition to expertise in fisheries and terrestrial resources, its founding members have over fifty years of experience in fluvial geomorphology, sediment transport engineering, and stream habitat restoration issues associated with large dams. Stillwater Sciences has worked directly with the Tuolumne River Technical Advisory Committee (TRTAC) and the Turlock and Modesto Irrigation Districts to implement the 1995 FERC Settlement Agreement monitoring program. Principle staff working on the project are Jennifer Vick, MS Landscape Architecture, and Noah Hume, PhD, with over site by Dr. Peter Baker. Ms Vick has extensive experience in geomorphic and ecological analysis and restoration planning in the Central Valley. Dr. Hume has over 15 years experience as an aquatic ecologist and

environmental engineer working on projects emphasizing water quality and supply as it relates to fish population and composition.

D. PROJECT BUDGET

The total project cost is estimated to be $10,673,000. Approximately 73 acres of riparian floodway with an improved riffle-pool sequence in the adjacent river channel will be created in this 1.2-mile long segment of the Mining Reach Project. The cost estimate is based on construction experience with two current restoration projects and the engineering estimate of the work at the preliminary (30%) design stage. The increase in the project costs over the prior 2001 PSP estimate is primarily due to the cost of materials and the increased quantity of materials based on the design surveys currently available. There is over 500,000 cubic yards of imported fill in this project. ROW acquisition costs represent gross cost estimates. The ROW costs have some potential to be reduced because survey information indicates very little mineral rights remain to be purchased in one 40-acre mining pond and application of current regulatory setbacks on the remaining 35 acre piece could reduce the amount of aggregate that would need to be paid for. All 73 acres are subject to being mined under an old County use permit that predates SMARA regulations. The 35-acre Deardorff portion was never mined. Determination of the extent that regulatory limitations might now apply is anticipated to complicate the valuation process.

The estimated costs for mineral rights purchases stem from the pre SMARA Stanislaus County Use Permit #1211 for aggregate mining issued in 1965 and modified in 1973 that covers the project area. There is not an active contract to mine under this permit. It is not certain at this early stage in the project if current regulatory setbacks and other restrictions can be made to apply to this old permit. The mineral rights cost estimates for this project assumes that the bulk of the material, approximately 1,200,000 tons, would NOT be subject to these regulatory restrictions and are purchased at market costs. The landowner has provided proprietary information on quantities of aggregate and gold from boring logs and royalty rates. To the extent that the current regulatory restrictions do apply, the volume of the aggregate valued as a commercial reserve would be reduced thereby decreasing the project easement costs. A significant portion of the aggregate from the Deardorff parcel will be used in the creation of the floodway on the adjacent 40-acre pond.

The preliminary design of the Warner-Deardorff Segment No. 3 was integrated into the design work for the upstream MJ Ruddy Segment No. 2 to take advantage of reducing the environmental permitting costs by $88,000 and a potential to save an additional $35,000 in engineering costs, if the Warner-Deardorff PSP 2001 funding came through in time to not have a break in the design work. To make that combination work, the TRTAC contribution of $40,000 shown in the 2001 PSP for the Warner-Deardorff project was added to the $75,000 TRTAC cost share already slated for the MJ Ruddy project under AFRP cooperator agreement #11332-9-J025. As a result there is no additional TRTAC cost share shown under this PSP.

The basic project component costs consist of $6,929,000 for setback levee construction and floodplain reconstruction, $607,000 for revegetation, a $754,000 construction contingency,

$1,819,000 for mineral rights purchases, $83,000 for construction permits, $124,000 for construction management, $177,000 for project management, and $180,000 for project monitoring. The Districts will be contributing $40,000 to the monitoring and permitting costs under the MJ Ruddy Segment No 2 Project agreement with AFRP. The engineering estimate shown in Attachment 4 provides a better view of what goes into the project construction budget estimate than the CALFED budget table format on the web page.

E. LOCAL INVOLVEMENT

The parties most directly impacted by the proposed project are the four local landowners and the aggregate-mining operator, Santa Fe Aggregates. The TID staff and consultants started working with local stakeholders in 1997 and will continue to meet with the affected stakeholders to listen to and address their individual concerns. Recognizing those individual concerns, the landowners and the mining operators have been cooperative and supportive of the project. Periodic meeting are held with an executive committee of the landowners that will be involved with all six full scale restoration projects the TRTAC has identified, even those not yet funded. Typical discussions at these meeting include restoration project activities, terms and conditions in conservation easements, ROW appraisal processes, USFWS hazardous material surveys, project design issues, etc.

The formal process to acquire necessary conservation easements from willing sellers for the first phase of construction started in February 1999 in the 7/11 Segment of the Mining Reach. The landowners and mining operators have asked that design, ROW engineering, property appraisals, and completed conservation easements are in place prior to the start of construction, rather than entering into agreements such as Rights of Entry for Construction during completion of the conservation easement process. For the Warner Deardorff Segment this work will not be completed until summer of 2002, depending on how fast cooperator agreements are signed after the PSP award.

Several outreach meetings have been held with City of Modesto and Stanislaus County public works and planning agency staffs starting in December 1998. The Stanislaus County planning department is also actively involved with the Project induced modifications to the use permits for the mining operations in the project areas. Each set of affected mining use permits is modified so there no overlap between the County administered mining reclamation plan under SMARA regulations and the restoration project actions. The EA/IS for the four segments in the Mining Reach Project and Special Run Pools 9 and 10 went through a public hearing in June 1998. The comments received were addressed in the amended mitigation plan for the EA\IS. The final EA\IS was adoption in July 1999 and it outlines the mitigation and monitoring that are to be followed to minimize impacts associated with the restoration activities. There was also a public outreach workshop for the Habitat Restoration Plan attended by most of the landowners affected by the restoration projects. This workshop included presentations by TRTAC member groups and agencies. A 16-page summary of this plan can be viewed at the TID web page, www.tid.org. The following information is already on file with CALFED under the 2001 PSP for the Warner-Deardorff Project CF # 2001-C209: Copies of the notice letters for this phase of the project that were sent to the Stanislaus County Board of Supervisors and Planning

Department during the 2001 PSP process and signed project concurrence statements from the owners affected by the project.

F. COMPLIANCE WITH STANDARD TERMS & CONDITIONS

Applicant is a public entity. The applicable PSP project group type is Public Works Construction. The applicant agrees to the terms and conditions of the 2002 Proposal Solicitation Package and intends to comply with those terms and conditions.

It is anticipated that private contractors will perform a majority of the public works construction effort. The applicant will be deferring the requirement for submission of bid & payment bonds until such time as each subcontract is sought and awarded and before any work under the subcontract is performed.

