Mokelumne River Spawning Habitat Improvement Project

Project Information

1. **Proposal Title:**

   Mokelumne River Spawning Habitat Improvement Project

2. **Proposal applicants:**

   Joseph Miyamoto, East Bay Municipal Utility District

3. **Corresponding Contact Person:**

   Joseph Miyamoto
   East Bay Municipal Utility District
   500 San Pablo Dam Road Orinda, CA 94563
   510 287-2021
   miyamoto@ebmud.com

4. **Project Keywords:**

   Anadromous salmonids
   At-risk species, fish
   Habitat Restoration, Instream

5. **Type of project:**

   Implementation_Full

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

   No

7. **Topic Area**:

   Ecosystem Water and Sediment Quality

8. **Type of applicant:**

   Local Agency

9. **Location - GIS coordinates:**

   Latitude: 38.226852

   Longitude: -121.0229

   Datum:

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

Lower Mokelumne River. Nine-mile reach just below Camanche Dam.

10. **Location - Ecozone:**

    11.2 Mokelumne River

11. **Location - County:**

    San Joaquin

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:**

    11

15. **Location:**

    California State Senate District Number: 5

    California Assembly District Number: 10

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

    2

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: 52,400

    b) Do you have cost share partners already identified?

       Yes

       If yes, list partners and amount contributed by each:

East Bay Municipal Utility District $32,000

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:

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

No

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

No

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

Yes

If yes, identify project number(s), title(s) and CVPIA program (e.g. AFRP, AFSP, b(1) other).

113328J200 Mokelumne River Spawning Habitat Improvement Project AFRP

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.

113329J014 Enhancement and Evaluation of spawning in the Mokelumne River AFRP

113320G023 Mokelumne River Streambank Improvement Project 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)

Erwin Van Nieuwenhuyse	**US Bureau of Reclamation**	**(916)978-5213**	**evannieuwenhuyse@mp.usbr.gov**
Gonzalo Castillo	**US Fish and Wildlife Service**	**(209)946-6400 ext 323**	**gonzalo_castillo@fws.gov**
Greg Pasternak	**UC Davis**	**gpast@ucdavis.edu**	

21. **Comments:**

Environmental Compliance Checklist

Mokelumne River Spawning Habitat Improvement Project

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: East Bay Municipal Utility District
   NEPA Lead Agency (or co-lead:) U.S. Fish and Wildlife Service
   NEPA Co-Lead Agency (if applicable):

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):

      Mitigated Negative Declaration for the Mokelumne River Spawning Habitat Improvement Project - August 1998
      Finding of No Significant Impact for the Mokelumne River Spawning Habitat Improvement Project - September 1998

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

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

FEDERAL PERMITS AND APPROVALS

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

PERMISSION TO ACCESS PROPERTY

Permission to access city, county or other local agency land. Agency Name: East Bay Municipal Utility District	Required, Obtained
Permission to access state land. Agency Name:	
Permission to access federal land. Agency Name:	
Permission to access private land. Landowner Name:	

6. **Comments.**

Environmental Documentation/Permits Acquired Mitigated Negative Declaration pursuant to section 15074 of the California Environmental Quality Act (August 1998) Finding of No Significant Impact pursuant to section 102(2)(c) of the National Environmental Policy Act (September 1998) The USFWS determined that the Project complied with Section 106 of the National Historic Preservation Act (July 1998) Concurrence from the National Marine Fisheries Service that the project is not likely to adversely affect the Central Valley steelhead of Central Valley fall/late fall-run chinook salmon (September 1998) Letter of Permission (LOP) from the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344)(September 1998) Internal Section 7 Consultation from the U.S. Fish and Wildlife Service that the project is not likely to affect the California red-legged frog, Valley

Land Use Checklist

Mokelumne River Spawning Habitat Improvement Project

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

   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?**

   No

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

   No

   If you answered no to #3, explain what type of actions are involved in the proposal (i.e., research only, planning only).

   The Mokelumne River Spawning Habitat Improvement Project will consist of the annual placement of 1,200 cubic yards of gravel (600 cubic yards of 2-6 inch diameter, 300 cubic yards of ¼-2 inch diameter and 300 cubic yards of 6-9 inch diameter) in toe bar configurations, perpendicular to the stream flow, for two consecutive years.

