

Restoration and Monitoring of Riparian Habitat Corridors Along The Lower Mokelumne River

Project Information

1. **Proposal Title:**

Restoration and Monitoring of Riparian Habitat Corridors Along The Lower Mokelumne River

2. **Proposal applicants:**

John Meek, San Joaquin County Resource Conservation District

3. **Corresponding Contact Person:**

John Meek
San Joaquin County Resource Conservation District
1222 Monaco Court, Suite 23 Stockton, CA
209 333-8146
jmeek@jmeek.com

4. **Project Keywords:**

**Habitat Restoration, Riparian
Monitoring
Neotropical migratory birds**

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:**

Riparian Habitat

8. **Type of applicant:**

Local Agency

9. **Location - GIS coordinates:**

Latitude: 38.159

Longitude: -121.206

Datum:

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

Project restoration site 1 is 2 miles below Camanche dam, between Highway 88 and McIntire Road. Project restoration site 2 is between Peltier and Jahant Roads. Monitoring will be conducted along the Mokelumne River from Camanche Dam to the confluence with the Cosumnes River, and along Murphy Creek from from its confluence with the Mokelumne River upstream 2.5 miles.

10. Location - Ecozone:

1.2 East Delta, 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:

18, 11

15. Location:

California State Senate District Number: 5

California Assembly District Number: 10, 17

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: 7.5

Total Requested Funds: \$859,405

b) Do you have cost share partners already identified?

Yes

If yes, list partners and amount contributed by each:

East Bay Municipal Utilities District \$192,500

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.

99N-15 Lower Mokelumne River Watershed Stewardship Program Watershed

Not assigned Murphy Creek Restoration Watershed

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.

**Not
assigned**

**Vernal Pool, Grassland & Seasonal Wetland
Conservation and Restoration Program Aquisition**

**Habitat
Restoration**

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)

21. **Comments:**

Environmental Compliance Checklist

Restoration and Monitoring of Riparian Habitat Corridors Along The Lower Mokelumne River

1. CEQA or NEPA Compliance

- a) Will this project require compliance with CEQA?

No

- b) Will this project require compliance with NEPA?

No

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

The project is riparian restoration and bird monitoring. Nothing that will trigger compliance with CEQA or NEPA is anticipated.

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

CEQA Lead Agency:

NEPA Lead Agency (or co-lead:)

NEPA Co-Lead Agency (if applicable):

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

CEQA

- Categorical Exemption
- Negative Declaration or Mitigated Negative Declaration

-EIR

Xnone

NEPA

- Categorical Exclusion
- Environmental Assessment/FONSI

-EIS

Xnone

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?

Not Applicable

- 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

General Plan Amendment

Specific Plan Approval

Rezone

Williamson Act Contract Cancellation

Other

STATE PERMITS AND APPROVALS

Scientific Collecting Permit

CESA Compliance: 2081

CESA Compliance: NCCP

1601/03

CWA 401 certification

Coastal Development Permit

Reclamation Board Approval

Notification of DPC or BCDC

Other

FEDERAL PERMITS AND APPROVALS

ESA Compliance Section 7 Consultation

ESA Compliance Section 10 Permit

Rivers and Harbors Act

CWA 404

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: Ed Craig, Brad Lange

Required, Obtained

6. Comments.

Land Use Checklist

Restoration and Monitoring of Riparian Habitat Corridors Along The Lower Mokelumne 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?**

No

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

Restoration/enhancement of riparian areas along the lower Mokelumne River and monitoring of restoration site. Also monitoring of neotropical migrant and resident songbird use of the riparian corridor from Camanche Dam to the confluence with the Cosumnes River

- 4. Comments.**

Conflict of Interest Checklist

Restoration and Monitoring of Riparian Habitat Corridors Along The Lower Mokelumne 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):

John Meek, San Joaquin County Resource Conservation District

Subcontractor(s):

Are specific subcontractors identified in this proposal? Yes

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

Geoff Geupel Point Reyes Bird Observatory
Jeanne Hammond Point Reyes Bird Observatory
John DiGregoria Bitterroot Restoration, Incorporated

Helped with proposal development:

Are there persons who helped with proposal development?

Yes

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

Amy Augustine San Joaquin Resource Conservation District

Jeanne Hammond Point Reyes Bird Observatory

Geoffrey Geupel Point Reyes Bird Observatory

Kent Reeves East Bay Municipal Utility District

John DiGregoria Bitterroot Restoration, Incorporated

Comments:

Budget Summary

Restoration and Monitoring of Riparian Habitat Corridors Along The Lower Mokelumne 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	subcontractor/BRI-Planting Plan	310	20150	0	0	0	0	0	0	20150.0	1511.25	21661.25
2	subcontractor/BRI-Intensive Site Preparation	3206	111480	0	7450	3850	0	0	0	122780.0	9208.5	131988.50
3	subcontractor/BRI-Site Preparation	584	26868.92	0	2500	860	0	0	0	30228.92	2267.17	32496.09
4	subcontractor/BRI-plantingSite preparation/management, oversight & reporting	1550	70285.32	0	1290	84604.50	0	0	0	156179.82	11713.49	167893.31
5	subcontractor/BRI-vegetation monitoring	332	21580	0	0	0	0	0	0	21580.0	1618.5	23198.50
6	subcontractor/BRI-site maintenance	1312	56514	0	1900	13906	0	0	0	72320.0	5424	77744.00
7	First quarter project management	30	1500	0	0	0	0	0	0	1500.0	112.5	1612.50
8	Second quarter project management	30	1500	0	0	0	0	0	0	1500.0	112.5	1612.50
9	Third quarter project management	30	1500	0	0	0	0	0	0	1500.0	112.5	1612.50
10	Fourth quarter project management	30	1500	0	0	0	0	0	0	1500.0	112.5	1612.50
11	PRBO project oversight and report	43.3	1203.25	409.10	500				612.58	2724.93	204.37	2929.30
12	PRBO project management/data collection, analysis, and report	692.8	10000	3400	1000				4176	18576.0	1393.2	19969.20
13	PRBO GIS mapping, coordination	43.3	787.25	267.67	500				450.93	2005.85	150.44	2156.29
14	PRBO data collection/data entry	1385.6	12800	1792		100	4000	1650	5899.18	26241.18	1968.09	28209.27
15	PRBO data entry/data collection	1385.6	12800	1792		100	4000	1650	5899.18	26241.18	1968.09	28209.27
		10964	350468.74	7660.77	15140.00	103420.50	8000.00	3300.00	17037.87	505027.88	37877.10	542904.98

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	subcontractor-vegetation Monitoring	332	21580	0	0	0	0	0	0	21580.0	1618.5	23198.50
2	subcontractor-Site maintenance	1312	57054	0	1900	13906	0	0	0	72860.0	5464.5	78324.50
3	First quarter project management	30	1500	0	0	0	0	0	0	1500.0	112.5	1612.50
4	Second quarter project management	30	1500	0	0	0	0	0	0	1500.0	112.5	1612.50
5	Third quarter project management	30	1500	0	0	0	0	0	0	1500.0	112.5	1612.50
6	Fourth quarter project management	30	1500	0	0	0	0	0	0	1500.0	112.5	1612.50
7	PRBO Project oversight and report	43.3	1263.41	429.55	500				635.96	2828.92	212.17	3041.09
8	PRBO Project management, data collection, analysis, and report	692.8	10500	3570	1000				4370.3	19440.3	1458.02	20898.32
9	PRBO GIS mapping, coordination	43.3	826.61	281.05	500				466.22	2073.88	155.54	2229.42
10	PRBO data collection/data entry	1385.6	13440	1881.6		250	4000		5675.76	25247.36	1893.55	27140.91
11	PRBO data collection/data entry	1385.6	13440	1881.6		250	4000		5675.76	25247.36	1893.55	27140.91
		5314	124104.02	8043.80	3900.00	14406.00	8000.00	0.00	16824.00	175277.82	13145.83	188423.65

