Frymire Ranch Project, Spawning Habitat Restoration in the Stanislaus River

Project Information

1. **Proposal Title:**

   Frymire Ranch Project, Spawning Habitat Restoration in the Stanislaus River

2. **Proposal applicants:**

   Carl Mesick, Carl Mesick Consultants

3. **Corresponding Contact Person:**

   Carl Mesick
   Carl Mesick Consultants
   7981 Crystal Boulevard El Dorado, California 95623-4817
   530 620-3631
   cmcfish@innercite.com

4. **Project Keywords:**

   At-risk species, fish
   Flood Plain and Bypass Management
   Habitat Restoration, Instream

5. **Type of project:**

   Implementation_Pilot

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

   No

7. **Topic Area**:

   At-Risk Species Assessments

8. **Type of applicant:**

   Private for profit

9. **Location - GIS coordinates:**

   Latitude: 37.81457

   Longitude: -120.69223

   Datum:

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

The Stanislaus River downstream of Knights Ferry near river mile 53.

10. **Location - Ecozone:**

    13.1 Stanislaus 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:**

    California 18th

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: $715,701

    b) Do you have cost share partners already identified?

No

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?

Yes

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

#97-N21	**Knights Ferry Gravel Replenishment Project**	**ERP**

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.

11332-1-J003	**Spawning Habitat and Floodplain Restoration in the Stanislaus River at Two-Mile Bar, Phase 1**	**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)

Kris Vyverberg	**CA Department of Fish and Game**	**(916) 653-8711**	**kavberg@dfg.ca.gov**
Tom Cannon	**HDR Engineering, Inc.**	**(916) 351-3823**	**tcannon@hdrinc.com**
G. Mathias Kondolf	**UC Berkeley**	**(510) 644-8381**	**kondolf@uclink.berkeley.edu**

21. **Comments:**

Environmental Compliance Checklist

Frymire Ranch Project, Spawning Habitat Restoration in the Stanislaus River

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: CA Department of Fish and Game
   NEPA Lead Agency (or co-lead:) US 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?

      No

      If the CEQA/NEPA process is not complete, please describe the dates for completing draft and/or final CEQA/NEPA documents.

      The final documents should be completed by July 2003

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

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	Required
General Plan Amendment	
Specific Plan Approval	
Rezone	
Williamson Act Contract Cancellation	
Other	

STATE PERMITS AND APPROVALS

Scientific Collecting Permit	
CESA Compliance: 2081	Required
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:

Permission to access federal land.
Agency Name:

Permission to access private land.
Landowner Name: Frymire & Hunter — Required, Obtained

6. **Comments.**

5 - Other. A general lease from the State Lands Commission will be required. CESA Compliance 2081: This will not be required but the online form will not permit me to uncheck this box.

Land Use Checklist

Frymire Ranch Project, Spawning Habitat Restoration in the Stanislaus River

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?**

   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?

      1 acre

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

      Grading, removal of dredger tailings, and pasture improvement

   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	**Agriculture**	**None**
Zoning	**Frymire:A-2-5 Hunter:A-2-40**	**None**
General Plan Designation	**Agriculture**	**None**

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

      No

   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.

Not applicable

4. **Comments.**

Conflict of Interest Checklist

Frymire Ranch Project, Spawning Habitat Restoration in the Stanislaus River

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):

Carl Mesick, Carl Mesick Consultants

Subcontractor(s):

Are specific subcontractors identified in this proposal? Yes

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

Scott McBain	**McBain and Trush**
Mark Fortner	**MBK Engineers**
Rod Hawkins	**Hawkins and Associates Engineering**
Dennis Hood	**KDH Biological Resource Consultation**
Steve Walser	**Smith and Walser Enterprises**
Sean Smith	
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):

Steve Walser **Smith and Walser Enterprises**

Comments:

None

Budget Summary

Frymire Ranch Project, Spawning Habitat Restoration in the Stanislaus River

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	Project Management	150	9750	0	400	50	0	0	0	10200.0	0	10200.00
2	Restoration Planning	200	13000	0	450	650	13100	0	0	27200.0	0	27200.00
3	Environmental Permitting	405	21250	0	3413	10555	34080	0	0	69298.0	0	69298.00
4	Gravel Processing and Riffle Construction	120	7800	0	1000	0	159600	0	0	168400.0	0	168400.00
7a	Trout Spawning Habitat Studies, Winter 2002	135	9000	0	1100	132	16800	0	0	27032.0	0	27032.00
		1010	60800.00	0.00	6363.00	11387.00	223580.00	0.00	0.00	302130.00	0.00	302130.00

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	Project Management	30	1950	0	100	25	0	0	0	2075.0	0	2075.00
4	Gravel Processing and Riffle Construction	100	6500	0	1020	200	150000	0	0	157720.0	0	157720.00
5a	Fluvial Geomorphic Performance Studies, Winter 2003	51	3320	0	215	0	33000	0	0	36535.0	0	36535.00
6a	Chinook Salmon Spawning Habitat Studies, Fall 2003	605	22300	0	3250	1150	0	0	0	26700.0	0	26700.00
7b	Trout Spawning Habitat Studies, Winter 2003	135	9000	0	1133	132	16800	0	0	27065.0	0	27065.00
		921	43070.00	0.00	5718.00	1507.00	199800.00	0.00	0.00	250095.00	0.00	250095.00

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
1	Project Management	90	5850	0	100	25	0	0	0	5975.0	0	5975.00
5b	Fluvial Geomorphic Performance Studies, Winter 2004	51	3320	0	221	0	35000	0	0	38541.0	0	38541.00
6b	Chinook Salmon Spawning Habitat Studies, Fall 2004	605	22300	0	3348	1150	0	0	0	26798.0	0	26798.00
7c	Trout Spawning Habitat Studies, Winter 2004	135	9000	0	1166	132	16800	0	0	27098.0	0	27098.00
		881	40470.00	0.00	4835.00	1307.00	51800.00	0.00	0.00	98412.00	0.00	98412.00

Grand Total=650637.00

Comments.

Budget Justification

Frymire Ranch Project, Spawning Habitat Restoration in the Stanislaus River

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

Dr. Mesick, Senior Fisheries Biologist 1,577 hours total; Dr. Mesick, Field Supervising Biologist, 530 hours total; Fisheries Technician II 530 hours total; and Botanist II 175 hours total.

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

Dr. Mesick, Senior Fisheries Biologist $65/hour, Dr. Mesick, Field Supervising Biologist $45/hour, Fisheries Technician II $20/hour, and Botanist II $30/hour.

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

Benefits for CMC employees are included in the billing rate. Benefits are estimated to be 4% of the billing rate.

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

Purpose is to travel between the El Dorado office and the Stanislaus River field sites and for equipment rental and purchases. Estimated costs for all non-local travel is $16,916.

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

No office, laboratory, or computing supplies will be billed. Proposed costs for field supplies and total station rental are $4,426.

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.

McBain and Trush will assist with Tasks 5a and 5b Fluvial Geomorphic Performance Studies at an estimated cost of $68,000 over two years for approximately 670 hour of labor per year. Billing rates are as follows: Senior Fluvial Geomorphologist/Project Manager $80/hour; Geologist $60/hour; and Technical Assistant $45/hour. MBK Engineers will assist with Task 3 Environmental Permitting. Mark Fortner will conduct hydraulic modeling for a flood risk assessment for the Reclamation Board. The estimated cost is $10,000 for approximately 100 hours of labor plus expenses. Mr. Fortner is billed at $95/hour. Hawkins & Assoicates Engineering will assist with the grading permits for Task 2, topographic surveys for Task 3, and as-built surveys and construction staking for Task 4. The estimated costs is $20,100 for 260 hours of labor. Their billing rates are as follows: Civil Engineer $85/hour Project Manager $75/hour Associate Engineer $75/hour Design Technician $65/hour The above rates includes all equipment and incidental office supplies. KDH Environmental Services will assist with sensitive wildlife surveys for Task 3. KDH will subcontract with EIP Associates to conduct surveys for amphibians and small mammals. EIP will also assist with other CEQA/NEPA analyses such as public services, land use, and noise analysis. The estimated costs for KDH's services is $13,000 for approximately 370 hours of labor and $8,840 for EIP's services for 125 hours of labor. Billing rates for KDH are as follows: Project Coordinator $50/hour Staff Biologist III $40/hour Staff Biologist II $35/hour Staff Biologist I $30/hour Technician II $25/hour EIP will bill at an average

rate of $80/hour for this project.

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 costs are for Dr. Mesick's labor to provide a monitoring plan, invoices, quarterly reports, an oral presentation of results and respond to questions from program managers over the three year life of the project.

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

Estimated environmental permitting fees are $9,775.

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.

