Sources, Transport Mechanisms, and Environmental Fate of Heavy Metals and Fine Sediments Associated with Large-Scale Hydraulic Mining in the Humbug Creek Watershed

Project Information

1. **Proposal Title:**

   Sources, Transport Mechanisms, and Environmental Fate of Heavy Metals and Fine Sediments Associated with Large-Scale Hydraulic Mining in the Humbug Creek Watershed

2. **Proposal applicants:**

   Ray Patton, California Department of Parks and Recreation, Gold Mines Sector
   Jim Eicher, Bureau of Land Management
   Vivian Kee, Tahoe National Forest

3. **Corresponding Contact Person:**

   Marilyn Murphy
   California Department of Parks and Recreation, Gold Mines Sector
   10556 East Empire Street Grass Valley, CA 95945
   530 273-3884 x308
   murphy00@pacbell.net

4. **Project Keywords:**

   Heavy Metals (mercury, selenium, etc.)
   Mine Waste Assessment & Remediation
   Sediment Generation, Movement, and Accumulation

5. **Type of project:**

   Research

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

   No

7. **Topic Area**:

   Ecosystem Water and Sediment Quality

8. **Type of applicant:**

   State Agency

9. **Location - GIS coordinates:**

Latitude: 39.3637239

Longitude: -120.9198327

Datum: NAD 27

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

The project location is comprised of the Humbug Creek watershed (4.8 river miles) from its confluence with the South Yuba River 5.1 river miles above Edwards Crossing to a point 2.5 river miles above the historic mining town of North Bloomfield. The project area encompasses several tributaries, including Diggins Creek (0.4 river miles), which originates at Hiller Tunnel, the present day outlet to Malakoff Diggins. Malakoff Diggins is an hydraulic placer mine with an open pit approximately 7000 feet by 3000 feet in area by 200 to 500 feet in depth. Several other placer and hard rock mines are located along Humbug Creek within the project area. An approximately 8,000 foot long partially plugged tunnel, originating at Malakoff Diggins, discharges to Humbug Creek approximately 4,000 feet upstream of the South Yuba River. Historically, a 4,000 foot wooden flume carried water and sediment from the tunnel outlet to the South Yuba River.

10. **Location - Ecozone:**

    Code 16: Inside ERP Geographic Scope, but outside ERP Ecozones

11. **Location - County:**

    Nevada

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:**

    2

15. **Location:**

    California State Senate District Number: 1

    California Assembly District Number: 3

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: 10

    Total Requested Funds: 1,808,593.23

    b) Do you have cost share partners already identified?

    Yes

    If yes, list partners and amount contributed by each:

    Bureau of Land Management 8,496

    US Forest Service 9,150

    California State Parks 64,725

    c) Do you have potential cost share partners?

    Yes

    If yes, list partners and amount contributed by each:

    South Yuba River Citizens League 5,000

    Malakoff Diggins Park Association 5,000

    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.

98-G1029	**South Yuba Comprehensive Management Plan Phase I**	**Watershed**
WSP01-0067 (award letter)	**South Yuba Comprehensive Management Plan Phase II**	**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?

    No

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)

Janet Cohen	**Yuba Watershed Council**	**530 265 5961 x 207**	**janet@syrcl.org**
Charlie Alpers	**U.S. Geological Survey**	**916 278 3134**	**cnalpers@usgs.gov**
Jenny Curtis	**U.S. Geological Survey**	**916 278 3165**	**jacurtis@usgs.gov**

21. **Comments:**

Environmental Compliance Checklist

Sources, Transport Mechanisms, and Environmental Fate of Heavy Metals and Fine Sediments Associated with Large-Scale Hydraulic Mining in the Humbug Creek Watershed

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.

      Planned activities (environmental sampling and monitoring, feasibility study, and design) have no possibility of a significant environmental impact and are outside the definition of a "project." An EIS/EIR will be prepared during this project to assess potential impacts and identify mitigation measures for restoration alternatives identified in the feasibility study prior to designing any action. It is important to note that the actual implementation of a restoration action will not be completed during this project.

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

   CEQA Lead Agency: None
   NEPA Lead Agency (or co-lead:) None
   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 Required

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:

6. **Comments.**

Land Use Checklist

Sources, Transport Mechanisms, and Environmental Fate of Heavy Metals and Fine Sediments Associated with Large-Scale Hydraulic Mining in the Humbug Creek Watershed

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

   No

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

   No

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

   No

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

   Research only. Data will be used to evaluate restoration alternatives and design of selected alternative(s). Any future changes to land use identified during the evaluation of restoration alternatives will be addressed as part of a future implementation phase.