G. LITERATURE CITED

Habitat Restoration Plan for the Lower Tuolumne River Corridor (McBain & Trush 2000)

AFRP / CALFED Adaptive Management Forum: Tuolumne River Restoration Summary Report (AMF Summary Report, Stillwater Sciences 2001)

Trinity River Maintenance Flow Study (McBain and Trush 1997)

Tiered EA/IS Mitigated Negative Declaration – Gravel Mining Reach & Special Run Pools 9/10 Restoration and Mitigation Projects July 1999 (SCH#98052070)

Tuolumne River Design Document (draft) (McBain & Trush)

Submitted by:

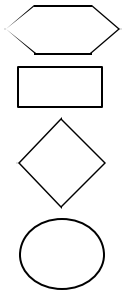
TURLOCK IRRIGATION DISTRICT

By Wilton Fryer
Habitat Restoration Program Project Manager

Date: 25 September 2001

The models attached are grouped into the following categories:
S = Salmon life cycle and limiting factors models
G = Geomorphic process models
P = Project -specific models

The shapes used in the flowcharts signify the following:



action

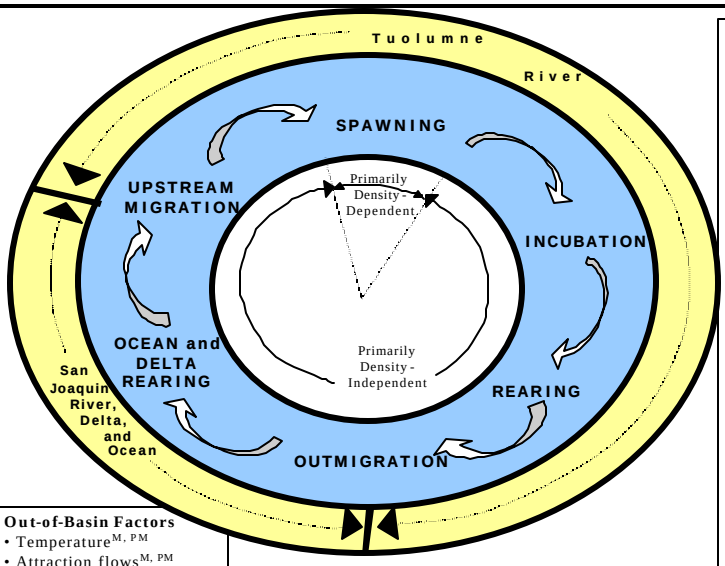
anticipated result

monitored parameter

decision point

In the S and G models, shading indicates pathways that are being targeted by current restoration actions.

Dashed lines (around boxes or as pathways) indicate increasing uncertainty.



Key In-Basin Factors

Affecting Adult Migration
•Flow
•Temperature
•Dissolved oxygen submodel

Affecting Spawning and Incubation Survival
•Redd superimposition*, PM [S-2]
•Habitat area M, PM [S-2, S-3]
•Substrate permeability *, PM [S-3]
•Water temperature M, PM [S-3]

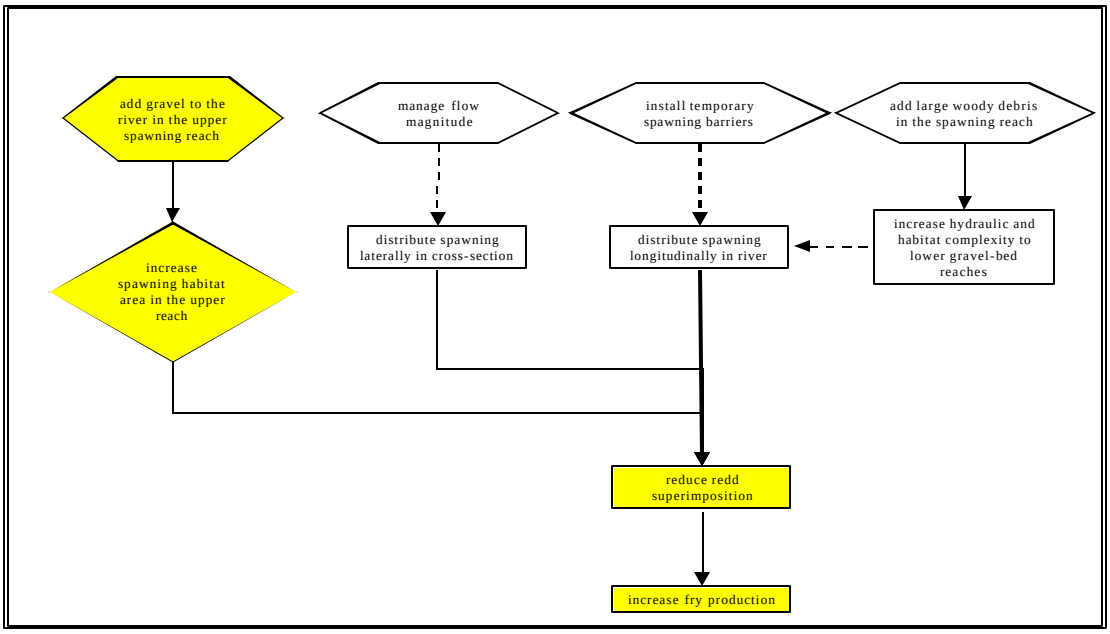
Affecting In-river Rearing Survival
•Water temperature M, PM
•Stranding M, PM
•Food supply PM
•Flow variability M, PM
•Habitat [G-1]

Affecting Outmigration Survival
•Spring flow *, M, PM [S-4]
•Temperature*, M, PM [S-4]
•Predation *, M, PM [S-4]

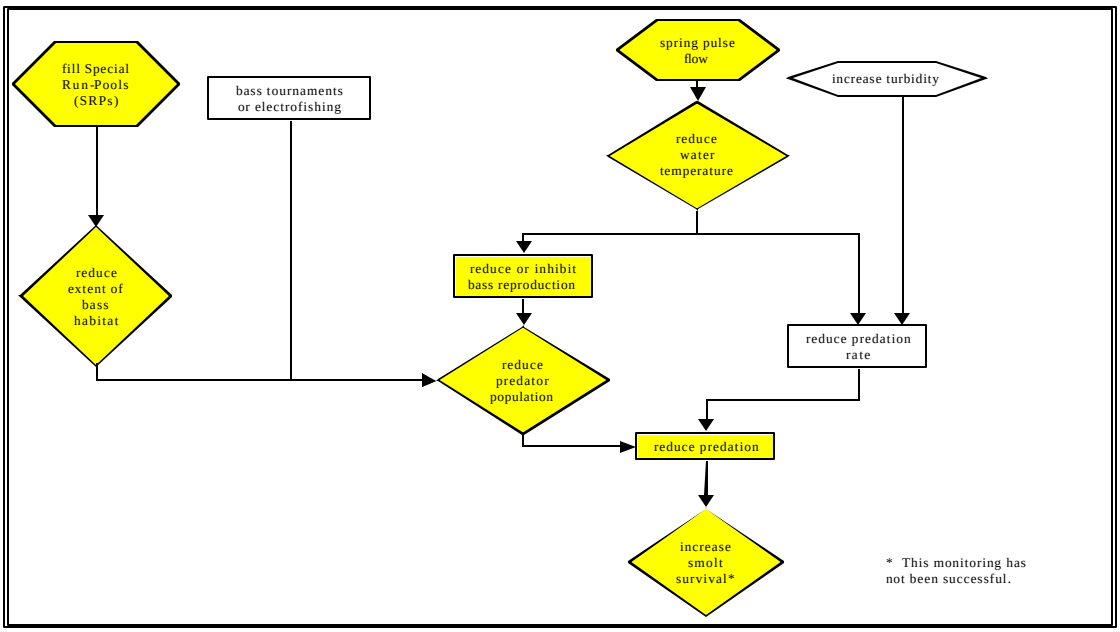
* Indicates factors that are considered to be limiting.
M Indicates factors that are currently being monitored.
PM Indicates factors for which past monitoring data are available.