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	subcontractor-vegetation monitoring	222	14430	0	0	0	0	0	0	14430.0	1082.25	15512.25
2	subcontractor-site maintenance	720	21415	0	550	700	0	0	0	22665.0		22665.00
3	First quarter project management	30	1500	0	0	0	0	0	0	1500.0	112.5	1612.50
4	Second quarter project management	30	1500	0	0	0	0	0	0	1500.0	112.5	1612.50
5	Third quarter project management	30	1500	0	0	0	0	0	0	1500.0	112.5	1612.50
6	Fourth quarter project management	30	1500	0	0	0	0	0	0	1500.0	112.5	1612.50
7	PRBO project oversight and report	43.3	1326.58	451.03	500				384.7	2662.31	199.67	2861.98
8	PRBO project management, data collection, analysis, and report	692.8	11025	3748.5	1000				4574.32	20347.82	1526.09	21873.91
9	PRBO GIS mapping, coordination	43.3	867.94	295.1	500				482.28	2145.32	160.9	2306.22
10	PRBO data collection, data entry	1385.6	14112	1975.68		250	4000		5897.93	26235.61	1967.67	28203.28
11	PRBO data collection, data entry	1385.6	14112	1975.68		250	4000		5897.93	26235.61	1967.67	28203.28
		4612	83288.52	8445.99	2550.00	1200.00	8000.00	0.00	17237.16	120721.67	7354.25	128075.92

Grand Total=859404.55

Comments.

Budget Justification

Restoration and Monitoring of Riparian Habitat Corridors Along The Lower Mokelumne River

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

BRI Restoration Consultant-2216 BRI Field Crew-7724 PRBO Program Director-130 PRBO Biologist-2078 PRBO GIS Specialist-130 PRBO Intern Field Biologist-4157 PRBO Intern Field Biologist-4157 SJRCD Program Manager-360

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

BRI Restoration Consultant: \$65/hr. BRI Field Crew: \$32.75/hr. PRBO Program Director:\$4813/month PRBO Biologist: \$2500/month PRBO GIS Specialist: \$3149/month PRBO Intern Field Biologist: \$1600/month PRBO Intern Field Biologist: \$1600/month SJRCD Program Manager: \$50/hr.

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

PRBO Program Director: \$409.10/year PRBO Biologist: \$3400/year PRBO GIS Specialist: \$267.67/year PRBO Intern Field Biologist: \$1792/year PRBO Intern Field Biologist: \$1792/year

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

Per Diem costs for work crews required to stay in the area at various stages of site preparation, planting, and maintenance. Also, mileage for PRBO to travel from Marin County to San Joaquin County for aspects of project oversight and data collection (not including field intern biologists.

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

Office: \$600 Computing: \$1,000 Field Supplies, tools, gasoline: \$4675 Plants and plant treatments including fertilizers and herbicides: 154155.3

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.

\$4000 budget items in each of the three years listed for PRBO data collection/data entry is for housing. Field intern biologists will live in or near San Joaquin County when conducting field work. The housing will double as office space.

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.

Inspection of work in progress: \$5400 Validation of costs: \$1800 Report Preparation: \$3600
Presentations/Public outreach: \$3600 Communication with Subcontractors: \$1800

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

Direct costs listed under PRBO headings are indirect costs subcontractor PRBO is charging San Joaquin County Resource Conservation District.

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.

Overhead costs include: general office staff, rent, insurance, utilities, phone service, internet service, computers, audio/visual equipment, office supplies.

Executive Summary

Restoration and Monitoring of Riparian Habitat Corridors Along The Lower Mokelumne River

Restoration and Monitoring of Riparian Habitat Corridors Along The Lower Mokelumne River Songbird Use of Existing and Restored Habitat Executive Summary The San Joaquin County Resource Conservation District, in partnership with the East Bay Municipal Utility District (EBMUD), Point Reyes Bird Observatory (PRBO), and Bitterroot Restoration, Inc. (BRI) propose to implement riparian restoration and a Neotropical Migratory Bird Monitoring Program (NMB) along the lower Mokelumne River in San Joaquin County. The project is part of a larger effort to restore and enhance riparian habitat values along the lower Mokelumne River and Murphy Creek on both public and private lands. In the conceptual model for this project, riparian restoration will increase the diversity and richness of focal riparian bird species utilizing the Mokelumne River corridor. Data collected can help determine which plants and plant associations benefit avian communities while also reducing stream bank erosion and enhancing other river functions for the benefit of anadromous fish species. Results of the monitoring will provide information that can be used to evaluate and adjust restoration practices. Monitoring of this restoration and enhancement project will be used to assess whether a directed management enhancement action has been carried out as designed. There is only limited knowledge of most species relationship with their habitat, and information is especially lacking where habitat conditions are linked to population status (Block et al. 2001). This project involves the use of three key elements: Ø Restoration of an additional two miles (+/- 45 acres) of riparian habitat along the Mokelumne River. Ø Monitoring the response of neotropical migrant songbird species to riparian restoration along the Mokelumne River during a period of three years. Ø Monitoring the response of neotropical migrant songbird species to riparian restoration along Murphy Creek, a tributary of the Mokelumne River, during a period of three years. The proposed approach is feasible and appropriate because it uses proven methods of restoring native vegetation communities in California and other western states. The bird monitoring protocols proposed for this project were already used to establish baseline data for neotropical migrant and resident songbirds along the Mokelumne River. EBMUD will contribute in-kind by adding point-count, mist netting, and nest monitoring locations to areas where there is already permission for biological monitoring on public and private lands, and assisting with the monitoring. Knowledge gained from this project can be applied to other proposed restoration sites in the watershed. The information generated will be shared with other agencies, organizations, and landowners to help them make decisions regarding habitat conservation, riparian restoration, and other land management activities (e.g., grazing, agricultural production) affecting neotropical and resident songbirds and anadromous fish. This project specifically addresses several of the draft Stage 1 PSP priorities, including: DR-1, strategic goal 4; DR-2, strategic goal 4; and, DR-4, strategic goals 1 and 4. The project will provide collateral benefits that meet other draft Stage 1 PSP priorities, including: DR-3, strategic goal 4; and DR-5, strategic goal 5. This project also will help to meet milestones identified for the Delta and East Side Tributaries in the ERP Draft Stage 1 Implementation Plan. The riparian restoration component will add to the total number of restored and enhanced riparian acreage in the watershed. It will also enhance work being conducted in other CALFED and CVPIA funded projects underway in the watershed, in addition to providing several ecosystem-wide benefits.