Approximately 50% of the salary-billing rates are for overhead costs for computer equipment and software, office supplies, reference books, phone and internet service, utilities, furniture, unreimbursed time spent on proposal development, accounting and taxes, attending watershed work groups, employee management, literature searches, and equipment and vehicle maintenance.

Executive Summary

Frymire Ranch Project, Spawning Habitat Restoration in the Stanislaus River

The Frymire Ranch Project is a revision of a May 2000 CALFED proposal submitted by Carl Mesick Consultants (CMC) and The Trust for Public Land. The May 2000 proposal was for a demonstration project to restore spawning and rearing habitat for fall-run chinook salmon and steelhead trout in five reaches in the Stanislaus River. Its primary objectives were to (1) evaluate the benefits of restoring floodplain, spawning, and rearing habitats at the same location, and (2) determine why steelhead trout were not using some of the riffles restored for CMCs Knights Ferry Gravel Replenishment Project (KFGRP). To achieve the first objective, floodplain and inriver habitats were to be restored at three of the reaches whereas only inriver habitat was to be restored at two reaches. All five reaches differ in channel and floodplain width, gradient, encroachment of riparian vegetation, and sedimentation problems and the importance of fluvial geomorphic processes for restoration of the Stanislaus River was to be assessed by McBain and Trush. To achieve the second objective, two gravel sizes would be used to reconstruct riffle habitat based on the hypothesis that steelhead trout require smaller gravel than available at the KFGRP sites. Recently fishing guides reported that steelhead are using some of the KFGRP sites and so another hypothesis was added to test whether providing cover and feeding stations adjacent to the spawning areas was needed to provide habitat for steelhead trout. Two of the reaches, Two-Mile Bar and Lovers Leap, have been recommended for funding. The two objectives of the May 2000 proposal can be evaluated by implementing only these two reaches as both floodplain and inriver spawning and rearing habitat will be restored at Two-Mile Bar whereas only the inriver habitat will be restored at Lovers Leap. The primary benefit of implementing the Frymire Ranch Project, which is located between Two-Mile Bar and Lovers Leap in an extensively mined stretch of river, would be twofold. First it would increase both the number of study sites and diversity of habitat features, thereby improving the statistical evaluation of the hypotheses. Second, by increasing the amount of restored habitat for salmon and steelhead trout in the Stanislaus River, the project should increase the probability of detecting the response of the salmonid populations to the restored habitat with escapement surveys, angler surveys, and screw trapping. Although the KFGRP significantly improved the habitat for chinook salmon, there was no significant change in the estimated number of juvenile salmon produced in the Stanislaus River following restoration. It is possible that the juvenile estimates, which were based on screw trapping studies, are not sufficiently accurate to detect small changes in abundance. The Frymire Ranch Project is a three-year project that would design, permit, and reconstruct six riffles using onsite dredger tailings. CMC would be assisted by a highly experienced team of subcontractors that include McBain and Trush, MBK Engineers, Hawkins and Associates Engineering, KDH Biological Resource Consultation, Smith and Walser Enterprises, and Mr. Sean Smith. Three years of fishery and fluvial geomorphic studies would be conducted to evaluate the above hypotheses. This project will help achieve CALFED ERP, Science Program, and CVPIA priorities to help restore at-risk species, implement channel-floodplain reconstruction projects, and conduct adaptive management experiments to improve our understanding of at-risk species. The total cost of this project is $715,701.

Proposal

Carl Mesick Consultants

Frymire Ranch Project, Spawning Habitat Restoration in the Stanislaus River

Carl Mesick, Carl Mesick Consultants

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Frymire Ranch Project,
Spawning Habitat Restoration in the Stanislaus River

Carl Mesick Consultants (CMC) is submitting this proposal for the Frymire Ranch Project, which is a revision of the Six-Mile Bar project described in a May 2000 CALFED proposal submitted by CMC and The Trust for Public Land (TPL). This would be part of a demonstration project to restore spawning and rearing habitat for fall-run chinook salmon (*Oncorhynchus tshawytscha*) and steelhead trout (*O. mykiss*) in the Stanislaus River. CMC would be assisted by a highly experienced team of subcontractors that include McBain and Trush, MBK Engineers, Hawkins and Associates Engineering, KDH Biological Resource Consultation, Smith and Walser Enterprises, and Mr. Sean Smith.

Background

CMC and TPL submitted a proposal to fund channel and floodplain restoration on the Stanislaus River (Proposal #2001-C207) to CALFED on 15 May 2000. The proposal was for a relatively large effort that was divided into five separate reaches. The primary objectives of the project were to (1) evaluate the benefits of restoring floodplain, spawning, and rearing habitats at the same location, and (2) determine why steelhead trout were not using some of the riffles restored for CMC's Knights Ferry Gravel Replenishment Project (KFGRP). To achieve the first objective, floodplain and inriver habitats were to be restored at three of the reaches whereas only the inriver habitat was to be restored at two reaches. All five reaches differ in channel and floodplain width, gradient, encroachment of riparian vegetation, and sedimentation problems and it was anticipated that the fluvial geomorphic studies to be conducted by McBain and Trush would help evaluate the importance of fluvial geomorphic processes for restoration of the Stanislaus River. To achieve the second objective, two gravel sizes would have been used to reconstruct riffle habitat based on the hypothesis that steelhead trout prefer to spawn in natural riffles because the gravel was smaller at those sites compared to the KFGRP sites. However since the May 2000 CALFED proposal was prepared, Mr. Steve Walser and Mr. Tim Smith, who are professional fishing guides on the San Joaquin tributaries, reported that steelhead trout are using some of the KFGRP riffles, particularly those with cover and feeding stations adjacent to the spawning areas.

As a result of a "medium" ranking for the May 2000 proposal, only one of the reaches, Two-Mile Bar, was recommended for funding by the CALFED/CVPIA Selection Panel. Since then, the Four-Pumps Committee has recommended funding for the Lovers Leap reach of the original proposal. The two objectives of the May 2000 CALFED proposal can be evaluated by implementing only the Two-Mile Bar and Lovers Leap projects. Both floodplain and inriver spawning and rearing habitat will be restored at Two-Mile Bar whereas only the inriver habitat will be restored at Lovers Leap.

The primary benefit of implementing the Frymire Ranch Project would be twofold. First it would increase both the number of study sites and diversity of habitat features, thereby improving the statistical evaluation of the hypotheses. Second, by increasing the amount of restored habitat for fall-run chinook salmon and steelhead trout in the Stanislaus River, the project should increase the probability of detecting the response of the salmonid populations to the restored habitat with escapement surveys, angler surveys, and screw trapping. Although the KFGRP significantly improved spawning and egg incubation conditions for fall-run chinook salmon at 18 riffles in fall 1999 (CMC 2001b), there was no significant change in the number of juvenile salmon based on screw trapping studies at Oakdale between spring 1999 and spring 2000 (S.P. Cramer and Associates). It is possible that the juvenile estimates are not sufficiently accurate to detect small changes in abundance. Implementing the Two-Mile Bar, Lovers Leap, and Frymire Ranch projects would restore nearly three times the amount of habitat that was restored by the KFGRP and so a population response should be evident if the projects are truly beneficial.

It is apparent from the comments of the Topic Area Review Panel (TARP) that there were misconceptions by the hydrologists on the TARP who gave a "fair" ranking for the May 2000 proposal, whereas all other reviewers ranked the proposal as either "very good" or "medium high". It is likely that the hydrologists misunderstood the proposal probably because the information had to be split between the text, which was limited to six pages, and Table 1. Although the hydrologists indicated that the proposal should have addressed four factors: (1) stream competence, (2) replenishment capacity, (3) sediment quality, and (4) potential downstream effects, the CMC and TPL proposal addressed all four of these factors in Table 1. The proposal included direct measurements of sediment quality and potential downstream effects, and hydraulic modeling was proposed to evaluate stream competence. In addition, replenishment capacity would be discussed as part of the fluvial geomorphic assessment. In fact, there is virtually no replenishment capacity in the Stanislaus River's spawning reach because there are only two very small tributaries below Goodwin Dam, dikes minimize the potential for channel meander, and the encroached vegetation minimizes streambank erosion. The TARP hydrologists also complained about the methods proposed by McBain and Trush regarding tracing gravel movement, whereas Table 1 included the methods suggested by the TARP hydrologists (scour cores and sequential cross sections made with a total station). The TARP hydrologists also urged other ways of accommodating steelhead spawning instead of testing the effects of gravel size. All three projects at Two-Mile Bar, Lovers Leap, and Frymire Ranch have since been revised to test the influence of cover and feeding stations as well as the influence of gravel size. Overall, the revisions made in this proposal should remedy the above issues.