Out-of-Basin Factors
• Temperature M, PM
• Attraction flows M, PM
• Water quality M, PM
• Dissolved oxygen M, PM
• Harvest*, M, PM
• Ocean conditions M, PM
• Delta export mortality *, M, PM

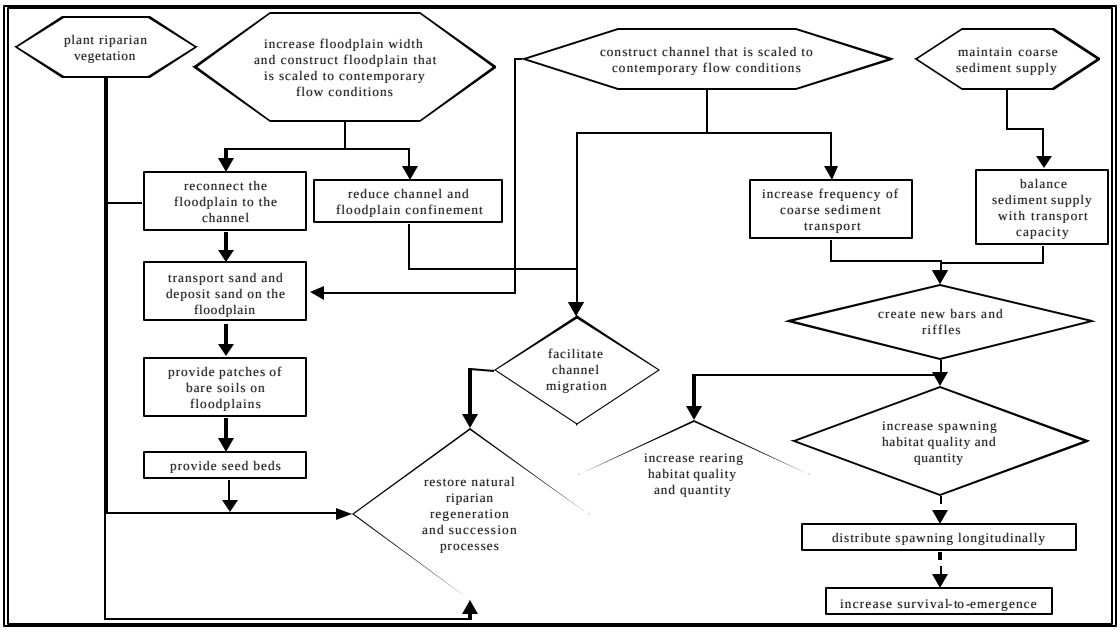
Model S-1. Overarching model of factors affecting chinook salmon population abundance in the Tuolumne River.
[Relevant submodel numbers are indicated in brackets.]



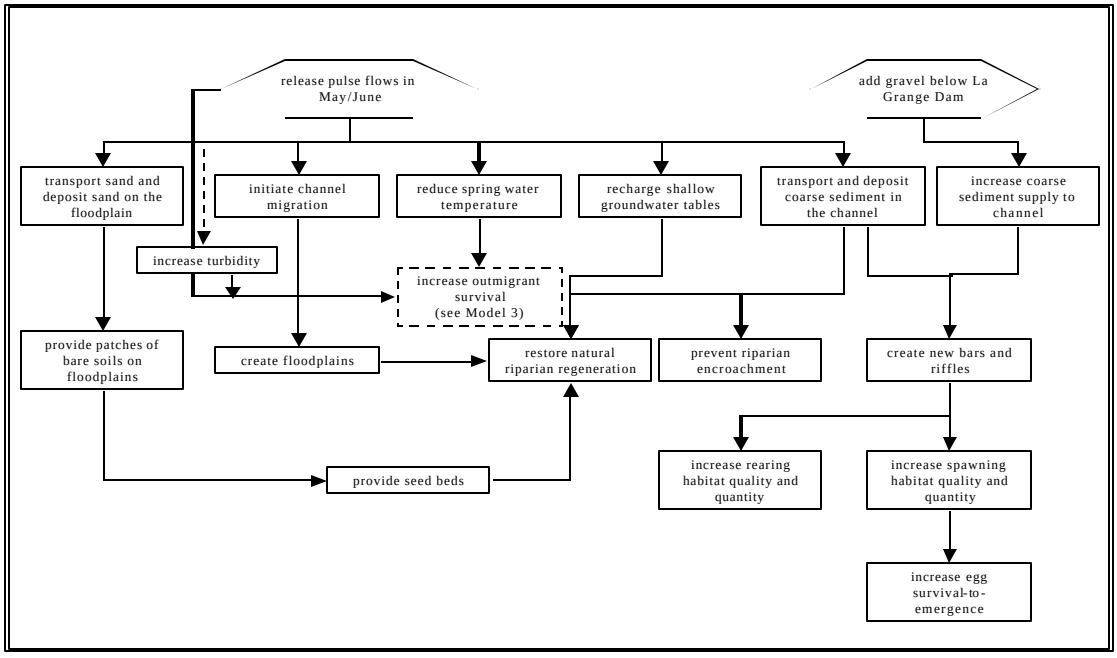
Model S-2. Potential alternative actions to reduce chinook salmon redd superimposition.



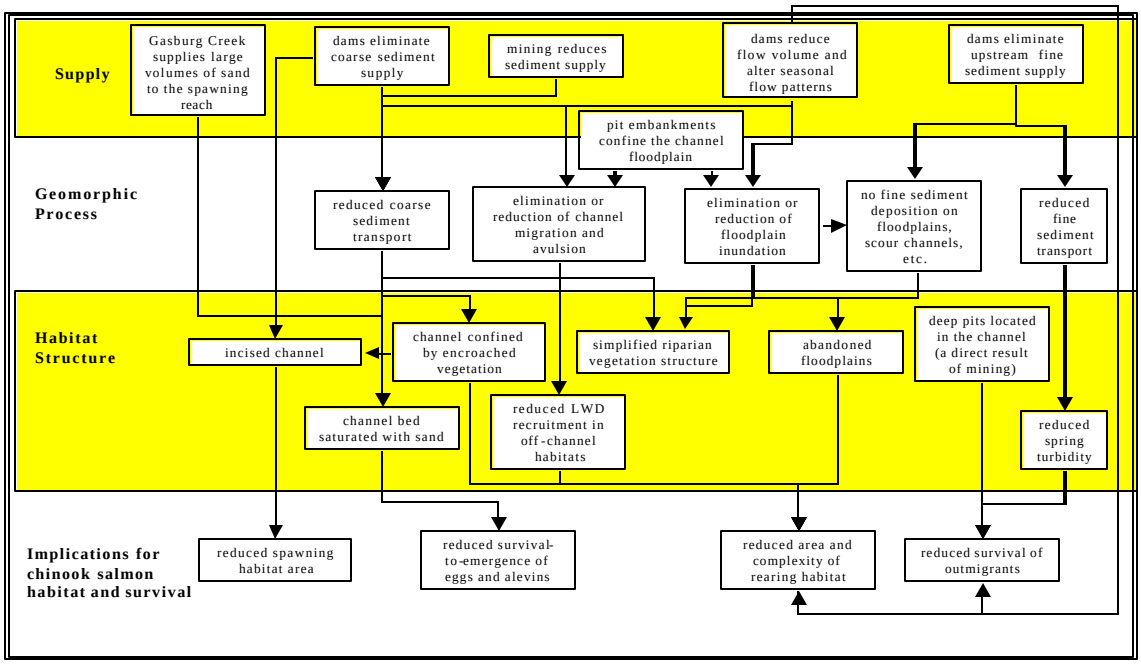
Model S-4. Potential alternative actions to increase juvenile outmigrant survival.