Proposal

San Joaquin County Resource Conservation District

**Restoration and Monitoring of Riparian Habitat Corridors Along The Lower
Mokelumne River**

John Meek, San Joaquin County Resource Conservation District

Restoration and Monitoring of Riparian Habitat Corridors Along The Lower Mokelumne River – Songbird Use of Existing and Restored Habitat

I. Project Description: Goals and Scope of Work

A. Problem

At present, the lower Mokelumne River is witnessing a continued decline in riparian habitat quality and quantity, and a trend towards degradation of watershed natural resources. Agriculture (predominantly viticulture), grazing, and urban/suburban areas are the primary land uses and stressors on the watershed, and the greatest threats to riparian habitat. Within the Central Valley, once extensive riparian forests, up to 10 miles wide, have been mostly removed or severely degraded due to anthropogenic disturbances such as development, water diversion, channelization of rivers, and the encroachment of agriculture (Roberts et al. 1977).

Riparian ecosystems in California account for less than one percent of the total land area (Smith 1977) and are considered the most important habitat for conservation of neotropical migrant and resident songbirds (Manley and Davidson 1993). Riparian habitat also provides productive breeding grounds and vital over-wintering and migration stopover areas (Cogswell 1962, Gaines 1977), and corridors for dispersal (Geupel et al. 1997). Loss of riparian areas has resulted in the severe decline of Yellow Warblers, Warbling Vireo and Blue Grosbeak among others, and the local extirpation of species such as the Yellow-billed Cuckoo and Bell's Vireo along the Mokelumne River (Reeves et al. 2001) and throughout the Central Valley (Geupel et al. 1997, Geupel et al. 2001).

The decline of riparian ecosystems is also a significant contributing factor to the decline of anadromous fish populations. During the past 150 years, mining, poorly managed livestock grazing, timber harvesting, agriculture as well as recreational and urban development have eliminated or substantially disturbed salmon habitat (Levin/Schiewe 2001). An otherwise clean and healthy river may not be able to support a viable salmon population without healthy riverbank ecosystems. (Cederholm et al. 2000).

Restoring degraded ecosystems is a relatively new management approach and the effects of most restoration treatments on various systems processes and components are not well understood. The effect of restoration and enhancement on native wildlife is a primary question or concern in many areas, and is most efficiently addressed when monitoring wildlife response is considered during the design phase of restoration (Block et al. 2001).

The San Joaquin Resource Conservation District (SJRCDD) proposes a restoration of ~ 45 acres of riparian habitat along the lower Mokelumne River, and to monitor the benefits of riparian restoration along the Mokelumne River and one of its tributaries, Murphy Creek.

The goals of this project are:

- Determine which types of plants and plant associations used in riparian restoration will benefit neotropical migrant and resident songbirds and other special status wildlife species while simultaneously providing stream bank stabilization and enhancement of anadromous fish habitat.
- Provide for the re-establishment of neotropical migrant and resident songbirds, and other special status wildlife species.

The objectives of this project are:

- To restore two river miles (~ 45 acres) of Valley Foothill Riparian Habitat along the lower Mokelumne River on private property.
- To provide site-specific recommendations for managers to increase the amount of, and enhance the quality of nesting and foraging habitat for neotropical migrant and resident songbirds, and enhance habitat for other special status wildlife species, including anadromous fish.
- To assess the importance of different riparian habitat patches by looking at bird species richness, diversity, and demography along the lower Mokelumne River and Murphy Creek.
- To update an inventory and determine breeding status of current migratory and resident bird species using the lower Mokelumne River.
- To determine relative abundance and distribution of select species along the lower Mokelumne River and Murphy Creek.
- To assess the use during fall migration of the lower Mokelumne River as both a migratory flyway and dispersal corridor.
- To use native plants to out-compete or eliminate non-native invasive plant species at riparian restoration sites.

The hypotheses of the study are:

- Revegetating degraded riparian corridors will increase Valley Foothill Riparian Habitat along the lower Mokelumne River.
- Riparian restoration will cause an increase in avian species richness and diversity within the lower Mokelumne River watershed.
- Phased riparian restoration projects will sufficiently mimic a disturbance regime in creating diversity in age class and canopy structure to create a more naturally complex riparian habitat system.
- Native plants used in riparian restoration can out-compete or eliminate non-native invasive plants, especially when combined with a weed removal program prior to and active maintenance following riparian restoration.

Birds are good indicators of ecosystem health and of riparian habitat quality in particular. This is because bird populations are sensitive to a number of important components including the levels of primary and secondary productivity in the system, the structural and species diversity of vegetation, and the size and connectivity of habitat patches. In addition, bird numbers have been demonstrated to respond quickly and positively to some, but not all, habitat restoration efforts (RHJV 2000, Geupel et al 2001b). Thus, bird population response is a good indicator of the success of riparian habitat management and restoration. Furthermore, riparian restoration benefits listed species if the needs of these species are considered during project implementation (RHJV 2000, Block et al. 2001). To ensure that reliable information can be obtained on wildlife responses, restoration should be designed and implemented with long-term monitoring in mind (Block et al. 2001).

Riparian restoration designed for wildlife will also aid efforts in the watershed to restore rearing and/or spawning habitat for Chinook salmon and steelhead (Cederholm et al. 2000). Riparian restoration and enhancement benefits anadromous species by: supplying organic material to the aquatic foodweb; adding woody debris to in-stream habitat; altering the amount of sunlight that reaches the river; reducing sedimentation by stabilizing banks and filtering sediment and other

materials from runoff; and by providing absorption of nutrients and other chemicals from runoff (Nuramulani et al. 1997, Simon 1999).

The lower Mokelumne River is defined as the section of the river that flows from the base of Camanche Dam to the Sacramento-San Joaquin Delta west of the City of Lodi in San Joaquin County (Figure 1). This is considered a regulated river/watershed with over 15 large diversions throughout the entire system. The areas where riparian restoration will take place are located 2 miles below Camanche Dam, between Highway 88 and McIntire Road; and 3 miles below Woodbridge Dam between Peltier and Jahant Roads.

B. Justification

SJRCD, in partnership with the East Bay Municipal Utility District (EBMUD), Point Reyes Bird Observatory (PRBO), and Bitterroot Restoration, Inc. (BRI) propose to implement a pilot project involving restoration of 2 one-mile stretches of the lower Mokelumne River, and a Neotropical Migratory Bird Monitoring Program (NMB) from Camanche Dam to the Cosumnes River and along a tributary, Murphy Creek. The project is part of a larger effort to restore and enhance riparian habitat values within the lower Mokelumne River and Murphy Creek on both private and public lands.

BRI will restore ~ 45 acres (15% of targeted acres for LMR) of additional riparian habitat along two separate one-mile stretches of the Mokelumne River. BRI will conduct vigor assessments and site specific transects of the restoration sites to determine the diversity of canopy structure created and the success of this specific restoration site from a vegetative perspective. The NMB will collect bird response to restoration data at these sites to provide information about re-colonization by songbirds.

Valley Foothill Riparian Habitat is a mosaic of vegetative associations distributed across the landscape and along the river corridor. The mosaic pattern includes areas dominated by trees and tall shrubs interspersed with areas dominated by low shrubs and open areas dominated by herbaceous vegetation.

In the conceptual model for this project, riparian restoration will increase the diversity and richness of riparian bird focal species utilizing the Mokelumne River corridor. These include, but are not limited to, Swainson's Hawk, Willow Flycatcher, Warbling Vireo, Bank Swallow, Yellow Warbler, Common Yellowthroat, Wilson's Warbler, Yellow-breasted Chat, Song Sparrow, Black-headed Grosbeak, and Blue Grosbeak. Using baseline data already in hand, areas where restoration has already taken place will be monitored to measure how birds respond to newly restored areas. This data will be compared to data from areas that lack riparian vegetation in order to measure restoration success.