A. Project Description: Project Goals and Scope of Work

The Frymire Ranch is located approximately five miles downstream of Goodwin Dam in a stretch of river that was extensively mined for gravel and gold prior to 1980 (Figure 1). This project differs from the Six-Mile Bar Project in the May 2000 proposal in that a road will not be developed through the US Army Corps of Engineers fee property at Six-Mile Bar to provide access to the river. This change was necessary because the landowner, Ms. Nancy Frymire, has since withdrawn her agreement to permit the construction of this road. The road would have divided her pasture into two sections and provided public access through her land. Instead, there is an existing road on her property that will be used to access the river for this project. The project name was changed

because no work will be conducted on Six-Mile Bar and to help reassure the landowner that no new roads will be constructed. Another change is that the hypotheses regarding restoring spawning habitat for steelhead trout now include an evaluation of the benefits of constructing cover and feeding areas adjacent to the spawning habitat. In addition, the budget has been revised to reflect the likelihood that the Frymire Ranch Project would be implemented as a "stand-alone" project.

The Frymire Ranch Project would reconstruct six riffles in a 0.5-mile long reach in the Stanislaus River that is important for both fall-run chinook salmon and steelhead trout. Most of the fall-run chinook salmon spawn between Knights Ferry and Willms Pond, which are four to seven miles downstream from Goodwin Dam, respectively (CMC 2001a, 2001b). Professional fishing guides frequently fish for rainbow and steelhead trout between Knights Ferry and Honolulu Bar and many trout are caught at some the KFGRP riffles constructed in summer 1999 (S. Walser and T. Smith, personal communication, see "Notes"). Juvenile salmon and trout also use the KFGRP riffles for rearing (Fisheries Foundation, unpublished data, T. Cannon, personal communication, see "Notes"). The restoration of riffle habitat is important for the survival of rearing juveniles because predators, such as Sacramento pikeminnow (*Ptychocheilus grandis*), striped bass (*Morone saxatilis*), and largemouth bass (*Micropterus salmoides*) are abundant in areas dredged for gravel and gold (S. Walser and T. Smith, personal communication, see "Notes"). Sacramento pikeminnow are the primary predator at the Frymire Ranch Project sites (S. Walser and T. Smith, personal communication, see "Notes"). The project would test the hypothesis that creating cover and resting habitat adjacent to spawning habitat will create habitat suitable for steelhead trout. Another proposal will be submitted by CMC to CALFED in October 2001 to continue to evaluate the benefits and methods of restoring spawning habitat for fall-run salmon at the 1999 KFGRP sites. CMC is also coordinating with S.P. Cramer and Associates, the California Department of Fish and Game, Fisheries Foundation and Smith and Walser Enterprises to evaluate the effects of riffle restoration on predation at the Frymire Ranch Projects sites and other mined areas in the Stanislaus River.

1. Problem

Most Central Valley river ecosystems have been severely degraded over time due to water diversions and land-use practices. The origins of degradation of river ecosystems can be traced back to the 1848 California gold rush, and include the construction of numerous dams, occupation of the floodway, and the mining of gold and gravel from the active channel and floodplain. Gravel and gold mining has been intensive throughout the primary spawning and rearing reaches on the Stanislaus River. A long-time resident of the Stanislaus River corridor reports that inriver mining was particularly intensive during the early 1940s and that draglines were used to excavate both the streambed and part of the floodplain (Frymire, personal communication, see "Notes"). After the peak mining period, Kondolf et al. (2001) estimated that an additional 1,031,800 yd^3 of gravel were extracted from the active channel between Goodwin Dam (RM 58.5) and Oakdale (RM 40) between 1949 and 1999. Surveys conducted by the California Department of Fish and Game (DFG 1972) in the 1960s suggest that the riffles were completely excavated from about 55% of the channel between the Knights Ferry County Bridge (RM 54.5) and the Orange Blossom Bridge (RM 47). The few riffles that remain have since become armored and shortened based on a comparison between the DFG surveys conducted in the 1960s and surveys conducted in 1995 and 1996 (Mesick 2001a).

2. Justification including Conceptual Model, Hypotheses and Project Type

Conceptual Model

Escapement of fall-run chinook salmon to the Stanislaus River has fluctuated between 50 and 35,000 fish since 1946. The fluctuations in escapement are well correlated with streamflow during smolt migration and the number of adult fish that return to spawn (Mesick 2001b). Smolt survival studies with hatchery reared fish suggest that mortality is abnormally high in the deepwater ship channel between Stockton and the confluence with the Mokelumne River and that survival can be improved by either flood flows or a barrier at the head of the Old River which shunts water into the ship channel (Mesick 2001b). One possible explanation for the high mortality rates of hatchery-reared smolts during their 5-10 day migration through the deepwater ship channel in mid April when water temperatures were generally suitable is that striped bass (*Morone saxatilis*) and other predators congregate in the dredged channels and hatchery reared juvenile salmon are particularly susceptible to predation. Another possible explanation for why escapement increases two years after a flood event is that the survival of fry rearing in the San Joaquin mainstem and Delta may be substantially increased during high flows that presumably reduce the impacts of predation, unscreened diversions, contamination, and other stressors. However, there are insufficient data to assess the survival of juvenile salmonids rearing in the Delta.

A stock-recruitment analysis for the Stanislaus River salmon population from 1946 to 1998 suggests that recruitment is frequently limited by an insufficient number of spawners (a.k.a., stock). The analysis indicates that recruitment initially increases as stock increases but then remains constant after stock exceeds about 2,500 three-year-old fish (Mesick 2001b). The number of spawners returning to the Stanislaus River was fewer than 1,500 fish, which was probably low enough to substantially limit recruitment, during 46% of the years from 1958 to 1998. It is likely that the low abundance of spawners was a result of the combined effects of poor smolt survival when springtime flows were low and high ocean harvest rates of adult salmon.

The stock-recruitment analysis also suggests that the habitat in the Stanislaus River can support the progeny of only about 1,250 adult female salmon. It is likely that instream gravel mining, which peaked during the early 1940s prior to the escapement surveys, degraded the quantity and quality of both spawning and rearing habitat in the Stanislaus River. The upstream dams that blocked the coarse sediment supply worsened the problem as the remaining riffles became armored and smaller as they eroded away. The limited amount of riffle habitat in the Stanislaus River results in high rates of redd superimposition during which the late arriving females either excavate and kill the incubating eggs or deposit the fine sediment from their redd on top of the superimposed redd, thereby entombing the alevins. Dr. Mesick observed numerous dead alevins in superimposed redds but few in non-superimposed redds in the Stanislaus River in February and March 2001. Fine sediment intrusion from redd superimposition also tends to reduce the downwelling of surface flow into the redds which increases the influence of oxygen-poor groundwater in the egg pocket. Low D.O. concentrations either kill the embryos or stunts their growth, which reduces their chances for survival (Chapman 1988). The eggs of late arriving female salmon are susceptible to turbid runoff from winter storms in the Stanislaus River that probably coat the eggs with clay-sized particles that would reduce their ability to absorb oxygen (CMC 2001b). Stunted fry are frequently observed in the screw traps in the San Joaquin tributaries and they are probably quite vulnerable to water

temperatures above 65^{o}F, predation, low food availability, contamination, unscreened diversion and other stressors.

It is also likely that loss of riffle habitat from inriver gravel mining also reduced rearing habitat and increased predation of juvenile salmonids. Numerous chinook salmon and steelhead/rainbow trout juveniles were observed using the KFGRP riffles, whereas in mined areas, the juveniles are typically restricted to the densely vegetated river margins to avoid predators (Fisheries Foundation, unpublished data, Tom Cannon, personal communication, see "Notes"). Large schools of Sacramento pikeminnow (*Ptychocheilus grandis*) occur at the Frymire Ranch Project sites and numerous salmonid fry have been observed in their stomachs (Walser and Smith, personal communication, see "Notes").

The construction of new riffle habitat in the primary spawning reach in the Stanislaus River should increase the abundance and condition of the emerging fry, primarily by reducing redd superimposition. Presumably, healthy fry should be able to tolerate warm temperatures, low food availability, and low levels of contamination and avoid predation, unscreened diversion and other stressors better than the fry produced in the highly silted, natural riffles in the Stanislaus River. Restoration of riffle habitat should also decrease the abundance of predators, particular Sacramento pikeminnow, which feed extensively on fry (Walser and Smith, personal communication, see "Notes"). Although it will be impossible to eliminate predators throughout the system, particularly in the Delta, an increase in the production in healthy smolts should result in increased recruitment to the adult population.

Restoring floodplain habitat at Two-Mile Bar should help restore sediment transport rates at the restoration riffles which would prolong their effective life compared to natural riffles where encroached vegetation and dikes result in abnormally high rates of gravel movement. In addition, inundation of floodplain habitat is expected to increase food availability and provide juvenile salmonids with refuge from floods. The growth and survival of juvenile chinook salmon was somewhat greater, although not significantly, for fish rearing in the inundated Yolo Bypass than in the mainstem of the lower Sacramento River in 1998 and 1999 (Sommer et al. 2001).