4. **Comments.**

Conflict of Interest Checklist

Mokelumne River Spawning Habitat Improvement Project

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):

Joseph Miyamoto, East Bay Municipal Utility District

Subcontractor(s):

Are specific subcontractors identified in this proposal? No

Helped with proposal development:

Are there persons who helped with proposal development?

Yes

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

James R. Smith East Bay Municipal Utility District

Comments:

Budget Summary

Mokelumne River Spawning Habitat Improvement Project

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	Purchase Gravel	0	0	0	0	21000	0	0	0	21000.0	0	21000.00
2	Purchase Boulders	0	0	0	0	1700	0	0	0	1700.0	0	1700.00
3	Place Gravel and Boulders	0	0	0	0	0	3500	0	0	3500.0	0	3500.00
		0	0.00	0.00	0.00	22700.00	3500.00	0.00	0.00	26200.00	0.00	26200.00

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**
1	Purchase Gravel	0	0	0	0	21000	0	0	0	21000.0	0	21000.00
2	Purchase Boulders	0	0	0	0	1700	0	0	0	1700.0	0	1700.00
3	Place Gravel and Boulders	0	0	0	0	0	3500	0	0	3500.0	0	3500.00
		0	0.00	0.00	0.00	22700.00	3500.00	0.00	0.00	26200.00	0.00	26200.00

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**
		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Grand Total=52400.00

Comments.

Budget Justification

Mokelumne River Spawning Habitat Improvement Project

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

0 labor hours

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

0

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

0

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

0

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

The Mokelumne River Spawning Habitat Improvement Project will consist of the annual placement of 1,200 cubic yards of gravel (600 cubic yards of 2-6 inch diameter, 300 cubic yards of ¼-2 inch diameter and 300 cubic yards of 6-9 inch diameter) in toe bar configurations, perpendicular to the stream flow, for two consecutive years.Three large boulders (2-4 ft diameter) will be placed at each location.The source of gravel for the enhancement project will be from the open, floodplain gravel quarry on the Mokelumne River. Boulders are about $565 each and gravel is about $17.50/cubic yard.

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.

Gravel will be deposited and manipulated by a 2-5 yard, rubber-tired front-end loader.Work will be accomplished during summer low-flow periods (approximately 250-400 cfs) when there will be minimal effect on anadromous fish. The entire project will require approximately 2 weeks, with work in the river requiring about 5 days. Gravel placement will occur during the last two weeks of August and the first week of September. Equipment and operator will require about 2 days at an hourly rate of $220 (includes equipment and operator).

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.

0

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.

0

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

0

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.

0

Executive Summary

Mokelumne River Spawning Habitat Improvement Project

The lower Mokelumne River just below Camanche Dam provides habitat for spawning fall-run chinook salmon and Central Valley steelhead. Since the completion of the dam in 1964, recruitment of suitable spawning gravel, a key component of salmonid spawning habitat, has been curtailed. Camanche Dam blocks the movement of gravel from upstream sources and immediately below the dam there is no source of replacement gravel. The California Department of Fish and Game recommends that about 22,700 cubic yards of gravel should be added to the lower Mokelumne River to improve spawning habitat (CDFG 1993). The CALFED Ecosystem Restoration Program Plan (CalFed 1999) recommends providing annual supplementation of 1,200 to 2,500 cubic yards of gravel into the Mokelumne River below Camanche Dam to maintain spawning areas and to replace gravel that is transported downstream. East Bay Municipal Utility District has placed over 10,000 cubic yards of gravel in the lower Mokelumne River since 1990. East Bay Municipal Utility District, California Department of Parks and Recreation, California Department of Fish and Game and the U.S. Fish and Wildlife Service have funded these projects. The objectives of this project are to provide additional salmonid spawning gravels (approximately 1,200 cubic yards annually) within the preferred size range and improve intergravel water quality. This is a full-scale restoration project that will occur over two years (2002 and 2003). Annual costs are $26,200 with total project costs of $52,400.