4. **Comments.**

Conflict of Interest Checklist

Sources, Transport Mechanisms, and Environmental Fate of Heavy Metals and Fine Sediments Associated with Large-Scale Hydraulic Mining in the Humbug Creek Watershed

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):

Ray Patton, California Department of Parks and Recreation, Gold Mines Sector
Jim Eicher, Bureau of Land Management
Vivian Kee, Tahoe National Forest

Subcontractor(s):

Are specific subcontractors identified in this proposal? Yes

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

Alice Berg	Tetra Tech, Inc.
Clayton Creager	Tetra Tech, Inc.
Craig Hunter	Tetra Tech, Inc.
Karen Summers	Tetra Tech, Inc.
Matt Udell	Tetra Tech, Inc.
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):

Matt Udell Tetra Tech, Inc.

Jeremie Maehr Tetra Tech, Inc.

Clayton Creagar Tetra Tech, Inc.

Comments:

Budget Summary

Sources, Transport Mechanisms, and Environmental Fate of Heavy Metals and Fine Sediments Associated with Large-Scale Hydraulic Mining in the Humbug Creek Watershed

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.

State Funds

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**
FP	Field Work Planning						42302.35			42302.35	4230.24	46532.59
SC	Source Characterization						97104.20			97104.2	9710.42	106814.62
PP	Physical Process Assessment						150000			150000.0	15000	165000.00
EA	Effects Assessment						260516.30			260516.3	26051.63	286567.93
CR	Cultural Resource Assessment (incremental funding option)						53056.33			53056.33	5305.64	58361.97
FS	Feasibility Study and Design (incremental funding option)						0			0.0	0	0.00
PE	NEPA/CEQA Planning (incremental funding option)						0			0.0	0	0.00
CE	Community Relations/Education						67893.28			67893.28	6789.34	74682.62
PM	Project Management						40184.59			40184.59	4018.46	44203.05
		0	0.00	0.00	0.00	0.00	711057.05	0.00	0.00	711057.05	71105.73	782162.78

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**
FP	Field Work Planning						0			0.0	0	0.00
SC	Source Characterization						106023.88			106023.88	10602.38	116626.26
PP	Physical Process Assessment						100000			100000.0	10000	110000.00
EA	Effects Assessment						228260.69			228260.69	22826.07	251086.76
CR	Cultural Resource Assessment (incremental funding option)						0			0.0	0	0.00
FS	Feasibility Study and Design (incremental funding option)						61164.14			61164.14	6116.41	67280.55
PE	NEPA/CEQA Planning (incremental funding option)						5408.25			5408.25	540.83	5949.08
CE	Community Relations/Education						60926.68			60926.68	6092.67	67019.35
PM	Project Management						32415.29			32415.29	3241.53	35656.82
		0	0.00	0.00	0.00	0.00	594198.93	0.00	0.00	594198.93	59419.89	653618.82

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**
FP	Field Work Planning						0			0.0	0	0.00
SC	Source Characterization						0			0.0	0	0.00
PP	Physical Process Assessment						0			0.0	0	0.00
EA	Effects Assessment						0			0.0	0	0.00
CR	Cultural Resource Assessment (incremental funding option)						0			0.0	0	0.00
FS	Feasibility Study and Design (incremental funding option)						135014.50			135014.5	13501.45	148515.95
PE	NEPA/CEQA Planning (incremental funding option)						120848.85			120848.85	12084.89	132933.74
CE	Community Relations/Education						41409.53			41409.53	4140.95	45550.48
PM	Project Management						41646.78			41646.78	4164.68	45811.46
		0	0.00	0.00	0.00	0.00	338919.66	0.00	0.00	338919.66	33891.97	372811.63

Grand Total=1808593.23

Comments.
All cost are for a contractor to be hired after notice of award and negotiation of contract with Calfed. State Parks, USFS, and BLM are providing matching funds in the form of staff time for program management of this contract. Actual daily project management will also be contracted out, with all actions approved by direction of the State Parks program manager. Indirect costs are at a state rate of 10 percent.

Budget Justification

Sources, Transport Mechanisms, and Environmental Fate of Heavy Metals and Fine Sediments Associated with Large-Scale Hydraulic Mining in the Humbug Creek Watershed

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

No direct labor hours are proposed by State Parks. All technical and management work will be contracted out. State Parks, USFS, and BLM are providing matching funds in the form of staff time for program management.

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

No direct labor hours are proposed by State Parks. All technical and management work will be contracted out. State Parks, USFS, and BLM are providing matching funds in the form of staff time for program management.

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

No benefit costs are proposed by State Parks. All technical and management work will be contracted out. State Parks, USFS, and BLM are providing matching funds in the form of staff time for program management.

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

No travel costs are proposed by State Parks. All technical and management work will be contracted out. State Parks, USFS, and BLM are providing matching funds in the form of staff time for program management.