The KFGRP riffles constructed by CMC in 1999 were well used by spawning chinook salmon (CMC 2001a), rearing juvenile salmon and steelhead/rainbow trout (Fisheries Foundation, unpublished data, T. Cannon, personal communication, see "Notes"), and by spawning steelhead trout in 1999 and 2000 (S. Walser and T. Smith, personal communication, see "Notes"). Spawning salmon and rearing juveniles typically utilize the upstream portion of the riffles that forms the tails of pools whereas spawning steelhead trout typically utilize the downstream portion of the riffles where cover and feeding areas in the form of surface turbulence and deep water are available nearby. In contrast, large trout have not been observed at KFGRP riffles that lack cover adjacent to the downstream portion of the riffles. The riffles to be constructed for the Frymire Ranch Project, Lovers Leap, and the Two-Mile Bar projects will include the features that spawning salmon and trout appear to require, including pool tails, a few large boulders near the riffle's crest to create surface turbulence, and deep water near the downstream sections of the riffles.

Another issue for this project is that there appears to be a large volume of fine sediment (< 1-mm) stored in the mined channels near the Frymire Ranch and Lovers Leap that rapidly intrudes into the

restored riffles during annual pulse flows of at least 1,000 cfs (CMC 2001b). This project will help evaluate sediment transport issues relative to past inriver gravel mining in the Stanislaus River. In addition, it is possible that restoring a substantial amount of riffle habitat will bury enough of the stored fine sediments to reduce intrusion rates.

Hypotheses being tested

Hypothesis 1. Riffles constructed with clean gravel with a median diameter (D_{50}) of 15 to 20 mm will be used by more spawning steelhead and rainbow trout than will riffles constructed with clean gravel with a D_{50} greater than 30 mm.

Few trout were observed spawning at the KFGRP riffles, most of which had gravel with a D_{50} of 35 to 40 mm, whereas numerous trout spawned at natural riffles with smaller gravel in 1999 and 2000. Adult steelhead, 16 to 20 inches in length, typically use spawning gravel with a D_{50} of about 20 mm based on field observations at unrestored sites (Kondolf 2000). However, the median diameter of the gravel may not be the only factor controlling spawning site selection as the lack of sand-size particles (1/4 to 3/8-inch in diameter) in restoration gravel may also affect the ability of trout to construct redds. Salmon preferred to construct redds in gravel washed with a 1/4-inch screen compared to gravel washed with a 3/8-inch screen and it was noticeably easier to dig artificial redds with hoes and shovels in the gravel washed with the smaller screen (Mesick 2001b). Presumably the sand-sized substrate particles act as a "lubricant" during redd construction. To test this hypothesis, steelhead spawning will be monitored at three types of gravel placed at the project riffles at the Two-Mile Bar, Lovers Leap, and Frymire Ranch sites. For this project, all gravel would be washed with a 1/4-inch screen to maximize spawner use. Two size mixtures will be created with this gravel: One with a D_{50} of 15 to 20 mm and the other with a D_{50} of 30 mm. Steelhead spawning would be evaluated at these two gravel types as well as at the nearby KFGRP riffles that received gravel washed with a 3/8-inch screen.

Hypothesis 2. The useful life of riffles created with a D_{50} of 15 to 20 mm will be shorter than will riffles that receive gravel with a D_{50} of 30 mm.

There is concern that placing small gravel with a D_{50} of 15 to 20 mm will be rapidly mobilized by typical spring flows in the Stanislaus River and it may not be practical to construct riffles with small gravel.

Hypothesis 3. Riffles constructed with large boulders placed near the riffle's crest to create surface turbulence, and deep water nearby will be used by a greater number of spawning trout than will riffles that lack these features.

Adult ocean-maturing steelhead trout, which are the predominant ecotype in the Central Valley, typically spend a few weeks to a few months feeding prior to spawning which usually occurs between January and April. Anglers frequently catch steelhead in deep water immediately downstream from riffles during this period (Walser and Smith, personal communication, see "Notes) and presumably they are using this habitat for feeding. In addition, Central Valley steelhead tend to spawn where surface turbulence occurs, possibly to avoid anglers and other disturbances (Walser and Smith, personal communication, see "Notes). According to numerous

anglers fishing the lower Stanislaus River, steelhead fishing is particularly good at one of the KFGRP riffles (R13) where boulders create surface turbulence and deep water provides nearby feeding habitat. All riffles to be constructed at Two-Mile Bar, Lovers Leap, and Frymire Ranch will recreate the surface turbulence and deep-water conditions at KFGRP Riffle R13. Steelhead spawner use will be compared between these project riffles and the KFGRP riffles and nearby natural riffles that lack surface turbulence and deep water.

Hypothesis 4. Smolt survival will increase following restoration presumably by reducing redd superimposition and predation rates.

A proposal will be submitted to CALFED in October 2001 by CMC to evaluate the impacts of redd superimposition and another will be submitted by S.P. Cramer and Associates, the Department of Fish and Game, CMC, Fisheries Foundation, and Smith and Walser Enterprises to evaluate predation in various habitat types in the Stanislaus River. Salmon escapement is estimated by the California Department of Fish and Game and the number of fry migrating past Oakdale is estimated with screw traps by S.P. Cramer and Associates. CMC will evaluate trends in both escapement and juvenile production in annual reports.

Selection of Project Type

The Frymire Ranch Project is proposed as a demonstration project due to a moderate level of scientific uncertainty. The KFGRP environmental studies suggest that numerous juvenile and adult salmonids will utilize the restoration sites and that the restoration will improve habitat conditions at the project sites such that the survival, production, and health of juvenile salmonids should be improved (CMC 2001a, 2001b, 2001c). However, there are uncertainties regarding the importance of the size of gravel used for restoration and whether there are other important factors for steelhead, such as surface turbulence for cover and deep water for feeding. In addition, there may be unknown limiting factors that offset the project's benefits such that restorating spawning and rearing habitat have no net effect on the production and survival of juveniles to the adult stage. For example, a majority of the juvenile salmon produced in the Stanislaus River migrate into the San Joaquin River and Delta to rear as fry (S.P. Cramer and Associates 2000) and the fate of those outmigrants is unknown. If the production of adult salmon and trout does not increase after the implementation of several riffle restoration projects on the Stanislaus River, then research and restoration could be focused on conditions in the San Joaquin River and Delta.

3. Approach

The overall goal of the Two-Mile Bar, Lovers Leap and Frymire Ranch projects is to improve salmonid spawning gravel quality and quantity, increase floodplain habitat, and ultimately increase smolt production, aquatic invertebrate abundance, and riparian habitat downstream of Goodwin Dam. The objectives to achieve this goal are: (1) to construct riffle habitat in the mined channels of the Stanislaus River and (2) to restore floodplain function and habitat. CMC's approach to achieve these objectives is to apply a newly emerging technique that has been successfully used on Clear Creek to address both problems: Remove gravel on heavily disturbed bars in a way that restores floodplain habitat, and insert all or a portion of that gravel back into the river to create riffles that provide spawning and rearing habitat for both chinook salmon and steelhead trout. In effect, two

sites are restored for the price of one. Although floodplain habitat will not be restored for the Frymire Ranch Project, using dredger tailings near the restoration sites is important because it will eliminate the impact to the public caused by the trucking of heavy loads over small county roads.

The objectives for the Frymire Ranch Project will be achieved by implementing the following tasks.

Task 1. Project Management. CMC will manage this project, including submitting draft and final subcontracts, validation of costs, monitoring plans, final report, invoices, quarterly reports, responding to questions from CALFED and Four-Pumps managers, and general project oversight.

Task 2. Restoration Planning. CMC and Smith and Walser Enterprises will design the plans for spawning habitat based on the features of the KFGRP riffles that provide habitat for both salmon and trout. A peer review process that potentially includes fishery biologists from the Stanislaus River Fish Group and the local citizenry will guide final restoration design. Deliverables include copies of the draft and final design plans.

Task 3. Environmental Permitting. CMC will prepare all required environmental reports and permits, including those for CEQA/NEPA compliance for acquisition and restoration. MBK Engineers will conduct a flood capacity analysis. KDH Biological Resource Consultation and their subcontractors will assist with CEQA/NEPA compliance. Hawkins and Associates Engineering will assist with the grading permits needed to obtain gravel from the Frymire Ranch, the Hunter Ranch, and Lovers Leap. Deliverables include copies of all permit applications and approved permits.