Proposal

East Bay Municipal Utility District

Mokelumne River Spawning Habitat Improvement Project

Joseph Miyamoto, East Bay Municipal Utility District

MOKELUMNE RIVER SPAWNING HABITAT IMPROVEMENT PROJECT

Joseph J. Miyamoto
Manager, Fisheries and Wildlife Division
East Bay Municipal Utility District
500 San Pablo Dam Road
Orinda, CA 94563
Phone: 510.287.2037; Fax: 925.254.8320

Type of organization and tax status:
Municipal Utility District
Tax ID number: 94-6000590

MOKELUMNE RIVER SPAWNING HABITAT IMPROVEMENT PROJECT

Executive Summary

The lower Mokelumne River just below Camanche Dam provides habitat for spawning fall-run chinook salmon and Central Valley steelhead. Since the completion of the dam in 1964, recruitment of suitable spawning gravel, a key component of salmonid spawning habitat, has been curtailed. Camanche Dam blocks the movement of gravel from upstream sources and immediately below the dam there is no source of replacement gravel.

The California Department of Fish and Game recommends that about 22,700 cubic yards of gravel should be added to the lower Mokelumne River to improve spawning habitat (CDFG 1993). The CALFED Ecosystem Restoration Program Plan (CalFed 1999) recommends providing annual supplementation of 1,200 to 2,500 cubic yards of gravel into the Mokelumne River below Camanche Dam to maintain spawning areas and to replace gravel that is transported downstream.

East Bay Municipal Utility District has placed over 10,000 cubic yards of gravel in the lower Mokelumne River since 1990. East Bay Municipal Utility District, California Department of Parks and Recreation, California Department of Fish and Game and the U.S. Fish and Wildlife Service have funded these projects. The objectives of this project are to provide additional salmonid spawning gravels (approximately 1,200 cubic yards annually) within the preferred size range and improve intergravel water quality. This is a full-scale restoration project that will occur over two years (2002 and 2003). Annual costs are $26,200 with total project costs of $52,400.

A. Project Description: Project Goals and Scope of Work

1. Problem - The Mokelumne River is a major tributary to the Sacramento-San Joaquin Delta. Five species of anadromous fishes including fall-run chinook salmon (*Oncorhynchus tshawytscha*) and steelhead trout (*Oncorhynchus mykiss*) are present in the lower Mokelumne River. The California Department of Fish and Game (CDFG) has determined that the lower Mokelumne River between Camanche Dam and its confluence with the Delta is of considerable importance for restoration and maintenance of chinook salmon and steelhead (CDFG 1991). Since life stage requirements for steelhead trout are generally similar, steelhead often benefit from implementation of management proposals for salmon (CDFG 1991).

Before the completion of Camanche Dam in 1964, chinook salmon spawned primarily between Clements and the canyon about three miles below Pardee Dam (CDFG 1959). A few fish spawned upstream of the canyon below Pardee Dam and downstream between Clements and Lockford. CDFG (1959) estimated that the river downstream of Pardee was capable of sustaining an annual run of 15,000 adult

chinook salmon. However, runs for the 19-year period of record before Camanche Reservoir was impounded averaged 3,300 spawners.

The majority of salmon spawning now takes place in the 9-mile reach between Camanche Dam and Elliott Road. For the 35-year post-impoundment period, chinook salmon runs average about 3,800 spawners. Variations in run size and periodicity of the recorded data are comparable before and after the construction of Camanche Dam. However, the reliability of the pre-1964 data is questionable (FERC 1993). The Revised Draft Restoration Plan for the Anadromous Fish Restoration Program (USFWS 1997) calls for a fall-run chinook salmon production target of 9,300 for the Mokelumne River. Recent escapement in the Mokelumne River as measured at the Woodbridge Irrigation District Dam is shown in Table 1.

Table 1. Fall-run Chinook Salmon Escapement in the Mokelumne River as Measured at Woodbridge Irrigation District Dam (data from EBMUD and USFWS 2000).