The diversity of breeding birds is often used as an indicator of healthy riparian areas because birds respond quickly to changes in habitat and will abandon - or become extirpated from - areas that are unsuitable, and quickly re-colonize restored areas (RHJV 2000). With baseline data collected as part of this study and from a preliminary study (Reeves et al. 2001), we can provide recommendations for future habitat restoration and enhancement projects planned along the Mokelumne River. A secondary benefit from the restoration is that the river's aquatic function will be enhanced for anadromous fish.

BRI will use habitat recommendations developed for songbirds to guide riparian restoration. The revegetation plan will consider feeding, roosting, and nesting habitat needs and design restoration to benefit these species. Data collected can help determine which plants and plant associations benefit avian communities while also reducing stream bank erosion and restoring other river function for the benefit of anadromous fish species. Since some restoration has already taken place, results at the BRI's restoration site can be compared.

Results of the monitoring will provide information that can be used to evaluate and adjust restoration practices (e.g. Small et al 1999, Geupel et al. 2001b). If results indicate the restoration and enhancement actions meet or exceed wildlife objectives, these restoration actions can be duplicated in future restoration projects on the Mokelumne and other similar watershed projects in the future (Block et al. 2001). The adaptive management model relies on monitoring the effects of land-management activities, and using results of the monitoring to modify the restoration and enhancement activities when warranted (Walters 1986; Gibbs et al 1999).

As a limiting factor, some studies have shown that diversity and abundance can be misleading indicators of bird population health. Measuring demographic parameters of wildlife response to restoration, particularly reproductive success, are most likely the best measure of success (Martin 1993, RHJV 2000). To mitigate this limiting factor, nest monitoring is one of the methods that will be used. Also, many neotropical migrants are dependent on early successional development in riparian habitats; therefore, they are good indicators of the success of restoration on an ecosystem scale (RHJV 2000).

Monitoring of this restoration and enhancement project will be used to assess whether a directed management enhancement action has been carried out as designed. In the adaptive management model for riparian restoration along the Mokelumne River, targeted research in the form of monitoring is the key measure of success. There is only limited knowledge of most species' relationship with their habitat, and information is especially lacking where habitat conditions are linked to population status (Block et al. 2001). Without monitoring songbirds, used as indicators of a recovering system, the success of the restoration project cannot be gauged. In support of the adaptive management concept, this project will provide information for future restoration projects on the lower Mokelumne River (LMR) and other watersheds in the Central Valley/Foothill area.

C. Approach

This project involves the use of three key elements:

- Restoration of 2 miles (~ 45 acres) of riparian habitat along the LMR.
- Monitoring songbird species along the LMR from Camanche Dam to the Cosumnes River to assess breeding status, distribution, and abundance in existing and restored riparian habitats for a period of three years.
- Monitoring the response of neotropical migrant songbird species to riparian restoration along Murphy Creek, a tributary of the Mokelumne River, during a period of three years.

Riparian restoration along the Mokelumne River will be designed to recreate Valley Foothill Riparian Habitat (Mayer and Laudenslayer 1988) consisting primarily of the vegetation series' Fremont Cottonwood and mixed willow (Sawyer and Keeler-Wolf 1994). To accomplish this, BRI

will plant a variety of native trees and shrubs will be planted for canopy structure, and sedges and grasses for ground cover. The planting design will seek to enhance existing native vegetation by planting a mosaic around existing native plants to create diversity in vertical and horizontal structure (Geupel et al. 2001b). This model will be used to recreate habitat for a variety of neotropical and resident songbirds (RHJV 2000) and at the same time restoring habitat functions for the entire aquatic system (Cederholm et al. 2000). The restoration will require a number of sequential tasks: developing a planting plan, site preparation, planting with weed mats and herbivory protectors, maintenance, and monitoring.

Maintenance and monitoring are critical components of restoring riparian habitat. Maintenance is necessary to ensure that the installed plants have the opportunity to become established and to compete with existing vegetation including non-native invasive plant species. Maintenance is also necessary to ensure that areas where plants did not establish are replanted to ensure overall project success. Monitoring is critical to understand how well plants are establishing and growing and to monitor the development of the riparian community overall. Site specific monitoring is necessary to ensure restoration project success. In addition to site specific monitoring, this project requires the monitoring of avifauna and their required habitat.

Restoration goals for this project were planned for focal bird species (RHJV 2000). Without bird monitoring, the adaptive management model is invalid. Birds are considered sensitive indicators of environmental change, responding quickly to both habitat enhancement and degradation. In order to get a more comprehensive assessment of avian community response to the restoration, a thorough assessment of the different ways birds use the Mokelumne River corridor is necessary. The bird monitoring component of this project will consist of: point count surveys, point count vegetation assessments, mist netting, Fall migration monitoring, and nest monitoring.

Riparian Restoration and Monitoring

The following outlines the specific steps that will be followed for successful restoration and enhancement of ~ 45 acres of Valley Foothill Riparian Habitat. Tasks include developing a planting plan, site preparation, installing plants, and conducting ongoing maintenance and monitoring of the restoration project.

Planting Plan

A planting plan will be developed to list specifically what is present on the sites and how the sites will be modified. Using GPS data, the borders of the entire planting area will be mapped as a polygon, as will the outer edges of large weed infestations. Point locations for all existing native riparian vegetation will also be recorded. These maps will be put into ARCVIEW (ESRI GIS software) to create a database of existing site conditions. A planting plan will be developed from this information that enhances existing conditions at each site while creating a mosaic of canopy coverage and structure in the riparian corridor.

Site Preparation

All non-native invasive plants [including Chinese tree of heaven (*Ailanthus altissima*), Himalayan blackberry (*Rubus discolor*), saltcedar (*Tamarisk ramosissima*), and perennial pepperweed (*Lepidium latifolia*)] will be targeted for removal. Weeds will be cut and stacked in burn piles for burning to occur after the weeds have dried enough to carry fire (during the burn season). If fire is not an

option, the stacked vegetation will naturally decompose on site and provide habitat for species that utilize debris piles. Immediately after clearing, Rodeo® will be applied to the freshly cut stems.

For trees and shrubs, each containerized stock planting location will be prepared by clearing a three-foot diameter circle. Each planting location will have a hole augered into the ground to prepare the location for installing 40D supercell containerized plants. Planting locations will be marked with colored flags denoting species. Trees to be planted will include valley oak (*Quercus lobata*), Fremont's cottonwood (*Populus fremontii*), sycamore (*Platanus racemosa*), white alder (*Alnus rhombifolia*), boxelder (*Acer negundo*), and Oregon Ash (*Fraxinus latifolia*). Shrub species to be planted will include California grape (*Vitis californica*), California Rose (*Rosa californica*), blue elderberry (*Sambucus mexicana*), buttonbush (*Cephalanthus occidentalis*) and species of willows (*Salix*). All plants will be grown from seed collected within the watershed.

All containerized stock will be planted with the entire root system below ground and the stem straight up. Two fertilizer packs will be added six inches from each plant. Mesh weed mats will be placed around the stem of each plant, and a mesh browse protector will be installed on each plant with two bamboo stakes for support.

Native grass and sedge plugs will be planted throughout the riparian corridor to create habitat for focal neotropical and resident songbirds. These sedges and grasses will also reduce competition from weedy species and reduce erosion of the newly exposed soil. Sedges will be planted along the edges of the river at normal summer flow level. A variety of native grass species plugs will be planted throughout the remainder of the revegetation site. Hoedads and dibbles will be used to place grass and sedge plugs in a three-foot spacing.