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

No supplies and expendable costs are proposed by State Parks. All technical and management work will be contracted out. State Parks, USFS, and BLM are providing matching funds in the form of staff time for program management.

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.

1. FP -- Field Work Planning 590 Hours at an average hourly rate of 66.10 ODCs 3181.99 Travel 120.36 Subcontractor 0.00 2. SC -- Source Characterization 1740 Hours at an average hourly rate of 58.52 ODCs 17331.15 Travel 7225.19 Subcontractor 76750.74 3. PP -- Physical Process Assessment 1949 Hours at an average hourly rate of 59.02 ODCs 25000 Travel 10000 Subcontractor 100000 5. EA -- Effects Assessment 2932 Hours at an average hourly rate of 60.27 ODCs 31390.63 Travel 20825.82 Subcontractor 259839.54 6. CR -- Cultural Resource Assessment 688 Hours at an average hourly rate of 64.77 ODCs 4743.93 Travel 3752.40 Subcontractor 0.00 7. FS -- Feasibility Study and Design 2588 Hours at an average hourly rate of 70.92 ODCs 12629.52 Travel 0.00 Subcontractor 0.00 8. PE -- NEPA/CEQA Planning 1000 Hours at an average hourly rate of 91.09 ODCs 4908.80 Travel 12441.92 Subcontractor 17818.00 9. CE -- Community Relations/Education 2115 Hours at an average hourly rate of 70.20 ODCs 6320.81 Travel 3627.32 Subcontractor 11800.00 10. PM -- Project Management 1384

Hours at an average hourly rate of 79.25 ODCs 3116.50 Travel 1444.32 Subcontractor 0.00

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.

No equipment costs are proposed by State Parks. All technical and management work will be contracted out. State Parks, USFS, and BLM are providing matching funds in the form of staff time for program management.

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.

No project management costs are proposed by State Parks. All project management work will be contracted out. State Parks, USFS, and BLM are providing matching funds in the form of staff time for program management.

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

No other direct costs are proposed by State Parks. All technical and management work will be contracted out. State Parks, USFS, and BLM are providing matching funds in the form of staff time for program management.

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.

The only indirect cost proposed by State Parks is a ten percent fee on all other costs to cover the internal costs associated with the management of project funds.

Executive Summary

Sources, Transport Mechanisms, and Environmental Fate of Heavy Metals and Fine Sediments Associated with Large-Scale Hydraulic Mining in the Humbug Creek Watershed

The California State Park System seeks to remedy the environmental destruction and contamination of over a century ago at Malakoff Diggins State Historic Park, a large-scale hydraulic placer gold mine located northeast of Nevada City, California. Sediment and potentially mercury are discharged from Malakoff Diggins and other nearby small-scale hydraulic and hard rock mines via Humbug Creek to the South Yuba River. State Parks seeks to conduct research to support restorative actions that will reduce the amount of sediment and mercury being released into the Humbug Creek, South Yuba River, and Bay/Delta watersheds in order to improve and protect ecosystems including the habitat of known at-risk, threatened, and endangered species. The following hypotheses will be assessed by the project: (1) Malakoff Diggins and associated drain tunnels, and other mines within the Humbug Creek watershed are releasing sediment and elemental and methyl mercury in quantities that are impacting the ecosystem, (2) methyl mercury formation and release could be reduced through adjustments to physical and chemical conditions at source areas and where conditions favorable for methylation occur, and (3) alteration or reduction of sediment transport mechanisms could significantly reduce sediment and mercury contamination both within mining-related sites and at downstream locations. The research effort required to test these hypotheses will be directed at gathering information to address the source, fate, and transport of sediment, mercury, and other heavy metals; educate park visitors and the community about ecosystem restoration actions; evaluate and design potential restoration actions; and prepare environmental documentation required before implementing any action. The expected outcome of the proposed project includes development of ecosystem and cultural resource characterization reports, physical and chemical models, database and GIS, feasibility study report, basis of design report, plans and specifications, educational materials, and a stakeholder group necessary to support refinement of the conceptual site model, selection, evaluation, and design of restorative actions, and implementation of restorative actions. Ecosystem Restoration Program Goals 1, 2, and 6, multi-regional priorities 3 and 5, and Sacramento Regional Goal 7 will be addressed through the proposed research.