Task 4: Gravel Processing and Riffle Construction. The construction phase of this project will be directly supervised by both Dr. Carl Mesick and Smith and Walser Enterprises and the gravel processing and construction will be subcontracted to Mr. Sean Smith, who implemented the construction phase of the Knights Ferry Gravel Replenishment Project. Approximately 7,200 cubic yards of gravel will be purchased from the local landowners and cleaned on site with a mobile gravel washing plant using a 1/4-inch screen and a 5-inch grizzly. Approximately half of the gravel will have a D_{50} of 30 mm as was produced for the KFGRP. The D_{50} for the remainder of the gravel will be between 15 and 20 mm by increasing the percentage of gravel between 1/4 and 1.5 inches in diameter. CMC will measure the particle size distribution of a 200 kg sample from each site using dry sieve analysis. The gravel will be placed at six sites between Riffle R10 near the Hunter Ranch and Riffle R12A, which is adjacent to Six-Mile Bar. The project riffles will be shaped like those created for the KFGRP, except that 2 to 3 large boulders will be placed on one side of the riffle's crest and the downstream portion of the riffles will be more fully developed to provide trout habitat. The dredged streambed immediately downstream from the boulders will not be completely filled with gravel to create pools for resting habitat adjacent to spawning habitat. To evaluate the benefits of this design for spawning steelhead trout, spawner use at these sites will be compared to the spawner use at nearby KFGRP riffles that lack these features. The gravel to be placed at Riffle R10, which is the upstream most riffle, will be obtained from the Hunter Ranch. Approximately 40% of the gravel to be placed adjacent to the Frymire Ranch and Six-Mile Bar will be obtained from the Frymire Ranch and the remainder will be obtained from Western Sand and Gravel at the Lovers Leap site. The large boulders will be acquired from Ms. Frymire's property. At the Frymire Ranch, pasture will be developed where dredger tailings are removed and several gullies will be

repaired to minimize fine sediment intrusion. Deliverables include a final report produced by CMC that describes construction methods and presents pre- and post-project contour maps.

Tasks 5a and 5b: Fluvial Geomorphic Permformance Studies. McBain and Trush will assess the influence of the proposed gravel augmentation on fluvial geomorphic processes with hydraulic modeling and monitoring within the context of the regulated flow regime, existing habitat, sediment routing, and vegetation encroachment. The scale of the gravel augmentation will also be evaluated within the context of the sediment transport capacity of the current, regulated flow regime. They will also determine the bed mobility thresholds with scour cores and by placing tracer rocks at restoration sites to track sediment movement during high flows. CMC will produce contour maps of pre-project conditions (Task 2) and post-project conditions (Task 6) for the first two years to help monitor sediment movement. CMC will also monitor bed permeability for Task 6 to assess fine sediment intrusion rates. Studies will document the conditions immediately after construction and during the following year for Tasks 5a and 5b respectively. Deliverables include annual reports produced by McBain and Trush.

Tasks 6a and 6b: Chinook Salmon Spawning Habitat Studies. From mid-October to mid-December, CMC will study chinook salmon spawner use, gravel permeability, intragravel dissolved oxygen concentrations, and streambed elevations at the six project sites. Spawner use will be surveyed at 10-day intervals and redd locations will be shown on a 1-foot interval contour map of each riffle. Gravel permeability will be measured with modified Terhune standpipes in the undisturbed gravel and at approximately 25 redds shortly after redd construction and at another 25 redds near the end of the incubation period in early February. Intragravel dissolved oxygen concentrations will be measured from samples collected with the standpipes from redds using the azide modification of the Winkler method. Streambed elevations will be measured at each riffle with a total station along a transect and in a 15- to 20-ft grid pattern over the entire surface of the riffle and adjacent streambanks. Contour maps will be produced for each site by importing the total station's AutoCAD DXF files into a software program called Terrain. Tasks 6a and 6b will document the conditions immediately after construction and during the following year respectively. Deliverables include annual draft and final reports produced by CMC.

Tasks 7a, 7b, and 7c: Steelhead/Rainbow Trout Spawning Habitat Studies. From mid-January through mid-March, Smith and Walser Enterprises will survey spawner use at each of the Frymire Ranch Project riffles and the nearby KFGRP sites (R12A to R20) using snorkeling techniques, underwater video photography, and hook-and-line methods. Surveys will be conducted during the winter prior to construction, immediately after construction, and during the following year for Tasks 7a, 7b, and 7c respectively. Deliverables include annual draft and final reports produced by CMC.

4. Feasibility

Restoration of spawning habitat at the sites identified in this proposal is feasible and effective as demonstrated by the KFGRP (CMC 2001b). In regard to scheduling, the processing and addition of 7,200 cubic yards of gravel can be completed during a 60-day period prior to spawning in mid October. Mr. Hunter and Ms. Frymire have signed agreements indicating that they are willing to participate in this project.

Environmental compliance and obtaining permits to do the work described herein should be feasible for this project as few impacts are anticipated. There should be minimal impacts to the public since all work will be done on-site and traffic on county roads will be minimal. No species of concern were observed in summer 1999 at the KFGRP projects sites. For Task 7, a permit was submitted in June 2000 to the National Marine Fisheries Service (NMFS) to survey adult steelhead trout during spawning for this project. Although this does not guarantee that a collecting permit will be granted, the proposed sampling techniques are acceptable to the NMFS.

Chinook Salmon Spawning Habitat Studies cannot be conducted when flood control releases are made and flows exceed 500 cfs. Flood control releases have been made during part or all of the spawning period in the last few years.

5. Performance Measures

There are two main objectives of this project and the following describes the Performance Measure, Metric, Target and Baseline for each.

First Objective: Determine the habitat features needed to restore spawning habitat for steelhead trout and chinook salmon.

Performance Measures: Specific program actions to obtain environmental permits and riffle construction will be measured according to the production of the deliverables described in Sections 3 and 7 and the number of riffles constructed. Environmental Indicators will include estimates of spawner use, physical features of spawning habitat, and measures of the quality of salmonid egg incubation habitat.

Metric: Program actions will be measured in terms of reports produced, the number of riffles restored, and the number of cubic yards of gravel placed. Environmental Indicators to assess spawner use will include redds/yd^2 at restored and control riffle habitats and the mean number of adult steelhead trout utilizing each riffle. The physical features of spawning habitat will be measured according to substrate size distribution, sediment transport rates, bed gradient and topography, and the proximity of pool habitat, large woody debris, and boulders and other features that create surface turbulence. Incubation habitat quality will be measured in terms of intragravel dissolved oxygen and bed permeability in undisturbed gravel and chinook salmon redds.

Target: The metrics for the Environmental Indicators will be significantly "better" at restoration sites than at control sites. The key physical features of restoration sites that maximize trout spawner use will be identified based on statistical tests.

Baseline: The KFGRP project has provided baseline data for the restoration of chinook salmon spawning habitat in the Stanislaus River. This project will collect one year of baseline data on steelhead trout use of the project reach. One year will be sufficient as Smith and Walser Enterprises report that virtually no salmonids use the mined Frymire Ranch reach based on numerous guided fishing trips over many years.

Second Objective: Increase the production of steelhead trout and chinook salmon juveniles that outmigrate and adults that return to the Stanislaus River to spawn.

Performance Measures: Environmental Indicators will include estimates of juvenile and adult production.

Metric: Environmental Indicators to assess juvenile production will be the estimated number of juveniles migrating past screw traps at Oakdale and Caswell Park in the Stanislaus River by S.P. Cramer and Associates. The number of salmon adults will be the estimated as escapement by the Department of Fish and Game that CMC will adjusted for ocean harvest.

Target: Juvenile and adult abundance will be significantly greater following restoration compared to baseline conditions.

Baseline: S.P. Cramer and Associates has been estimating juvenile abundance at Oakdale since 1994 and Caswell Park since 1996. The Department of Fish and Game has been estimating chinook salmon escapement on the Stanislaus River since 1947. Smith and Walser Enterprises has logs of steelhead and rainbow trout caught during their guided trips on the Stanislaus River since January 2001.

6. Data Handling and Storage

All data will be entered onto standardized forms that specify all data to be collected for each task. Field supervisors will confirm that all data have been accurately recorded before leaving the study sites by initialing each form. Survey data will be based upon an established coordinate system and datum so that all information can be easily georeferenced and used in a GIS. Permanent benchmarks related to this coordinate system and datum will be established at each site. Data collected electronically, such as with a total station, will be stored on hard media, such as a CD. All data analysis will be conducted using standard software programs, such as Quatro Pro. Copies of map files and final spreadsheet files will be submitted to CALFED or the CVPIA if requested.

7. Expected Products/Outcomes

Draft and final reports will be submitted for Tasks 5 through 7. A final construction report will be submitted for Task 4. Copies of the draft and final construction plans for Task 2 will be submitted. Copies of all reports for CEPA/NEPA compliance, applications for environmental permits, and final permits will be submitted. If requested, data will be submitted in hard copy and in an electronic format compatible with Microsoft Access. If requested, oral presentations will be made at annual review meetings. A final report will be submitted that summarizes all project reports.