Maintenance

Maintenance will begin after plant installation is complete. Maintenance will include weed management and replacement planting. Weed management will consist of reducing problem species on site by mowing and herbicide application. Successful weed management will reduce costs for management during the three-year course of this project.

During the late fall of years 2 and 3, replacement plants will be installed to ensure project success. Each fall, 20 percent of initial tree and shrub planting numbers will be installed. For grasses and sedges, 5 percent of initial plantings will be installed. If mortality is low after each growing season, then replacement planting will be used to enhance the original planting. If plant mortality is high, planting will infill low cover areas.

Monitoring

Monitoring will be conducted to assess plant health and habitat development. Annual vigor assessments will be used to determine plant health. Habitat development will be measured via a series of methodologies recording cover for each species encountered within plotted areas. Vigor assessments will be used to determine the health of each containerized tree and shrub planted. Plants will be rated on a scale of 0 to 4 with 0 being a dead plant and 4 showing excellent growth during the growing season. All dead plants will be replaced with a new plant of the same species (up to 20% of original planting numbers for trees and shrubs, and 5% for grasses and sedges).

Habitat assessment will include cover/frequency studies using randomly selected 40 meter transects (Elzinga et al. 2000) across the riparian corridor. Starting at five meters and progressing every five meters along each transect, cover will be recorded for the herbaceous layer, shrub layer, and tree canopy (Elzinga et al. 2000)

Ground cover will be measured by running eight 2 meter transects perpendicular to the main transect line. These transects will alternate on each side of the main transect line. A 20cm x 50cm frame will be placed parallel with the 2m transect tape. Total cover will be recorded using Daubenmire cover classes as modified by Bonham (1989) for each species encountered with the frame. The frame will then be shifted to 0.5m, 1m, and 1.5m marks resulting in cover readings of a 2m x 20cm strip. Cover will be recorded for each species at each mark for a total of four cover readings per 2m transect, and 36 cover readings for the main transect. Average cover for each species will be determined by dividing the total cover for each species by 36. Frequency will be determined by totaling the number of times a single species is found in each cover frame and dividing by 36.

Two approaches will be used to monitor shrub canopy. The first uses a densiometer placed on the ground at each 5m interval and canopy cover read from the grid to determine total shrub cover. The second entails recording cover using the same cover classes as used for ground cover for each species of shrub encountered within a 1m radius circle from the 5m interval. Sapling trees will be recorded as shrubs until they have a diameter at breast height (dbh) greater than 10cm.

Two approaches will be used to monitor tree cover. All trees within 10m on either side of the 40m transect will be measured for dbh, and basal area for each species will be calculated (Elzinga et al. 2000). At each 5m interval along each transect a densiometer will be used to record overstory canopy cover for each of the four cardinal directions. Average cover will be calculated by adding the total cover from the four readings and dividing by four.

This restoration approach will result in the increase of riparian habitat along the lower Mokelumne River. Maintenance and monitoring will ensure that native plants will effectively reduce non-native invasive plants.

Monitoring Avian Response to Restoration and Enhancement

In order to address the increasing urgency to protect, manage and adequately restore riparian areas that support healthy bird populations, California Partners In Flight (CPIF) and the Riparian Habitat Joint Venture (RHJV) created the Riparian Bird Conservation Plan (RBCP). The goal of the RBCP is to promote and guide the conservation and restoration of riparian habitat sufficient to support the long-term viability and recovery of native bird populations and associated species (RHJV 2000). Historically, the lower Mokelumne River provided habitat for all of the riparian focal species highlighted in the RBCP (Grinnell and Miller 1944). Comparing recent surveys with historical breeding distribution information shows that 11 of the 14 focal species still use the lower Mokelumne for breeding, migration and/or over-wintering (Reeves et al. 2001).

The NMB is being implemented to provide critical data on riparian bird use of the lower Mokelumne River from Camanche Dam to the confluence with the Cosumnes River. The data will be used to guide management activities proposed to restore and enhance riparian habitats along the river.

Point Count Surveys

Point count surveys are a standard monitoring technique (Ralph et al. 1993 and 1995) that PRBO has used widely in the Central Valley since 1993 at various locations along the Sacramento, Cosumnes and San Joaquin rivers. Point count surveys are one of the most efficient and data-rich methods of monitoring landbird populations. The data are used to calculate secondary population parameters, such as abundance, species richness and diversity. Using the point count method, we can detect annual changes in bird populations, differences in species composition between different habitat types, and abundance patterns of species. Vegetation characteristics (measured at each point count station) will be related to changes in bird species composition and abundance across the stations. These data can be used to evaluate the quality of existing habitat and help guide where and how restoration could be implemented to improve habitat conditions for riparian birds.

A total of 67-point count stations have been established in riparian vegetation along the banks of the lower Mokelumne River, from the Camanche Dam to Woodbridge. As part of this proposal, the river miles to the Mokelumne's confluence with the Cosumnes River will be incorporated into the monitoring program. Approximately 30 additional points will be established along the reach extending from Woodbridge to the Cosumnes River, and 38 points will be established along Murphy Creek.

All point count stations (approximately 140) will be visited three times during the breeding season (mid-April through June) following standard protocol (Ralph et al. 1995). Surveys will be conducted by a trained PRBO field biologist, familiar with the identification of local bird species by sight and sound. Surveys will start at sunrise and be completed within four hours to ensure that birds are monitored during the period when they are most active. Each point will be surveyed for five minutes and all bird detections by sight, song and call will be recorded. Observers will also record any sign of breeding activity (e.g., courtship, nest-building, carrying food). General weather conditions such as temperature, wind speed and percentage of cloud cover will also be noted.

Point Count Vegetation Assessment

Vegetation data will be collected at point count stations that can be used to relate the differences in bird species composition and abundance to differences in vegetation. Vegetation assessment will be conducted using the releve method (Mueller-Dombois and Ellenberg 1974, Ralph et al. 1993). A 50-meter radius plot, centered on the point count location, will be described using general habitat characteristics including aspect, slope, and maximum tree diameter-at-breast height (dbh). Total cover over the plot of trees, shrubs, herbaceous species, litter, water, and ground will be estimated as well as height of each layer. For each vegetation layer (trees, shrubs, herbaceous species), species composition and relative cover will be recorded as a percentage of total cover for that layer.

Mist Netting

Standardized mist-netting at two sites is being proposed to provide important demographic information on songbirds within riparian habitat along the Mokelumne River. By examining individuals captured in the nets for signs of active breeding condition (i.e., cloacal protuberance, brood patch) we can supplement information gained from point count and accurately determine if those species are using the riparian habitat along the Mokelumne River to breed. Furthermore, results from mist-netting can be used to determine where local populations are limited (Nur et al 1999). By determining productivity based on the ratio of young birds versus adults captured in the nets we can predict the future viability of local songbird populations (DeSante and Geupel 1987 ,

Nur et al 1999). Using recaptures of adults over 3 years of data collection we can estimate annual survivorship and determine if events on the wintering grounds are limiting populations (Chase et al 1999, Nur et al. 1999).

Mist-netting and banding will be conducted per guidelines described in Ralph et al (1993). A banding site will be established at an appropriate station with an array of 10 nets to be operated once in a ten-day period, for a total of ten times during the breeding season between 1 May and 10 August. Following standardized protocol, nets will be unfurled 15 minutes after local sunrise, checked every 30 to 45 minutes (more often in hot weather) and operated for five hours.