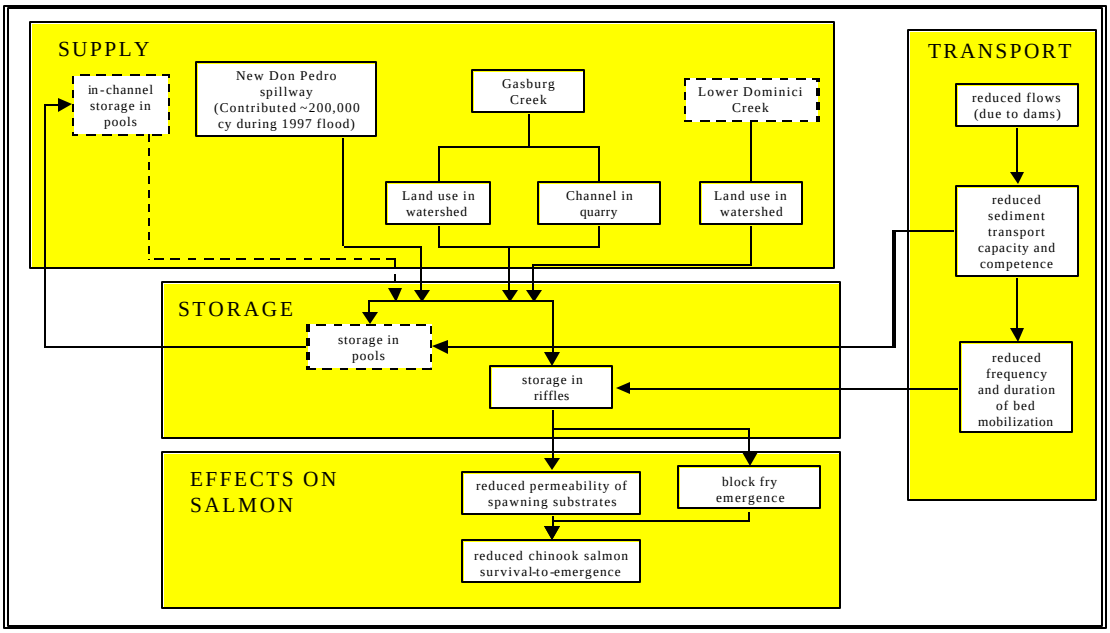
Model P-2. Effects of reconstruction of the Gravel Mining Reach on geomorphic processes, riparian vegetation, and chinook salmon survival.



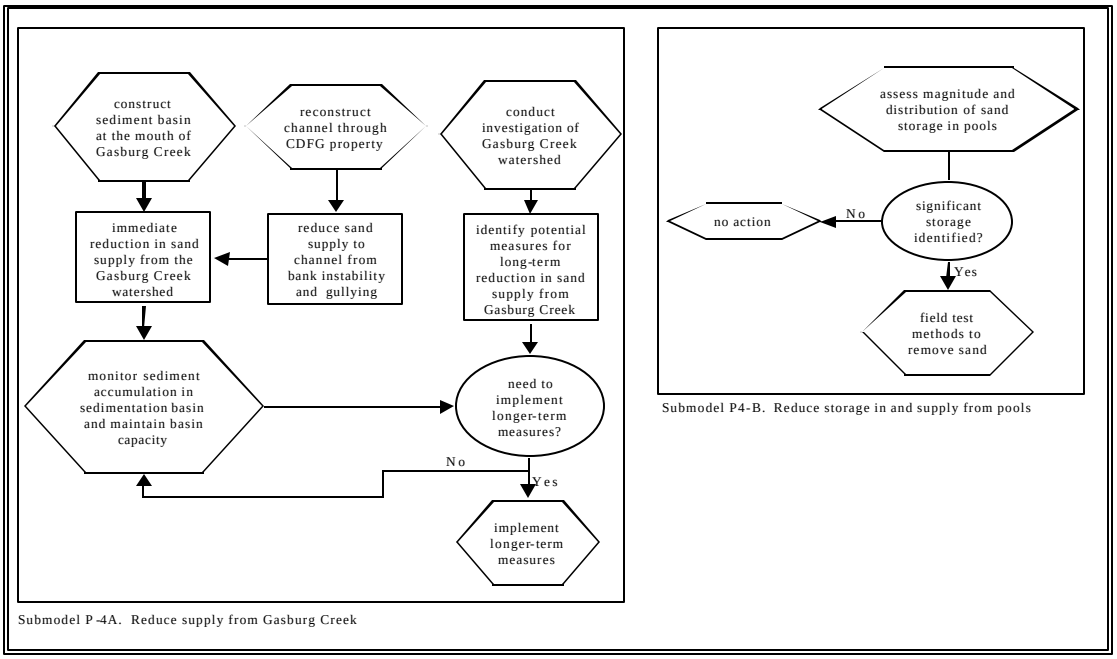
Model P-3. Effects of flow and coarse sediment management on aquatic and riparian habitat and chinook salmon survival.



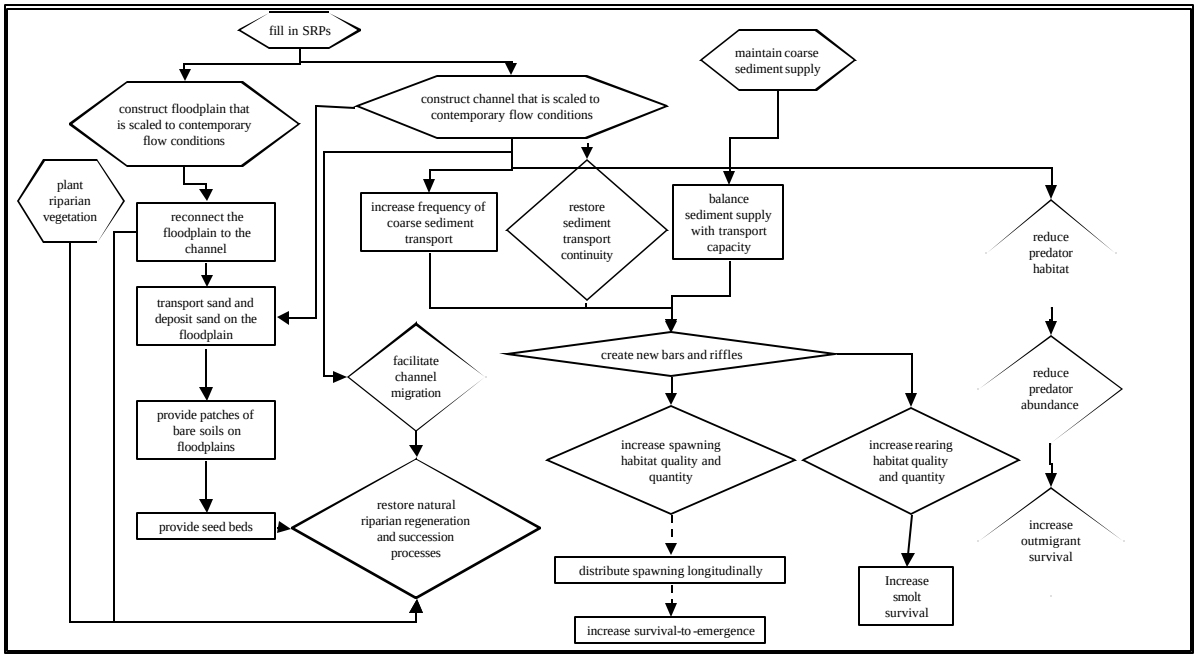
Model G-1. Overarching model linking the effects of dams and gravel mining to physical processes, habitat structure, and chinook salmon population response in the Tuolumne River.