8. Work Schedule

Assuming that the project is recommended for funding, a contract could be executed by September 2002. Tasks 1, 2, and 3 would begin immediately as soon as the contract has been executed. Task 1 Project Management would continue throughout the duration of the project. Task 2 Restoration Planning would begin in late Summer and it would be completed within four months. Task 3

Environmental Permitting would begin immediately and it would be completed approximately six months after Task 2 has been completed. Task 4 Gravel Processing and Riffle Construction would begin during the first summer after Task 3 was completed and it would be completed by late September, which is before the salmon begin to spawn. Task 5a Fluvial Geomorphic Permformance Studies would begin as soon as Task 4 had been completed and it would be completed within 12 months. Task 5b would begin during the following winter and it would be completed within 12 months. Task 6a Chinook Salmon Spawning Habitat Studies would begin in mid October after Task 4 had been completed and it would be completed within nine months. Task 6b would begin in mid October of the following year and it would be completed within nine months. Task 7a Steelhead/Rainbow Trout Spawning Habitat Studies would begin in mid January after the contract was executed and it would be completed within nine months. Task 7b would begin in mid January after Task 4 had been completed and Task 7c would begin in mid January during the following year. Overall it is anticipated that the project will begin September 2002 and it would be completed by September 2005.

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

1. ERP, Science Program and CVPIA Priorities

This project will help achieve several CALFED ERP and Science Program goals and CVPIA priorities.

Both the CALFED ERP and the CVPIA place a high priority on projects that help restore at-risk species that include fall-run chinook salmon and steelhead trout. This project should have a positive effect on adult reproduction, egg survival, and juvenile rearing for both species, as well as provide important information needed for the management of these species.

The CALFED ERP has a goal to rehabilitate natural ecosystem processes to support natural aquatic and associated terrestrial biotic communities. The restoration of floodplain habitat and the augmentation of gravel proposed by this project will contribute to achieving this goal.

CALFED's goal to enhance populations of selected species for sustainable commercial and recreational harvest, such as fall-run chinook salmon, rainbow trout, and steelhead trout, is also a focus of this project.

This project will help to attain several of CALFED's priorities identified the in the Draft Stage 1 Implementation Plan for the San Joaquin Region. By implementing a demonstration project to study physical processes and the response of fall-run chinook salmon and steelhead trout to restored habitat in channels impacted by instream channel mining, dike construction, and riparian encroachment, this project will address several priorities, including:

> Priority #1 Continue habitat restoration actions including channel-floodplain reconstruction projects and habitat restoration studies in collaboration with local groups;
> Priority #2. Restore geomorphic processes in stream and riparian corridors;

Priority #3. Improve rearing and spawning habitat and downstream fish passage on tributary streams and the main stem San Joaquin River, particularly for chinook salmon, steelhead trout, and splittail.
Priority #4. Implement actions to improve understanding of at-risk species in the region.

One of the priorities of the CALFED Science Program is to conduct adaptive management experiments. This project will test hypotheses related to the restoration of steelhead trout and fall-run chinook salmon habitat.

Another priority of the CALFED Science Program is to advance the understanding of ecosystem processes. This project will integrate the results of fluvial geomorphic studies and fishery studies to help improve the effectiveness of future restoration and to help accomplish CALFED goals.

This project's targets will contribute to achieving the CVPIA goal of doubling the natural production of anadromous fish in the Central Valley over levels that existed between 1967-1991 [Section 3406(b)] as well as the goal to restore and replenish, as needed, spawning gravels on the upper Sacramento, American, and Stanislaus rivers [relative to Section 3406(b)(13)]. The FWS has identified the lack of and accessibility to quality stream channel and riparian habitat, as well as spawning gravel availability and suitability as limiting factors for anadromous fish.

2. Relationship to Other Ecosystem Restoration Projects.

This project is intended to increase the scope of a large-scale restoration project on the Stanislaus River to be implemented by CMC, with assistance from McBain and Trush, Smith and Walser Enterprises, and other subcontractors, in 2002 to investigate the importance of restoring functional floodplain habitat adjacent to restored riffle habitat. The Anadromous Fish Restoration Program will fund work at Two-Mile Bar where both the floodplain and riffle habitat will be restored. The Four-Pumps Mitigation Agreement will fund work at Lovers Leap where riffle habitat will be restored but the floodplain will remain heavily encroached with riparian vegetation and constricted by dikes. CMC and Smith and Walser Enterprises will design the riffles to benefit both fall-run chinook salmon and steelhead trout. They will also conduct studies to evaluate the hypothesis that steelhead trout require cover and feeding stations adjacent to their spawning habitat. McBain and Trush will conduct fluvial geomorphic studies to evaluate the effect of a functional floodplain on sediment transport at the restored riffles. The Frymire Ranch Project would increase the number of restoration sites, which would strengthen the environmental studies by increasing the number of replicates and increasing the likelihood of detecting a population response in terms of increased smolt production and increased escapement.

CMC and Smith and Walser Enterprises are partnering with the Friends of the Tuolumne River to submit a proposal to CALFED in October 2001 to restore spawning habitat for steelhead trout adjacent to Bobcat Flat on the Tuolumne River. McBain and Trush would be restoring the floodplain habitat at Bobcat Flat. If funded, the environmental studies for this project would be integrated with CMC's projects on the Stanislaus River to increase our understanding of the importance of floodplain habitat and flow regimes to salmonid populations.

S.P. Cramer and Associates, the California Department of Fish and Game, Fisheries Foundation, CMC, and Smith and Walser Enterprises are submitting a proposal to CALFED in October 2001 to study the impact of predation on salmonid production in the Stanislaus River. The restoration of riffle habitat in dredged channels for the KFGRP reduced the abundance of predators based on reports from professional fishing guides (Walser and Smith, personal communication, see "Notes"). This proposed project would demonstrate the effect of restoring riffle habitat on predation rates and identify the most important predators and their habitat.

The U.S. Fish and Wildlife Service has contracted with the Fisheries Foundation to survey juvenile and adult salmonid habitat use in the Stanislaus River in 2000 and 2001. This study indicated that numerous juvenile chinook salmon and rainbow/steelhead trout were utilizing the KFGRP riffles constructed in summer 1999 whereas few juveniles were observed in the channels mined for gravel. It is anticipated that this study will continue in 2002.

CALFED funded CMC to implement the Knights Ferry Gravel Replenishment Project that added 13,000 tons of gravel between Two-Mile-Bar and the city of Oakdale in summer 1999. This project tested the source, size and placement of gravel for spawning habitat. The results of the KFGRP were used to design this project.

The Commercial Fishermen Salmon Stamp Program funded the Stanislaus Fly Fishermen and the Department of Fish and Game to add 1,000 to 2,000 tons of gravel each year to three sites in the Stanislaus River approximately one mile downstream from Goodwin Dam in 1996 and 1997. The CVPIA Section 3406(b)(13) program provided funds to add more gravel to one site in 2000.

The Four-Pumps Mitigation Agreement funded the construction of three riffles as spawning habitat for chinook salmon in the Stanislaus River at River Miles 47.4, 50.4 and 50.9 in 1994. These riffles were poorly used by spawning salmon and most of the gravel was quickly eroded away partially due to the boulder weirs constructed at the site boundaries. The weirs were intended to stabilize the gravel, but instead increased turbulence and bed shear stress.

3. Requests for Next-Phase Funding

This is not a proposal that is requesting next-phase funding.

4. Previous Recipients of CALFED Program or CVPIA funding.

CMC received funding from CALFED for the Knights Ferry Gravel Replenishment Project, #97-N21, which added 13,000 tons of clean gravel to 18 sites on the Stanislaus River from Two-Mile Bar to the city of Oakdale in August 1999. This project should be complected by December 2001.

CMC received funding to implement the "Spawning Habitat and Floodplain Restoration in the Stanislaus River, Phase 1, Two-Mile Bar" from the Anadromous Fish Restoration Program, agreement #11332-1J003. Work is expected to begin in fall 2001.

CMC's proposed project, "Spawning Habitat and Floodplain Restoration in the Stanislaus River, Phase 1, Lovers Leap, has been recommended for funding from the Four-Pumps Mitigation Agreement. The contract should be executed by March 2002.

5. System-Wide Ecosystem Benefits

The increased interest in and knowledge of the importance of dynamic river channels, and the relationship of fluvial geomorphic processes to ecosystem health and sustainability, both speak to the need for this project. The ecological objectives of this project are to (1) restore gravel and rebuild riffles in spawning reaches of the Stanislaus River, where insufficient in-channel habitat is limiting the production of chinook salmon and steelhead/rainbow trout, (2) to evaluate the restoration potential of adjacent floodplain lands, and (3) to develop conceptual restoration plans for those lands. In these reaches, flows cannot access the floodplain due to many factors including past land use practices such as mining. Because of river and land management practices, the natural channel and bank conditions that are favorable to salmon and steelhead and other important species do not occur. The dynamic processes of flow, sediment transport, channel erosion and deposition, establishment of riparian vegetation, etc. are limited, and thus spawning and rearing habitat is limited.