Birds captured in the nets will be removed and processed on-site with all individuals (except hummingbirds and game birds) receiving a standard aluminum U.S. Geological Survey Biological Resource Division (BRD) band for permanent identification. Age, sex, wing length, breeding condition, weight, skull ossification, flight feather wear, molt, and fat score of each bird will be recorded as described by Pyle et al. (1997) prior to release of the bird. Birds aged as hatched from a nest during the 2001 breeding season will be recorded as hatch-year-birds and adults (individuals hatched during previous breeding seasons) as after-hatch-year birds. Estimates of survivorship can be generated from recapture rates of banded individuals the following year.

All mist-net data will be submitted to both the U.S. Geological Survey Biological Resource Division's Bird Banding Laboratory and the MAPS program of the Institute for Bird Populations (IBP) in Point Reyes Station, CA.

Fall Migration Monitoring

Mist-netting and banding at two sites during fall migration is proposed to provide information on songbirds, including Neotropical migrants, using riparian habitat along the Mokelumne River as a stop-over and dispersal site. Protocol will follow guidelines from the Migration Monitoring Council (Hussell and Ralph 1995) and will be conducted once a week at the same sites established during the breeding season from late August through October. Mist-netting will be conducted according to the protocol described above for the breeding season.

Area search plots, located at the mist-net sites, will be censused during mist-net operation to provide additional information on bird species using the area during migration. Mist nets do not sample larger bird species such as raptors, waterbirds, etc. and conducting area search censuses will document what other species are using the area. Area search protocol will follow guidelines described by Ralph et al. (1993) with three plots, each approximately 3 hectares, encompassing the mist-net site. Each plot will be censused for 20 minutes and all individuals detected, type of detection (i.e., visual, song, call) and flocking behavior will be recorded on standardized data forms.

Nest Monitoring

Nest monitoring is proposed to investigate songbird productivity within the riparian corridor, a direct measure of songbird population health. Productivity estimates provide information on whether a local population of birds is viable based on nesting success. Nest searching plots will be established at 2 sites. Nests will be located and monitored by PRBO biologists following BBIRD protocol, minimizing human induced predation probability and disturbance to the adults and nest site (Martin and Conway 1997, Martin and Geupel 1993). All data will be shared with the USFWS co-op unit at

the University of Montana for inclusion in BBIRD, a national monitoring and research program that receives data from over 20,000 nests per year in North America (Martin and Conway 1997). Vegetation measurements of nest substrate will be conducted after completion of nest cycles. Spot mapping will also be conducted by PRBO biologists at the nest-searching plots to determine the number of pairs of focal riparian species holding breeding territories. The same observer will visit each plot a minimum of eight times during the breeding season, mapping all territorial individuals. (see Ralph et al. 1993 for review).

D. Feasibility

The proposed riparian restoration will take place on private land in an area adjacent to vineyards/ranchland in the agricultural dominated landscape of the lower Mokelumne River watershed. The landowners, with 2 miles of river frontage, have granted permission for restoration and monitoring to take place on their property (letters attached).

The proposed approach is feasible and appropriate because it uses proven methods of restoring native vegetation communities in California and other western states. By formulating a site-specific planting strategy, then implementing and maintaining the revegetated area, new habitat will be created for neotropical songbirds while at the same time restoring riparian function for the benefit of anadromous fish populations. By monitoring site specific transects within the restoration area, the project will provide vital information on the diversity of canopy structure created and how it relates to the habitat needs of focal riparian bird species.

PRBO has been conducting long-term monitoring of terrestrial bird populations for more than 35 years (RHJV 2000). Recommendations from these studies are currently being used by numerous agencies including recipients of CALFED funded projects to evaluate and adaptively manage riparian restoration (Griggs and Small 2000, Small et al. 2000, Geupel et al. 2001a, b) and formed the basis for the statewide Riparian Bird Conservation Plan (RHJV 2000).

PRBO currently holds all applicable federal and state banding and collecting permits for the marking and handling of migratory birds (non-listed species).

EBMUD will contribute in-kind by adding point-count, mist netting, and nest monitoring locations to areas where there is already permission for biological monitoring on public and private lands consistent with the lower Mokelumne River Project Water Quality and Resource Management Program developed in partnership with the California Department of Fish and Game and the U.S. Fish and Wildlife Service.

The knowledge gained from both the riparian restoration and assessment and the bird monitoring is expected to reveal how targeted riparian restoration is beneficial for specific neotropical migrant and resident songbird species and anadromous fish in a primarily agricultural landscape. Knowledge gained from this project can be applied to other proposed restoration sites in the watershed.

E. Performance Measures

Performance measures for monitoring riparian restoration will include results from transect studies, vigor assessments, analysis of diversity in vertical and horizontal stratification and canopy diversity as outlined in section C. These performance measurements will be conducted and reported by BRI.

Performance measures for the component monitoring avian communities include changes in occurrence, species abundance, richness, and diversity, and breeding status and nesting success of neotropical migrant and resident songbirds in existing and restored riparian areas along the Mokelumne River as outlined in section C. Performance measurements for bird monitoring will be conducted by PRBO and EBMUD, and reported by PRBO.

Quantifiable performance measurements will include:

- High survivability of tree, shrub, sedge, and grass plantings.
- Low recurrence of removed non-native invasive plant species
- Habitat assessments that reveal increased diversity of canopy structure, and horizontal and vertical stratification
- An increase in species and diversity among riparian bird focal species and target neotropical landbirds.
- An increase in foraging and breeding activity by riparian bird focal species and target neotropical migrant and resident landbirds.
- Recolonization by songbird species as measured by abundance and distribution within restored riparian habitat.

Presentations and data reports will be given at public meetings of the SJRCD, Lower Mokelumne River Watershed Steering Committee, Mokelumne-Cosumnes Watershed Alliance (MCWA), and at future professional conferences. Results will also be published in annual reports for both BRI and the SJRCD, and on the SJRCD, MCWA, and PRBO websites.

F. Data Handling and Storage

BRI will be responsible for primary handling, storage, and interpretation of information gathered for all restoration activities. Site plans and vigor assessments for the riparian restoration site will be recorded with GPS mapping and downloaded daily to a computer database. Cover and frequency data generated from transect assessments will be recorded as hard copy and entered into a computer spreadsheet. There will be a set of hard copies for all digital data kept in different locations, and electronic copies will be stored on CD-ROM.

PRBO will be responsible for primary handling, storage, and interpretation of bird monitoring data. Information gathered during this project will be added to PRBO's long-term databases and also used for comparative purposes with other data collected during the past 8 years in California's Central Valley.

The data will also be available to academics and the general public through the SJRCD website

G. Expected Products/Outcomes

Results of the project will be used to guide the Lower Mokelumne River Watershed Stewardship Plan in identifying land stewardship actions, as well as recommendations for best management practices (BMPs). These recommendations will improve and enhance habitat for the benefit of all flora and fauna in the watershed. The information generated will be shared with other agencies, organizations, and landowners to help them make decisions regarding habitat conservation, riparian restoration, and other land management activities (e.g., grazing, agricultural production) affecting neotropical and resident songbirds and anadromous fish.