YEAR	NUMBER OF FISH	CAMP PRODUCTION TARGET	Estimate of Natural Production
1991	410		
1992	1,645		
1993	3,157		
1994	3,421		
1995	5,517	9,300	28,979
1996	7,920	9,300	22,995
1997	10,175	9,300	25,958
1998	7,213	9,300	15,650
1999	5,335	9,300	12,150

The Federal Energy Regulatory Commission (FERC) ranked the various factors limiting the production of salmonids in the lower Mokelumne River and determined that spawning habitat quality and quantity were the second most important factor (FERC 1993). Ocean harvest, which can account for 75-85% of the adult chinook salmon mortality, was identified as the most severe constraint on escapement of adults to the spawning grounds. CDFG (1991) determined that salmon and steelhead spawning habitat in the lower Mokelumne River is affected by historic gravel extraction, and minimal gravel recruitment. Spawning habitat improvement projects are needed to optimize habitat for spawning chinook salmon and steelhead trout (CDFG 1993). The Draft Anadromous Fish Restoration Program Plan (USFWS 1997) recommends the replenishment of gravel suitable for salmonid spawning habitat in the lower Mokelumne River.

2. Justification - Recruitment of suitable spawning gravel, a key component of salmonid spawning habitat, below Camanche Dam is minimal. Camanche Dam blocks the movement of gravel from upstream sources and immediately below the dam there is no source of replacement gravel. The small tributary that enters on the

north bank, Murphy Creek, contributes only a small amount of gravel to the river (CDFG 1991). Otherwise, the lower Mokelumne River receives little drainage and sediment. Also, there are several historic gravel mining areas along the river. The channel and banks from the dam to upstream of Bruella Road show little evidence of bank instability that could lead to gravel recruitment. According to CDFG (1991), Mokelumne River chinook salmon prefer gravel and cobble spawning substrate (6 mm - 230 mm), however, most gravel present is in the small range of the preferred sizes used by spawning chinook salmon.

In general, chinook salmon select gravel for spawning with a median diameter between 7 and 100 mm (Platts et al. 1979, Reiser and Bjornn 1979, Kondolf 1988). Within this range, the particle sizes used for redd formation can vary with the size of the fish (Burner 1951, Kondolf and Wolman 1993). Kondolf and Wolman (1993) determined that the relation between fish length and gravel size can be described by an envelope curve. In general, fish can spawn in gravels with a median diameter up to about 10% of their body length (Kondolf and Wolman 1993).

Adult female Mokelumne River fall-run chinook salmon range in fork length from 65 to 140 cm, with a mean of about 75 cm (BioSystems, Inc. 1992, Marine and Vogel 1996). Based on the relation between fish length and spawning gravel size (Kondolf and Wolman 1993), the median diameter of the upper limits of gravel sizes that Mokelumne River chinook salmon will likely be able to move should range from 65 to 140 mm. Based on this information, the following composition is recommended for gravel enhancement in the lower Mokelumne River, 50% in the 65-140 mm (2 ½ - 5 ½ in) range, 25% in the 6-65 mm (¼ - 2 ½ in) range and 25% in the 140-230 (5 ½ - 9 in) mm range. In practical terms, this translates to 50% large gravel, small cobble (2-6 inch diameter), 25% small and medium gravel (¼-2 inch diameter), and 25% medium cobble (6-9 inch diameter).

The California Department of Fish and Game recommends that about 22,700 cubic yards of gravel should be added to the lower Mokelumne River to improve spawning habitat (CDFG 1993). The CALFED Ecosystem Restoration Program Plan (CalFed 1999) recommends providing annual supplementation of 1,200 to 2,500 cubic yards of gravel into the Mokelumne River below Camanche Dam to maintain spawning areas and to replace gravel that is transported downstream.

The objectives of the Mokelumne River Spawning Habitat Improvement Project are to provide additional salmonid spawning gravels within the preferred size range and improve intergravel water quality. This is a full-scale restoration project.

The Project is intended to increase available and usable spawning habitat, improve gravel permeability and ultimately increase instream production of fall-run chinook salmon and steelhead. Increased gravel substrate will increase production of aquatic invertebrates and hence the food base available for juvenile salmonids. This project will help improve chinook salmon and steelhead stocks in the Mokelumne River

which will conserve the genetic diversity of these stocks and species. Maintaining genetic diversity provides the genetic basis by which populations can respond to fluctuating environmental conditions, which is essential to survival. Individual populations, or stocks of anadromous salmonids are adapted to the local environmental conditions of the their natal stream systems, hence, a wide range of genetic variability exists between them. Loss of individual stocks will most likely lead to loss of genetic diversity and ultimately to changes in genetic composition of the species as a whole and a reduction in biological and genetic diversity and the ability to adapt to environmental changes.