The Stanislaus River, as well as the Tuolumne, Merced and the San Joaquin Rivers, all provide habitat for fall-run chinook salmon and steelhead trout. The former is a species of concern and the latter is listed as threatened under the Federal Endangered Species Act. The primary limiting factors for chinook salmon, and steelhead, in these rivers include insufficient spawning and rearing habitat. This project will address both of these factors and thus contribute to the increase in production of salmon and potentially steelhead/rainbow trout in the Stanislaus River and in the San Joaquin Basin in particular, and in the Central Valley in general.

Restoration of in-channel and riparian habitats in and along the San Joaquin tributaries is a priority for the U.S. Fish and Wildlife Service Anadromous Fish Restoration Program as well as for the CALFED ERP. These physical habitat elements are also identified in CALFED's Strategic Plan as factors that scientists need to achieve a better understanding of in order to improve design and restoration efforts that will produce the greatest ecological benefit. This project will provide important biological and physical process data derived from intensive monitoring programs that will contribute to improving the knowledge base and the development of restoration actions elsewhere in the San Joaquin basin as well as other Central Valley rivers.

C. Qualifications

Carl Mesick Consultants, which was founded in 1992, will be responsible for project management, design, environmental permitting, construction supervision, and environmental studies. Dr. Carl Mesick will manage this project and directly supervise all field work. He received his Ph.D. in fisheries science from the University of Arizona in 1984. He has twenty years of experience as a fisheries scientist evaluating the effects of water diversions, hydroelectric operations, stream restoration projects, timber harvest, and mine operations on trout, salmon, non-game species of fish, and invertebrates. Dr. Mesick's expertise includes stream habitat restoration and studies of instream flow, water temperature, riparian vegetation, sedimentation,

entrainment at diversion intakes, food availability, fish passage, fish habitat preference, fish population monitoring, and stream habitat classification. He has studied the spawning habitat of fall-run chinook salmon on the Stanislaus River since 1994. Dr. Mesick manages and supervises all phases of the Knights Ferry Gravel Replenishment Project funded by CALFED, including project design, environmental compliance and permitting, construction supervision, and the monitoring of salmonid spawning habitat. He has managed other large, multi year projects for the City of Los Angeles Department of Water and Power, Southern California Edison, and the Electric Power Research Institute. Dr. Mesick worked as a Habitat Restoration Coordinator for the U.S. Fish and Wildlife Service's Anadromous Fish Restoration Program in 1998 and 1999.

McBain and Trush will be responsible for the geomorphic studies. Scott McBain and Darren Mierau will perform most of the work. Mr. McBain has 11 years of research and management experience, focusing on improving river ecosystems downstream of dams. His experience has focused on gravel-bed mobility and scour thresholds, bedload transport and deposition processes, effects of high flows on channel morphology, watershed sediment yields, and river corridor restoration. He has directed and managed a variety of projects, including a process-based corridor restoration plan for the Tuolumne River, a maintenance flow study on the Trinity River, a floodway restoration project on lower Clear Creek, several sediment management plans downstream of large dams, and developed conceptual restoration designs for several reaches of the Tuolumne River damaged by instream gravel extraction. Mr. McBain has received his Bachelor of Science degree in Environmental Resources Engineering department at Humboldt State University, and his Master of Science degree in Civil Engineering at the University of California at Berkeley. His focus at the University of California was hydraulic engineering under the supervision of Dr. H.W. Shen and fluvial geomorphology under Dr. William E. Dietrich. Mr. Mierau is an aquatic ecologist specializing in inland fisheries research and management, stream ecology, and salmonid biology. He completed his Master of Science degree in the Biology program at Humboldt State University, studying the taxonomy and community ecology of benthic invertebrates in Hat Creek, CA. His special interests include aquatic invertebrates, fish population dynamics, and methods to quantify the link between stream physical processes and fish habitat.

MBK Engineers (formerly Murray, Burns & Kienlen) will be responsible for the HEC analysis required for environmental permitting. MBK is located in Sacramento and has 33 years of experience with flood analysis, hydrology studies, regulatory permitting services, and stream restoration. The firm has worked extensively on the Stanislaus River and assisted with permitting for the Knights Ferry Gravel Replenishment Project. Mr. Mark E. Fortner, P.E., P.L.S., is a senior engineer with 16 years of professional experience who will manage their work.

Hawkins and Associates Engineering will develop the final grading plans for the processed dredger tailings used to produce spawning gravel. They will also produce the as-built surveys of the riffles. Hawkins and Associates Engineering is a new firm located in Modesto. Its principles have over 35 years of engineering experience and have either worked for or personally know many of the landowners associated with this project. Mr. Rodrick Hawkins, who will supervise their work, is licensed civil engineer that graduated from CAL Poly San Luis Obispo in 1989. Mr. Crolie Lindsay is a licensed civil engineer, land surveyor and general contractor in the State of California, who has worked extensively on the Stanislaus River.

KDH Biological Resource Consultation will assist with the NEPA/CEQA compliance. KDH Biological Resource Consultation (KDH) will be responsible for surveys of special status species under the Endangered Species Act and the California Endangered Species Act required for environmental permitting. KDH, which was founded in 1996, specializes in endangered species evaluations and their staff have conducted numerous surveys in a variety of habitats ranging from forestlands and montane meadows to Central Valley riparian and upland habitats, and agricultural areas. Mr. Dennis Hood, who has 14 years of experience conducting terrestrial and aquatic investigations in California and Oregon, will supervise their work and the work of their subcontractors. KDH will subcontract to EIP Associates for special-status amphibian and small mammal surveys, a noise analysis, and other miscellaneous analyses for NEPA/CEQA compliance. EIP Associates has more than 30 years of experience and has prepared more than 5,000 environmental documents within California. Mr. Mike Bumgardner will supervise their work.

Smith and Walser Enterprises will assist with the project design, construction supervision and steelhead trout spawning surveys. Mr. Tim Smith and Mr. Steve Walser have spent between 150 and 300 days per year for the last 14 and 27 years respectively, fishing for steelhead trout and other species in the San Joaquin River and its tributaries. They have seven years of professional experience guiding anglers, producing high quality underwater videos, writing articles and books on fish habitat and angling, and making presentations to fishing groups. Mr. Smith is the California Trout Stream Keeper for the Merced River and Mr. Walser is the California Trout Stream Keeper for the Tuolumne River. They are also collecting trout specimens from the San Joaquin tributaries for the National Marine Fisheries Service and the California Department of Fish and Game.

Mr. Sean Smith will supervise the project construction. He is a general engineering contractor with 24 years of experience. He supervised the processing and placement of gravel for the Department of Fish and Game's Goodwin Canyon Gravel Replenishment Project on the Stanislaus River in 1997 and the Knights Ferry Gravel Replenishment Project in 1999.

D. Cost

1. Budget

The costs for project management, planning, permitting, construction, the fluvial geomorphic and spawning habitat studies, and a 10% contingency budget total $715,701.

E. Local Involvement

A summary of this proposal was distributed to the Stanislaus Fish Group, which consists of agency and consulting biologists active on the Stanislaus River, for their review and comment. Dr. Mesick gave a tour of the KFGRP project sites near Lovers Leap to agency and consulting biologists on 9 May 2001. CMC held a public meeting in Knights Ferry that was publicized in the local newspaper on 8 June 2000 to discuss the overall project at Two-Mile Bar, Lovers Leap and the Frymire Ranch with the local residents. CMC also works with environmental reporters for The (Stockton) Record and the Oakdale Leader to help inform the public of project activities and successes.

F. Compliance with Standard Terms and Conditions.

CMC will comply with all state and federal terms.

G. Literature Cited

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Fisheries Foundation. Unpublished data. Work conducted under contract to the U.S. Fish and Wildlife Foundation. Concord, California.

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Walser S, and T. Smith. 2001. Sierra West Adventures, business partners and professional fishing guides on the San Joaquin tributaries, Sonora, California. Personal communication with Dr. Mesick on 10 February 2001.