The restoration planting plan and associated maps will be completed by the end of October 2002, and will be included in the first quarterly report and the first annual report. Also included in the appropriate quarterly reports and the first annual report will be a paper describing the vegetation assessments and vigor assessments conducted during June 2003 and October 2003. Subsequent quarterly and annual reporting will include sections describing vegetation and vigor assessments.

For the 2002 field season, PRBO will provide a summary report no later than January 1, 2003 describing methods, preliminary results on avian species composition and distribution as well as management recommendations. A spatially explicit database will also be provided on a CD.

For the 2002 growing season, SJCRCD will provide a summary report no later than January 1, 2003 describing methods, preliminary results on vegetation composition, canopy structure, and management of weeds and invasive species in the riparian restoration area.

The information will also be made available in the forms of presentations, reports, and papers to conferences and organizations including the State of the Rivers Symposium, the CALFED Science Conference, The Riparian Habitat Joint-Venture Floodplains and Riparian Restoration Conference, the new version of the Riparian Bird Conservation Plan (RHJV 2000), The Wildlife Society-Western Section annual conference, Society for Ecological Restoration-California Section annual conference, and other meetings as appropriate.

H. Work Schedule

Beginning in October 2002, the restoration sites along the Mokelumne River will be visited. The sites will be assessed and a planting scheme developed for each by the end of the month.

In early November, BRI crews will begin intensive site preparation at each of the project sites. Removing problem species such as Himalayan blackberry and saltcedar will take most of the month. Once the intensive site preparation is completed, general site preparation will begin. All site preparation activities should be completed by mid-December 2002.

Planting will commence in late December and should be completed within two weeks. BRI will attempt to have the project completely planted by the Christmas holiday.

Maintenance activities will begin in early January 2003. BRI crews will visit the site on a monthly basis for as long as is required to mow and apply herbicides to non-native invasive plants. Quarterly reports and budget milestones will be submitted for maintenance activities throughout the three years of this project.

Vegetation monitoring will be conducted in June of the following three years. During June, plants have good growth from the spring rains and anticipated higher spring river levels. Vigor assessments will be conducted in early October 2003 and 2004.

All reporting on the restoration component will meet CALFED reporting criteria.

First year bird monitoring will begin in mid-August 2002 with Fall migration monitoring. First year fall migration monitoring will consist of mist netting and banding at two sites along the Mokelumne River. The fall mist netting and banding work will occur once per week at the same mist netting site established during the breeding season monitoring and conclude at the end of October 2002. In addition to mist netting, area search plots will be used to detect other species including raptors, waterfowl, and avian species other than neotropical migrant and resident songbirds.

Point count surveys will begin approximately mid-April, 2003 along the Mokelumne River and Murphy Creek. This is to coincide with the nesting season. Each point count station will be visited three separate times during the breeding season for five minutes each during the time when birds are most active. Breeding season monitoring concludes at the end of June.

Nest monitoring will be conducted during the breeding season beginning in April 2003 and extend until August 2003. Nest monitoring and spot-mapping will be established at 2 sites along the lower Mokelumne River.

Breeding season mist netting and banding work will be conducted only along the Mokelumne River. Banding will begin May 1, 2003 and continue until August 10, 2003. An array of 10 mist nets will be operated once every 10 days, for 5 hours per day.

The work schedule for bird monitoring during years two and three of the grant will follow similar time lines.

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

A. ERP, Science Program and CVPIA Priorities

This project specifically addresses several of the draft Stage 1 PSP priorities.

DR-1: restore habitat corridors in the North Delta, East Delta, and San Joaquin River (strategic goal 4, habitats). For the east Delta habitat corridor, this project will contribute to connectivity between riparian habitats. In addition, our adaptive management model seeks to determine how riparian restoration helps to improve conditions that will provide for the recovery and restoration of native species of neotropical migrant and resident songbirds (through the monitoring of bird populations for response to restoration activities). Habitat restoration to improve conditions for these birds will contribute to connectivity between riparian habitats along the Mokelumne River, and will provide habitat and other processes to benefit at risk species including the giant garter snake, Swainson's hawk, and Valley elderberry long-horn beetle.

DR-2: restore and rehabilitate floodplain habitat in eastside tributaries (strategic goal 4, floodplains and bypasses as ecosystem tools). Riparian areas, by definition, are a part of the floodplain. As part of the restoration component, we will evaluate restored riparian areas where the Mokelumne River inundates its floodplain on a seasonal basis.

DR-4: restore habitat that would specifically benefit one or more at-risk species; improve knowledge of optimal restoration strategies for this species (strategic goals 1, at risk species assessments;

strategic goal 4, habitats). The adaptive management model will monitor the effectiveness of local riparian restoration strategies for at risk and locally extirpated species including California Yellow Warbler and Yellow-billed Cuckoo. Through the approach, we will be able to track and understand gains and losses of specific species and communities on a landscape basis as a cumulative result of establishing corridors of restored habitat.

As a part of the products and outcomes of this project, papers will be produced that will improve the state of knowledge about habitat-specific requirements of songbird species. We seek to determine which species adapt to different types of plants and canopy structure during the course of a riparian restoration. Additionally, we seek to track population response to phased riparian restoration as it might mimic a disturbance regime, and to increase our understanding of gains and losses of specific species and communities on a landscape basis. This can realistically lead to the development of local population models for selected species among neotropical migrant and resident songbirds.

The project will also contribute to other draft Stage 1 PSP priorities.

DR-3: restore upland wildlife habitat and support wildlife-friendly agriculture (strategic goal 4, wildlife-friendly agriculture). The restoration and bird monitoring will take place in a watershed that is primarily an agricultural landscape. Local farmers and ranchers are voluntarily encouraging riparian restoration on their lands. By using this work to compare the effectiveness of riparian restoration (especially its benefits in enhancing stream bank stabilization) we anticipate being able to more effectively promote wildlife friendly agriculture, especially in riparian areas. Restored riparian areas will have the beneficial effect of reducing non-point source pollution from agriculture (DeLong and Brusven 1991, Petersen 1992, Narumalani et al. 1997, Wissmar and Beschta 1998) and provide collateral benefits for anadromous fish populations through an increase in shaded riverine aquatic habitat (Simon 1999). Information obtained from this program will be incorporated into the Lodi-Woodbridge Winegrape Commission's Winegrower's Workbook in the habitat management section. .

DR-5: implement actions to prevent, control, and reduce impacts of non-native invasive species (strategic goal 5, non-native invasive species). The riparian restoration component of this proposal specifically targets Himalayan blackberry, Chinese tree of heaven, saltcedar and perennial pepperweed for reduction, control and eventual eradication from the riparian restoration sites. Revegetating areas dominated by these invasive exotics with a variety of native trees and shrubs is expected to result in the elimination of most populations of non-native invasive species from the project site. Eliminating or severely reducing populations of non-native plants will provide native vegetation with the opportunity to successfully establish through planting and natural processes.

This project also will help to meet milestones identified for the Delta and East Side Tributaries in the ERP Draft Stage 1 Implementation Plan. These milestones include:

- Develop and implement a program to establish, restore, and maintain riparian habitat to improve floodplain habitat, salmonid shaded riverine aquatic habitat, and in-stream cover along at least one tributary within the Eastside Delta Tributary EMZ.
- Restore a minimum of 300 acres of self-sustaining or managed diverse natural riparian habitat along the Mokelumne River, Cosumnes River, and Calavares River, and protect existing riparian habitat (this project meets 15% of that goal).