3. Approach - In 1990, East Bay Municipal Utility District (EBMUD) initiated an experimental spawning gravel project by placing about 500 cubic yards (cu yds) of suitable-sized gravel in the lower Mokelumne River just below the fish diversion fence below Camanche Dam. The objective was to enhance existing spawning areas as a means of increasing reproductive success of anadromous fishes. The project was continued in 1992, with about 300 cu yds of gravel placed in the river in the vicinity of Murphy Creek. The project has been continued over subsequent years in cooperation with the California Departments of Fish and Game and Parks and Recreation. The projects have typically consisted of placing washed river gravel (1-4 inch diameter) in known spawning areas. In the fall of 1993, 500 cu yds of gravel were placed at the Mokelumne River Day Use Area (MRDUA). The following year, the substrate was ripped and another 100 cu yds of gravel were placed at the MRDUA. In the fall of 1996, EBMUD placed over 650 cu yds of washed river gravel at three sites (2 at the MRDUA, 1 near Mackville Road). In 1997, 1,500 cu yds of gravel (1-8 inches in diameter) were placed at 3 sites (1 at the MRDUA, 1 near Mackville Road, and 1 about 1 mile below Mackville Road). In 1998, 1,200 cu yds were placed at two sites (1 below Mackville Road and 1 at the MRDUA). In 1999, approximately 3,200 cu yds were placed at two sites in the MRDUA. In 2000 and 2001, approximately 1,200 cu yds were placed. Data collected by EBMUD since 1996 show that the projects increase intergravel permeability, dissolved oxygen content, and reduce intergravel water temperatures in most situations. Benthic macroinvertebrates begin colonizing new gravel within three days and their numbers equal or surpass population densities at unenhanced areas within ten weeks after gravel placement. Adult fall-run chinook salmon also use new gravel for spawning within three months of gravel placement.

The Mokelumne River Spawning Habitat Improvement Project will consist of the annual placement of 1,200 cubic yards of gravel (600 cubic yards of 2-6 inch diameter, 300 cubic yards of ¼-2 inch diameter and 300 cubic yards of 6-9 inch diameter) in toe bar configurations, perpendicular to the stream flow, for two consecutive years. Placement will be made at two locations annually for the two-year period (approximately 600 cubic yards at each location) with a rubber tire loader. Old and new gravel will be incorporated into the berms. Three large boulders (2-4 ft diameter) will be placed at each location. Old and new gravel will be mixed on-site by mechanical ripping to loosen existing, compacted material. Toe bar configurations

with large boulders are used to increase downwelling, establish appropriate velocities (reported as 2.7-2.6 ft/s by CDFG 1991), serve as a gravel anchor, and provide suitable cover for adult and juvenile fish. Sloping the bank will restore the riverbank at each access site and adding suitable quantities of appropriate sized gravel will prevent bank sloughing and the introduction of fine sediment in the river.

The source of gravel for the enhancement project will be from the open, floodplain gravel quarry on the Mokelumne River. Smooth, uncrushed river rock from the George Reed Incorporated operation in Lockeford, California will be washed at the quarry, transported in steam-cleaned tractor-trailer transfer trucks (capacity of 20 yards) and deposited on-site. Gravel will be deposited and manipulated by a 2-5 yard, rubber-tired front-end loader.

Work will be accomplished during summer low-flow periods (approximately 250-400 cfs) when there will be minimal effect on anadromous fish. The entire project will require approximately 2 weeks, with work in the river requiring about 5 days. Gravel placement will occur during the last two weeks of August and the first week of September.

Spawning habitat improvement in the lower Mokelumne River will occur in the nine-mile reach between Camanche Dam and Elliott Road. Selection of this area is based on the known historic and current occurrence of spawning and substrate suitability. Selection of specific sites within this area will be made based on (in order of priority) existing condition (i.e., poor gravel quality or quantity, poor intergravel conditions, etc.), potential for enhancement (suitable gradient, suitable depth), physical access to the site, and landowner participation.