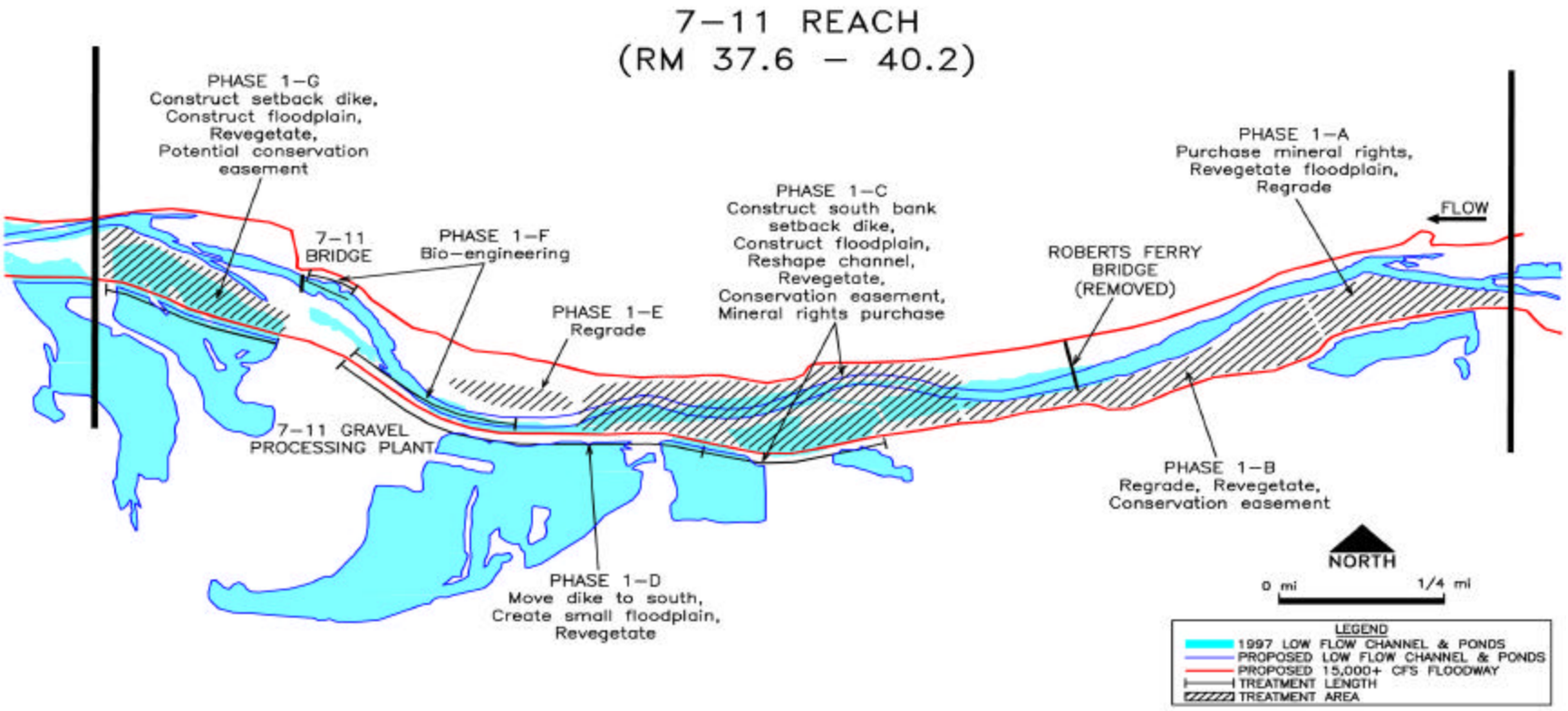
Model G-2. Fine sediment supply and storage and effects on chinook salmon survival in the Tuolumne River.



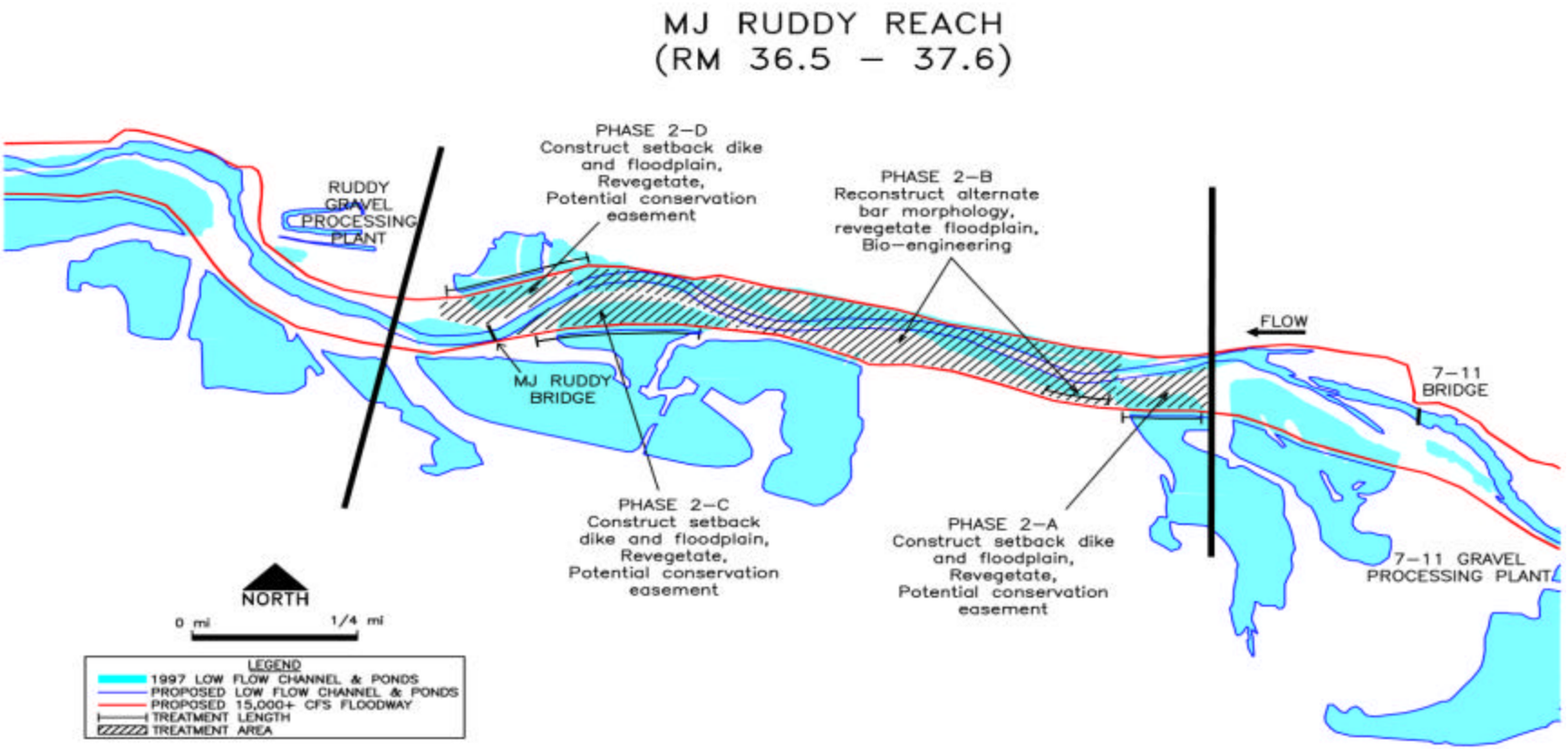
Submodels P-4A & P-4B. Measures to reduce sediment supply from Gasburg Creek reduce fine sediment storage and supply from pools.