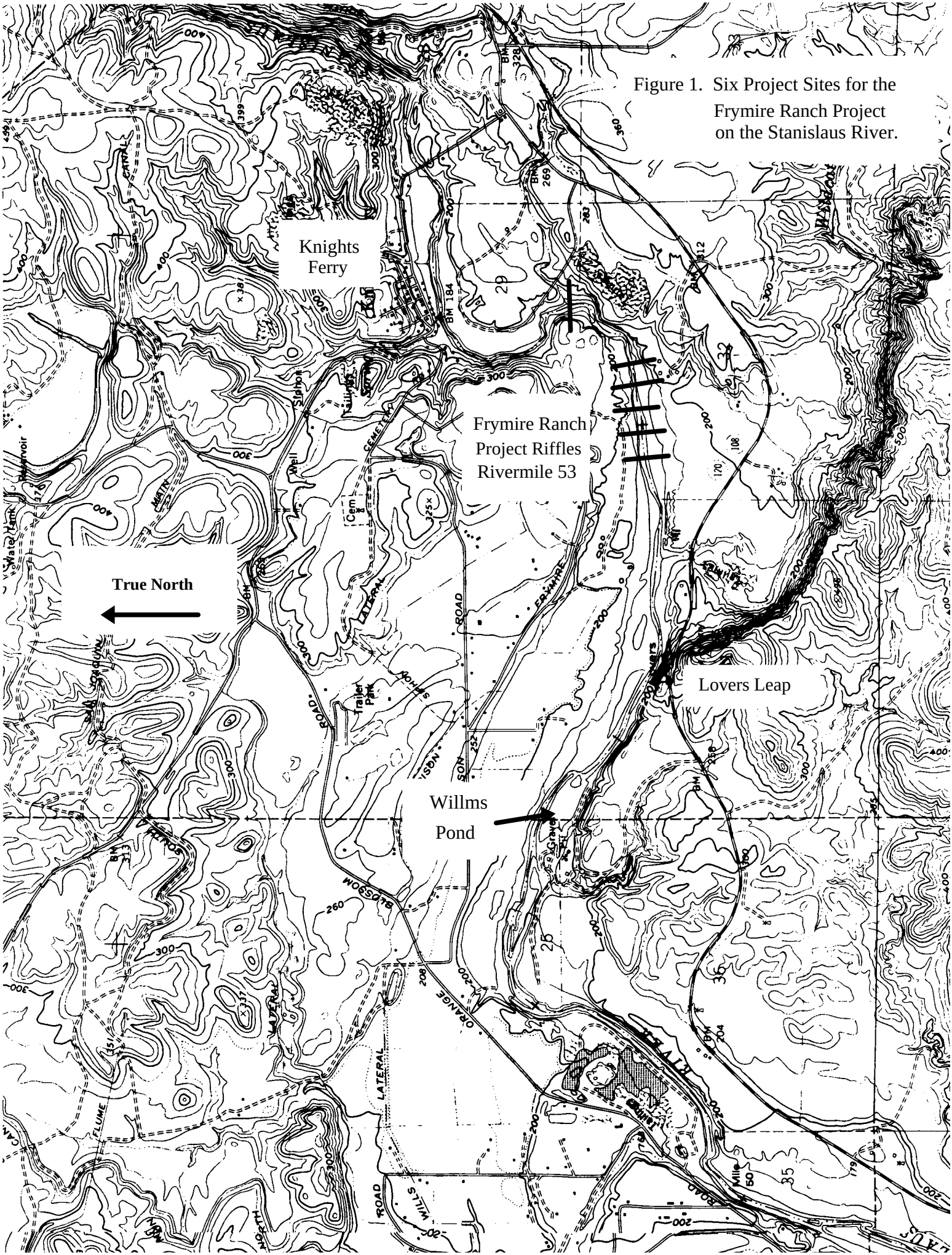

Figure 1. Six Project Sites for the Frymire Ranch Project on the Stanislaus River.

Permission Agreements for Access

CARL MESICK CONSULTANTS
FISHERY RESOURCE ASSESSMENTS
7981 Crystal Boulevard • El Dorado, CA 95623
Phone/Fax: (530) 620-3631
Email: cmcfish@innercite.com

Access and Gravel Purchase Agreement

The purpose of this agreement is to notify the CALFED Bay Delta Program that Ms. Nancy Frymire is willing to sell a sufficient quantity of dredger tailings to Carl Mesick Consultants (CMC) or their agents from her property on the south side of Frymire Road to produce clean gravel for a fair market value for the purposes of river restoration. CMC and their agents will improve Ms. Frymire's lower pasture by grading the areas where the tailings were obtained. Ms. Frymire also agrees to provide CMC and their agents with access to her property for the purposes of designing the restoration work, processing the gravel, studying the fish, and monitoring the restoration work. The parties to this agreement agree as follows:

1. Ms. Frymire agrees to sell sufficient raw material from her property to produce about 3,750 cubic yards of clean gravel, sorted to the specifications of CMC, for the fair market value of $1.56 per cubic yard of clean gravel. An advance payment of $3,000 has been given to Ms. Frymire by CMC today toward the purchase of 1,875 cubic yards of clean gravel. It is anticipated that the remainder of the gravel will be purchased in 2003.

2. Ms. Frymire agrees to provide access to her property to CMC and their agents during 2003 (or possibly 2004) for the purpose of processing the dredger tailings into clean gravel and then placing it in the riverbed next to her property to help restore fish habitat. No live trees would be removed. Access will be provided by the existing gravel road from Frymire Road. The CMC and their contractor agree to grade and repair the access road. The contractor will include Ms. Frymire in their liability insurance coverage as protection from all claims and losses resulting from work conducted by the contractor. CMC and their agents agree to provide Ms. Frymire with 30 panels of wire stock panels.

3. CMC and their agents agree to grade the areas where dredger tailings are obtained to increase the size of the lower pasture and improve irrigation to it. CMC and their agents agree to plant the newly graded pasture with pasture mix.

4. Ms. Frymire agrees to provide access to her property to CMC and their agents from September 2002 through September 2006 for the purposes of studying the salmon and trout and monitoring the gravel placement in the river.

5. CMC agrees to notify Ms. Frymire in advance of accessing the project site, if requested by Ms. Frymire. Ms. Frymire agrees to notify CMC of any concerns arising under this agreement by contacting Carl Mesick at (530) 620-3631.

6. Any modifications, other than gravel processing and pasture improvement, to Ms. Frymire's property will be restored to the condition in which the property was found before the modifications took place.

7. This agreement may be amended or terminated only by written mutual consent of all parties.

Nancy Jane Frymire — Aug 29- 2001

Nancy Jane Frymire
Property Owner

Date

Carl Mesick — 8/31/2001

Carl Mesick
Carl Mesick Consultants

Date

CARL MESICK CONSULTANTS
FISHERY RESOURCE ASSESSMENTS
7981 Crystal Boulevard • El Dorado, CA 95623
Phone/Fax: (530) 620-3631
Email: cmcfish@innercite.com

Access and Gravel Purchase Agreement

The purpose of this agreement is to notify the CALFED Bay Delta Program that Mr. Bob Hunter is willing to sell either raw material or sorted, clean gravel to Carl Mesick Consultants or their agents from his property on the west side of Sonora Road for a fair market value for the purposes of river restoration. Mr. Hunter also agrees to provide Carl Mesick Consultants and their agents with access to his property for the purposes of monitoring the restoration work and conducting fisheries studies. The parties to this agreement agree as follows:

1. Mr. Hunter agrees to sell either raw or processed gravel from his property, AP 002-40-21, to produce about 950 cubic yards (1,500 tons) of clean gravel, sorted to the specifications of Carl Mesick Consultants, for a fair market value. The raw gravel will be obtained from exposed gravel tailings on Mr. Hunter's property. It is anticipated that the gravel will be purchased in 2003.

2. If Mr. Hunter sells Carl Mesick Consultants processed gravel, the gravel will be sorted with a 1/4-inch screen and 5-inch grizzly and washed to Carl Mesick Consultants specifications to produce a final product of with a median diameter of 0.8 inches (20 mm). Mr. Hunter will produce the gravel within four months after he has been given written notice from Carl Mesick Consultants.

3. If Mr. Hunter sells Carl Mesick Consultants raw gravel, Mr. Hunter agrees to provide access to his property to Carl Mesick Consultants and their agents for the purpose of processing the raw material into clean gravel. Access will be provided by the existing road from Kennedy Road through parcel AP 002-40-21.

4. Mr. Hunter agrees to provide access to his property to Carl Mesick Consultants and their agents to design the restoration work, place the processed gravel in the riverbed next to his property to restore fish habitat, and to monitor the gravel placement and study the benefits of the restoration work for salmon and trout. The gravel placement will probably occur for two weeks during summer 2003 whereas the design work and fisheries studies will occur between September 2002 and December 2006. Access will be provided by the existing road from Kennedy Road through parcel AP 002-40-21.

5. Carl Mesick Consultants agrees to notify Mr. Hunter in advance of accessing the project site, if requested by Mr. Hunter. Mr. Hunter agrees to notify Carl Mesick Consultants of any concerns arising under this agreement by contacting Carl Mesick at (530) 620-3631.

6. Any modifications, other than gravel processing, to Mr. Hunter's property will be restored to the condition in which the property was found before the modifications took place.

7. This agreement may be amended or terminated only by written mutual consent of all parties.

Robert H. Hunter
Bob Hunter
Property Owner

8/26/01
Date

Carl Mesick
Carl Mesick
Carl Mesick Consultants

8/24/01
Date