4. Feasibility - East Bay Municipal Utility District has demonstrated that this project is feasible and appropriate based on successful gravel enhancement projects conducted since 1990. All environmental documentation and permits necessary to implement the project through September 2003 have been completed and/or obtained, including;

- Mitigated Negative Declaration pursuant to section 15074 of the California Environmental Quality Act (August 1998)
- Finding of No Significant Impact pursuant to section 102(2)(c) of the National Environmental Policy Act (September 1998)
- The USFWS determined that the Project complied with Section 106 of the National Historic Preservation Act (July 1998)
- Concurrence from the National Marine Fisheries Service that the project is not likely to adversely affect the Central Valley steelhead of Central Valley fall/late fall-run chinook salmon (September 1998)
- Letter of Permission (LOP) from the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344)(September 1998)
- Internal Section 7 Consultation from the U.S. Fish and Wildlife Service that the project is not likely to affect the California red-legged frog, Valley

elderberry longhorn beetle or any federally-listed threatened or endangered species (August 1998)

- Waiver of waste discharge requirements and water quality certification from the California Regional Water Quality Control Board pursuant to Section 401 of the Clean Water Act (September 1998)
- Streambed Alteration Agreement from the California Department of Fish and Game pursuant to section 1601/03 of the California Fish and Game Code (August 1998)
- Work period extension authorization for the 1998 Streambed Alteration Agreement (January 2001)

5. Performance Measures - *Channel Configuration and Gradient* - A survey which measures X, Y, and Z coordinates between the channel banks and upstream/downstream of the enhancement site will be conducted before and after gravel placement. Pre- and post-project graphic representations (wire grid and contour maps) are produced and these data are post processed by a grid-based program to determine volume, configuration and stream profile. *Intergravel Permeability, Dissolved Oxygen Content and Temperature* - Three random stations will be sampled (3 replicates/sample) at each site prior to, and immediately after gravel enhancement. A modified Terhune Mark VI standpipe will be used to evaluate gravel permeability, dissolved oxygen (DO) and temperature following Barnard and McBain (1994). A vacuum hand pump apparatus are used to collect water samples from the standpipe. Water samples are collected for 20 seconds and volumes are measured. Samples are taken at 15 cm, 30.5 cm, and 46 cm depths to evaluate gravel depth and stratification of compaction and sedimentation. Stream depth and velocity (at 60% of depth) at each sample site are measured and recorded with a portable flowmeter. Ambient DO and stream temperature (15 cm below the surface) as well as intergravel DO and water temperatures are measured and recorded with a dissolved oxygen meter.

6. Data Handling and Storage - Data will be processed and stored at East Bay Municipal Utility District's office in Lodi, California.

7. Expected Products/Outcomes - Results of the project performance evaluation will be compiled in a report and distributed through the Mokelumne/Cosumnes Watershed Alliance.

8. Work Schedule - Gravel placement will occur during the last two weeks of August and the first week of September of 2002 and 2003. Performance evaluation will occur prior to gravel placement and prior to the end of September 2002 and 2003.

B. Applicability to CALFED ERP and Science Program Goals and Implementation Plan and CVPIA Priorities

1. ERP, Science Program and CVPIA Priorities - The project addresses SJ-1 (Continue habitat restoration actions including channel-floodplain reconstruction projects and habitat restoration studies in collaboration with local groups) of the draft State 1 PSP priorities. The CVPIA (USFWS 2001) #2 action priority for the Mokelumne River is to replenish suitable salmonid spawning gravel (high priority).

The project targets spawning gravel availability/suitability for fall-run chinook salmon and steelhead. The Project is intended to increase available and usable spawning habitat, improve gravel permeability and ultimately increase instream production of fall-run chinook salmon and steelhead. Increased gravel substrate will increase production of aquatic invertebrates and hence the food base available for juvenile salmonids. This project will help improve chinook salmon and steelhead stocks in the Mokelumne River which will conserve the genetic diversity of these stocks and species. Maintaining genetic diversity provides the genetic basis by which populations can respond to fluctuating environmental conditions, which is essential to survival. Individual populations, or stocks of anadromous salmonids are adapted to the local environmental conditions of the their natal stream systems, hence, a wide range of genetic variability exists between them. Loss of individual stocks will most likely lead to loss of genetic diversity and ultimately to changes in genetic composition of the species as a whole and a reduction in biological and genetic diversity and the ability to adapt to environmental changes.