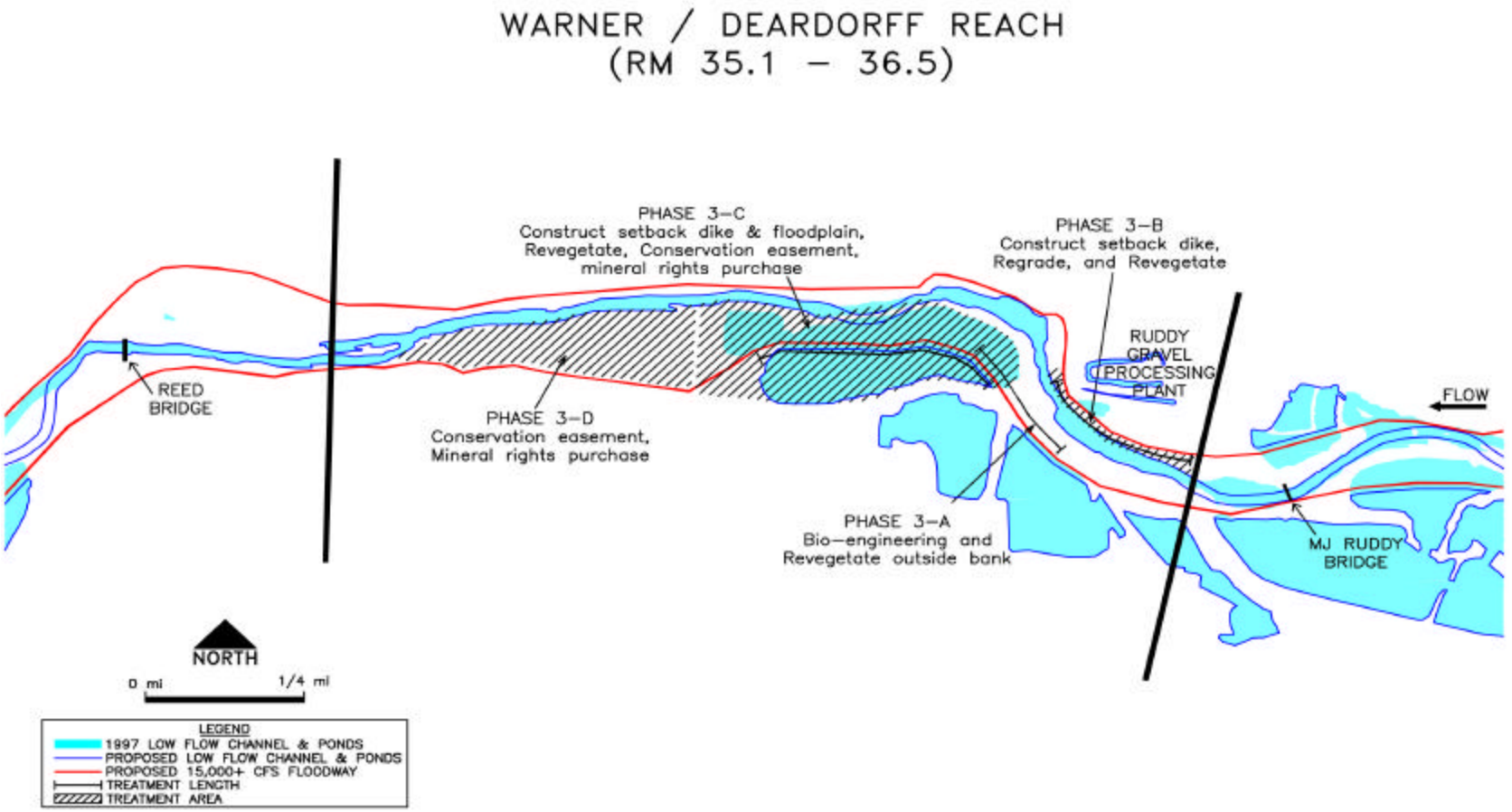
Model P-1. Effects of reconstruction of Special Run-Pools (SRPs) on geomorphic processes, riparian vegetation, and chinook salmon survival.



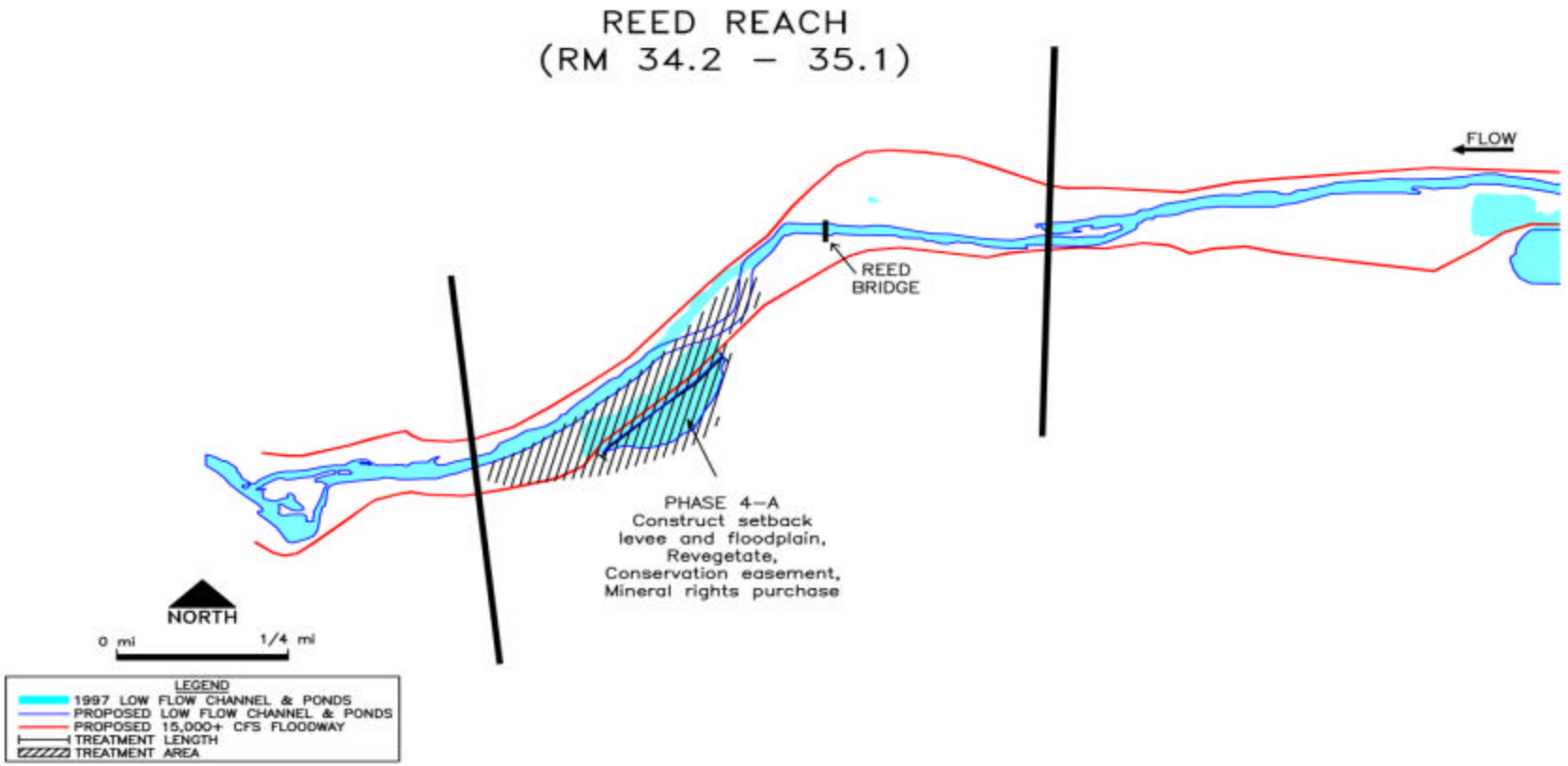
ATTACHMENT No. 2 – Mining reach Project Maps – Segment No. 2