- Develop and begin implementation of a demonstration program to reduce invasive non-native plant abundance within at least one EMU in the Delta

B. Relationship to Other Ecosystem Restoration Projects

The restoration component of this project is directly related to programmatic actions described in CALFED #99N-15, year one of the Lower Mokelumne River Watershed Stewardship Plan. By sharing information gathered in this study with the steering committee developing the stewardship plan, the committee will be in a better position to: develop a cooperative program to restrict further riparian vegetation removal, and establish riparian corridor protection zones; develop a cooperative program to implement riparian restoration; encourage improved land management and livestock grazing practices along stream riparian zones, develop a cooperative program to restore riparian woodlands along the entire Mokelumne River; and develop and implement a coordinated control program to reduce or eliminate invasive plant species from the riparian corridor along the Mokelumne River.

The riparian restoration component will add to the total number of restored and enhanced riparian acreage in the watershed. These include completed or scheduled riparian restoration projects along the Mokelumne River and Murphy Creek (funded by the Mokelumne River Partnership Grants and CVPIA). This project will also provide collateral benefits for anadromous fish restoration, including CVPIA-funded gravel enhancement projects conducted by EBMUD.

C. Previous Recipients of CALFED Program or CVPIA Funding

The San Joaquin County RCD has received funding for three previous CALFED grants. Grants 1 and 2 were for the Lower Mokelumne River Watershed Stewardship Program, #99N-15, funded through the Watershed Program. Grant 1 is for the first year of the project, with Grant 2 funding years two and three.

Grant 3 is for the Murphy Creek Restoration Project, also under the Watershed program. It has not been assigned a project number yet. The RCD is awaiting receipt of the contract, and work has not yet started, though is ready.

San Joaquin County RCD has also received CVPIA funding for land acquisition. The funds will be used to purchase +/- 630 acres of land to preserve vernal pools lands for resource management, education, and conservation purposes. The land is being purchased in one of the identified vernal pool conservation areas.

PRBO currently has 8 'service contracts' with agencies receiving or expected to receive CALFED funding; The Nature Conservancy (Sacramento River), Sacramento River Partners (Sacramento River), UC Davis (2 projects on Cosumnes River and Williamson-McCormick), USFWS (San Joaquin River NWR), North Shasta RCD (Clear Creek), San Francisco State University (Genetic identification of watershed-dependent species of special concern in the Central Valley), and University of Washington (BREACH II: Tidal Marsh Project in Suisun and San Pablo bays).

EBMUD has received 3 CVPIA grants for gravel enhancement and riparian restoration along the lower Mokelumne River.

D. System-Wide Ecosystem Benefits

Several system-wide benefits are anticipated through the riparian restoration aspect of the project. These include:

- Provide and enhance habitat for the re-establishment of neotropical migrant and resident songbirds and potentially other special status wildlife species including the giant garter snake and valley elderberry longhorn beetle.
- Provide connectivity between riparian habitats to allow for wildlife movement in the riparian zone along a greater portion of the river.
- Increase canopy cover to encourage cold-water fisheries and otherwise benefit anadromous fish species.
- Reduction of stream bank erosion, thereby reducing sedimentation.
- Reduce the amount of herbicide and pesticide runoff that enters the river.
- Displacement of non-native invasive plant species in favor of native vegetation.

III. Qualifications

The SJRCD is a special district authorized by the State Legislature and was formed from the combination of the Bear Creek and Tracy RCDs in 1989. The SJRCD has seven board members that live across San Joaquin County, and has successfully administered EPA, NRCS, and CALFED grants for the development and implementation of public outreach and education programs regarding natural resources in San Joaquin County.

SJRCD president **John Meek, Jr.** has farmed and managed farm properties all of his adult life. John has managed 10,000 acres of citrus, cotton, and native pasture. John currently farms 7,500 acres of land, including 1,800 acres in the Delta. He is also General Manager of the Land Management Division for the McCarty Company. In that capacity, he oversees McCarty Company activities on more than 54,000 acres of Delta Region property. He also administers six Reclamation Districts in the Delta Region.

Subcontractors

BRI will provide all aspects of the restoration, maintenance, and monitoring of the project site on Ed Craig's property. BRI has extensive experience restoring degraded lands in general and riparian habitat in the Central Valley specifically. We have or are currently working on riparian restoration projects on the South Fork Putah Creek, the Lower Merced in Yosemite National Park and numerous projects along Dry Creek/Best Slough within the bounds of Beale Airforce Base. BRI typically conducts maintenance and monitoring activities on all restoration projects to ensure success and to learn from unexpected contingencies. **John DiGregoria**, a Restoration Ecologist for BRI, will provide all project oversight, develop the planting scheme, and conduct all monitoring. John has extensive experience planning and implementing riparian restoration projects as well as monitoring vegetative communities and interpreting the associated data.

PRBO has been conducting riparian bird monitoring projects throughout the Central Valley in the following watersheds: lower Sacramento River from Red Bluff to Colusa, San Joaquin River, Clear Creek, Cosumnes, and Lassen Foothills area. PRBO also inventoried numerous other watersheds in 1998 and 1999 as part of a Packard Foundation-funded riparian bird initiative. Ongoing programs at PRBO (Palomarin and Southeast Farallon Island Field stations) represent two of the oldest databases on landbird populations in western North America. Results of these studies have contributed

significantly to current protocols now used to monitor and assess bird populations throughout the New World. PRBO biologists have been instrumental in the development, standardization and validation of the integrated methods used for terrestrial birds.

Geoffrey R. Geupel has a degree from Lewis and Clark College (BS Biology 1978) and has been employed as a biologist at PRBO for 21 years. He is currently Director of the Terrestrial Program at PRBO, has over 20 years experience in ornithological monitoring and research and has authored over 30 reviewed publications. Recent publications and presentations have helped define bird-monitoring protocols now used throughout North America. He has taught numerous technical workshops on bird monitoring and currently oversees 40 field biologists annually. Current areas of interest include breeding and population biology, bird response to habitat restoration, and conservation planning. He is currently: Co-Chair of California Partners in Flight, Chair of the Riparian Habitat Joint Venture's Science Committee, Board member of the Central Valley Joint Venture, and member of both the National Cowbird Advisory Council and Important Bird Area (IBA) National Technical Committee.

IV. Cost-Sharing

EBMUD will undertake and/or oversee the technical monitoring actions for the project including: logistical coordination for the riparian bird monitoring; monitoring amphibian, reptile, and mammal populations; sampling fish populations; water quality sampling (if citizen monitors are unavailable or are unable to conduct sampling); measuring water flows; and other measures as indicated in the monitoring plan. The SJRCD will work with EBMUD and the community to establish photo points to measure the success of riparian restoration efforts. EBMUD salaries and equipment provide the project's \$192,500 cost-sharing. This is from 3 EBMUD biologists (\$45,000 each for 3 biologists = \$135,000; \$50/hour) EBMUD support staff (\$50,000; \$15/hour) and EBMUD equipment (\$7,500).

V. Local Involvement

There are no potential third-party impacts foreseen. The Lower Mokelumne River Watershed Steering Committee is aware of the proposal and supports the work. Members of the committee include representatives from local, state, and government agencies and departments, educators, landowners, and conservation organizations. Other landowners in the watershed are monitoring restoration efforts in the watershed. Participation by these landowners in future restoration projects is anticipated with the success of this and other projects.

VI. Compliance With Standard Terms and Conditions

SJRCD will comply with the standard State and Federal contract terms.

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