2. Relationship to Other Ecosystem Restoration Projects - East Bay Municipal Utility District has conducted spawning gravel enhancement projects since 1990 and has placed over 10,000 cubic yards of gravel in the lower Mokelumne River to supplement the existing spawning gravels. These projects have been funded by East Bay Municipal Utility District, California Department of Fish and Game, California Department of Parks and Recreation and the U.S. Fish and Wildlife Service (CVPIA).

3. Requests for Next-Phase Funding. N/A

4. Previous Recipients of CALFED Program or CVPIA funding. East Bay Municipal Utility District has previously received funding from CVPIA:

- CVPIA Cooperative Agreement #113328J200 (Document Control No. 11332-8-J102) to provide additional salmonid spawning gravels within the preferred size range and improve intergravel water quality in the lower Mokelumne River - September 1998 through September 2000. Project was completed in September 2000.
- CVPIA Cooperative Agreement (Document Control No. 11332-9-J014) to provide a quantitative evaluation of gravel substrate movement and quality at enhanced and unenhanced sites in the lower Mokelumne River - July 1999 through September 2000. Project was completed in September 2000.

- CVPIA Grant #113320G023 to protect 2.3 acres of riparian habitat and reduce streambank erosion 1 1/2 miles downstream of Camanche Dam on the lower Mokelumne River. Grant has been modified to extend time line one year and devote half the funds to Murphy Creek restoration as well as mainstem Mokelumne work. Working with landowner and NRCS engineer to design off-stream water system for mainstem Mokelumne work. Murphy Creek restoration has been funded in part by CalFed and NFWF and contracts are being developed. Permitting will begin in October 2001.

5. System-wide Ecosystem Benefits - The project supplements and enhances (1) the Woodbridge Irrigation District/City of Lodi Lower Mokelumne River Restoration Project, which facilitates anadromous fish passage in the lower Mokelumne River; (2) the East Bay Municipal Utility District's Water Quality and Resource Management Program, which envisions a future condition in which the lower Mokelumne River is managed to provide sustainable supplies of water, hydropower and other natural resources while rehabilitating and maintaining diverse migratory and resident fish and wildlife populations; (3) the San Joaquin Resource Conservation District's Lower Mokelumne River Watershed Stewardship Program, the objectives of which are to involve agricultural, commercial, public, and residential landowners with other interested participants in a proactive approach to protect economic, cultural, and natural resource values within the watershed; reduce regulation; develop incentive and education programs for watershed stewardship; and provide a model program for watershed planning in San Joaquin County.

6. Additional Information for Proposals Containing Land Acquisition - N/A

C. Qualifications

East Bay Municipal Utility District has successfully conducted spawning gravel enhancement and evaluation projects in the lower Mokelumne River since 1990. The principal participants include Joseph J. Miyamoto and the staff of the Fisheries and Wildlife Division of East Bay Municipal Utility District. A qualified contractor will place the gravel, which will be supplied from the George Reed, Inc. gravel operation adjacent to the lower Mokelumne River.

D. Costs

1. Budget - Annual costs for the proposed project include purchase of suitable gravel and boulders, and contract labor/equipment costs to place the gravel.

Gravel …….. 1,200 cubic yards @ $17.50/cu yd	$21,000
Placement ……. 2 person-days and equipment	$ 3,500
Boulders ……..	$ 1,700
Total Annual Costs ……	$26,200
Total Project Costs ……	**$52,400**

2. Cost-Sharing - East Bay Municipal Utility District will conduct project management and project performance evaluation. Estimated costs for these in-kind services are $16,000 annually ($32,000 for total project)

E. Local Involvement - Access to gravel enhancement sites is on property owned and operated by East Bay Municipal Utility District or private landowners which have consented access.

F. Compliance with Standard Terms and Conditions - East Bay Municipal Utility District will comply with the standard State and Federal contract terms.

G. Literature Cited

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