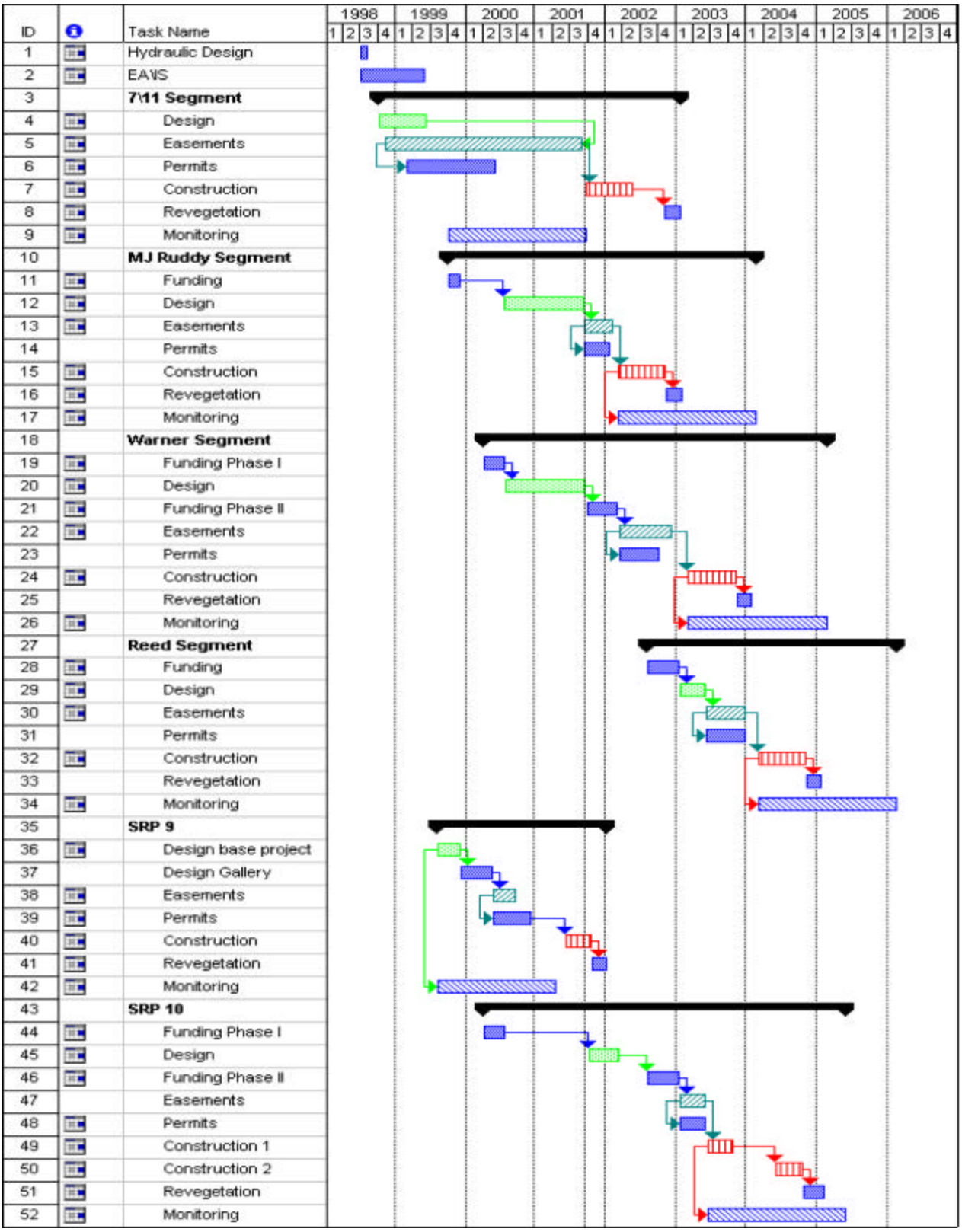
ATTACHMENT No. 2 – Mining Reach Project Maps – Segment No. 3



ATTACHMENT No. 2 –Mining Reach Project Maps – Segment No. 4


REED REACH
(RM 34.2 – 35.1)
FLOW
REED
BRIDGE
PHASE 4–A
Construct setback
levee and floodplain,
Revegetate,
Conservation easement,
Mineral rights purchase
NORTH
0 mi
1/4 mi
LEGEND
1997 LOW FLOW CHANNEL & PONDS
PROPOSED LOW FLOW CHANNEL & PONDS
PROPOSED 15,000+ CFS FLOODWAY
TREATMENT LENGTH
TREATMENT AREA

ATTACHMENT No. 3 – project Schedule



Engineer's Opinion of Probable Cost - 30% Design
Turlock Irrigation District
Tuolumne River Restoration **Warner - Deardorff Segment No. 3**
Date - 7/17/01 - TDB HDR Engineering

Construction Costs			Imp. Length	1.2 miles	
Item	Description	Unit	Unit Price	Quantity	Item Price
1	Trench and Excavation Shoring	LS	8,400.00	0	-
2	Clearing and Grubbing	ACRE	2,500.00	38.71	96,775
3	Instream Imported Fill	CY	11.00	31,588	347,468
4	Imported Mass Fill	CY	10.00	334,819	3,348,190
5	Imported Topsoil Fill	CY	8.00	63,779	510,232
6	Onsite Cut/Fill	CY	5.50	219,633	1,207,982
7	Dike Embankment	CY	10.00	70,903	709,030
8	Construct Dike Patrol Road Surface - 4" Thickness	SF	0.40	0	-
9	Construct Waterside Access Ramp	EA	24,000.00	2	48,000
10	Construct Landside Access Ramp	EA	3,000.00	0	-
11	Slope Vegetated Rock Slope Protection	SY	80.00	1,889	151,120
12	Place 1/2 Ton Rock Slope Protection	TON	65.00	0	-
13	Place 25 lb Rock Slope Protection	TON	65.00	0	-
14	Construct New Pipe Gate	EA	4,000.00	2	8,000
15	Construct Monitoring Survey Benchmarks	EA	500.00	6	3,000
16	Remove Miscellaneous Debris from Stream	LS	15,000.00	1	15,000
17	Remove Existing Barbed Wire Fencing	LF	4.50	200	900
18	Construct Barbed Wire Fencing	LF	4.50	0	-
19	Protect Existing Trees in Place (Misc. Costs)	EA	100.00	19	1,900
20	Tree Removal	EA	600.00	25	15,000
21	Protect Existing Irrigation Piping In Place	LS	2,000.00	1	2,000
22	Remove Existing Irrigation Laterals	LS	7,500.00	1	7,500
23	Scarify Existing Grade Terraces	ACRE	600.00	50	30,000
	Subtotal of construction				6,502,000
24	Soil Moisture Station	EA	600.00	3	1,800
25	Planting Module Type 1 - Rush	EA	747.50	30	22,425
26	Planting Module Type 2 - Sedge	EA	201.00	72	14,472
27	Planting Module Type 3 - Mugwort	EA	144.00	19	2,736
28	Planting Module Type 4 - Wild Rose	EA	201.00	45	9,045
29	Planting Module Type 5 - Blackberry	EA	207.00	17	3,519
30	Planting Module Type 6 - Lupine/Blazing Star	EA	624.00	0	-
31	Planting Module Type 7 - Elderberry	EA	202.00	34	6,868
32	Planting Module Type 8 - Arroyo Willow	EA	213.00	42	8,946
33	Planting Module Type 9 - Mulefat	EA	190.00	0	-
34	Planting Module Type 10 - Button Bush	EA	236.00	9	2,124
35	Planting Module Type 11 - Alder	EA	276.00	109	30,084
36	Planting Module Type 12 - Red Willow	EA	256.00	34	8,704
37	Planting Module Type 13 - Shining Willow	EA	256.00	25	6,400
38	Planting Module Type 14 - Black Willow	EA	288.00	67	19,296

39	Planting Module Type 15 - Mixed Willow	EA	299.00	33	9,867
40	Planting Module Type 16 - Cottonwood	EA	288.00	86	24,768
41	Planting Module Type 17 - Mixed Cottonwood	EA	311.00	162	50,382
42	Planting Module Type 18 - Ash / w/o Boxelder	EA	294.00	100	29,400
43	Planting Module Type 19 - Western Sycamore	EA	299.00	29	8,671
44	Planting Module Type 20 - Mixed Valley Oak	EA	311.00	382	118,802
45	Furnish and Install Beaver Protection	EA	50.00	1,078	53,900
46	Hydroseeding (Native Grass Species)	ACRE	2,000.00	3.9	7,800
47	Irrigation (1 Years Post Construction)	LS	160,000.00	1	160,000
48	Dewatering	LS	-	0	-
49	Silt Fence	LF	0.90	7,300	6,570
	Subtotal of revegetation				607,000
	Rounded Construction Subtotal				$ 7,109,000

General Contractor Indirect Costs

Construction Management (Contractor)	Percent	1.00%	$ 7,109,000	$	71,090
Field Office	Month	8	$ 500	$	4,000
Builders Risk Insurance	Percent	0.00%	$ 7,109,000	$	-
All Risk Insurance	Percent	0.40%	$ 7,109,000	$	28,436
Public Liability Insurance	Percent	1.00%	$ 7,109,000	$	71,090
Performance Bond	Percent	1.00%	$ 7,109,000	$	71,090
Payment Bond	Percent	1.00%	$ 7,109,000	$	71,090
Small Tools Costs	Percent	0.05%	$ 7,109,000	$	3,555
Job Cleanup/Closeout	Percent	0.30%	$ 7,109,000	$	21,327
Mobilization	Percent	1.20%	$ 7,109,000	$	85,308
		Rounded Subtotal		$	427,000
	Total Construction Costs			$	7,536,000
	Contingencies		**10%**	$	754,000
TOTAL CONSTRUCTION COSTS WITH CONTINGENCIES				$	8,290,000

Other Project Costs

Right-of-Way Acquisition	Acres	$ 1,000	73.1	$	73,100
Right-of-Way Acquisition	Acres	$ 15,000	5	$	75,000
Mineral Rights Acquisition	LS	$ 1,671,000	1	$	1,671,000
		Rounded Subtotal		$	1,819,000
Final design from 30% to 100% inc bidding	Engineering/SDC		2.00%		165,800
	Permitting & ROW Services		1.00%		82,900
	Const. Services/Insp.		1.50%		124,350
	Project Mgt TID		1.75%		176,908
		Rounded Subtotal			550,000
TOTAL ESTIMATED PROJECT COSTS					$ 10,659,000

PROJECT MONITORING

Developed from EA/IS	$180,000
PSP 2002 PROJECT TOTAL	$ 10,839,000

ATTACHMENT No. 5 – Next Phase Funding

The Warner-Deardorff Segment No. 3 of the Mining Reach Project was originally submitted for the PSP 2001 funding cycle. The project description remains unchanged between the 2001 and 2002 PSP. The only portions of the project funded under the 2001 PSP were preliminary (30%) design, permits, and appraisals. There have been no changes in project scientific merits and adaptive management framework from that proposal to the current proposal. However, the current 2002 PSP proposal does have a more extensive description of the conceptual models developed from the Adaptive Management Forum held in June 2001.

The overall costs of the project have increased based on the recent costs of materials for the SRP 9 project that is under construction and the contract negotiated for the 7/11 Segment No. 1 of the Mining Reach Project. The overall quantities of materials have increased based on the survey information used in the preliminary design.

The status of the Warner-Deardorff Segment No. 3 is as follows. The design has proceeded to the preliminary stage (30%) and is out for review with the District, McBain & Trush, and EDAW. The construction specifications will be patterned after those developed for the SRP 9 and 7/11Segment No. 1 Projects. Preliminary special status species surveys have started and this will be used for the regulatory permits required for construction. The remnant heron rookery appears to still be active and this will affect the final design for restoration of the floodway around the rookery. The survey work confirmed the "Tulare Pond" has been mined out. While this represents a savings in anticipated easement costs, the increase in the volume of materials required to recreate the design floodway has increased the overall project cost estimate. Given the volume of materials estimated for this project, 500,000 CY, the designers are evaluating the feasibility and effects of using a 4,500 cfs vs. 5,000 cfs flow for the bank full design. The lower flow requires less material for creating the floodway.

Work has started on the appraisal background valuations and ROW mapping. The project schedule for completion is shown in Attachment No. 3 of this PSP.

The monitoring program was developed for the entire Mining Reach Project. The monitoring program for all four Mining Reach Project segments is the same as shown in this PSP, Tables 1 & 2. The pre-project monitoring baseline was done at the start of the upstream 7/11 Segment No. 1. The post project monitoring for the two segments upstream of the Warner-Deardorff Segment No. 3 will commence upon completion of the MJ Ruddy Segment No. 2 construction in 2002.