Proposal

California Department of Parks and Recreation, Gold Mines Sector

Sources, Transport Mechanisms, and Environmental Fate of Heavy Metals and Fine Sediments Associated with Large-Scale Hydraulic Mining in the Humbug Creek Watershed

Ray Patton, California Department of Parks and Recreation, Gold Mines Sector
Jim Eicher, Bureau of Land Management
Vivian Kee, Tahoe National Forest

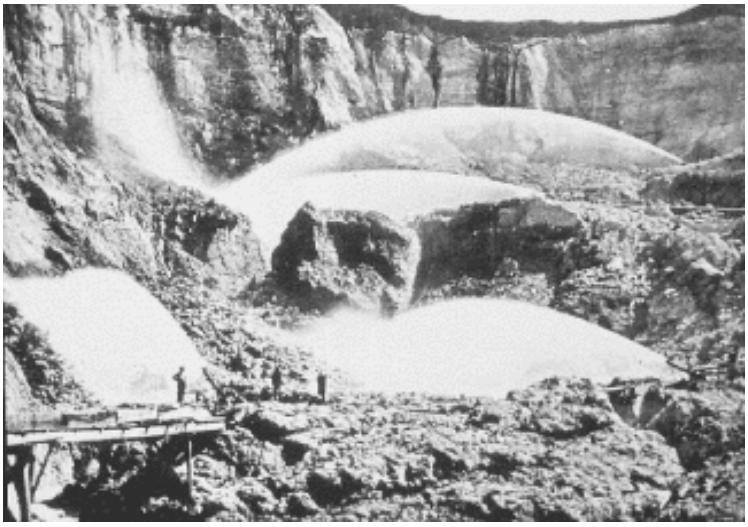
A. Project Description: Project Goals and Scope of Work

1. Problem

History

Beginning on that cold January morning in 1848 when gold was discovered at Sutters Mill on the American River near Coloma, the history of California was dramatically altered. Nearly half a million people swarmed to the California hills in search of the yellow metal, one of the largest human migrations in recorded history.

Only fourteen years after it had begun, the gold rush began to wane. Most of the gold discovered as nuggets and in shallow veins had played out; all that remained was fine-grained particles of gold mixed in millions of tons of ancient river gravels. Thus, in 1852, hydraulic mining was born. Using this new method, miners could blast away entire mountainsides with water cannons, or monitors, that shot 25 million gallons of water per day at speeds up to 124 miles per hour at gold-bearing gravels in the cliffs. Although severely limited by a federal court decision in 1884, hydraulic mining in the Sierra Nevada range has left significant scars on the landscape that are still causing concern over 100 years later.

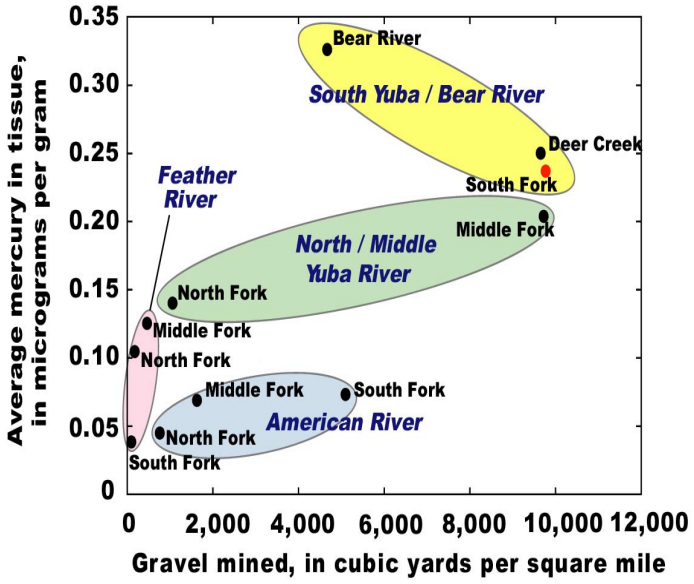


Giant water cannons, or monitors, were used at Malakoff Diggins to erode gold-rich gravels from 300- to 500-foot high cliffs. Gold was separated nearby and resulting tens of millions of tons of sediments were released to local streams and rivers (circa 1860).

Gold mining throughout California is a large part of our state's rich cultural heritage. It is also a major contributor to a legacy of environmental destruction and contamination. The California State Park System (State Parks) seeks to remedy the actions of over a century ago at Malakoff Diggins (a former hydraulic mine) through this compilation of research, education, and action. Malakoff Diggins northeast of Nevada City, the nearby town of North Bloomfield, and a wide variety of associated historic features and archaeological sites have been preserved as a California State Historic Park (SHP) so citizens can visit this grand example of mankind's conquest of nature and marvel at the changes imposed on the landscape. Visitors can stop by the historic mining town of North Bloomfield where they may stroll among the buildings that once housed the support system for the mine. While there, they can visit the small historic museum to learn about the history of hydraulic mining and the issues that it spawned. State Parks seeks to conduct research directed at gathering information to address the source, fate, and transport of sediment, mercury, and other heavy metals; educate park visitors and the community about ecosystem restoration actions; evaluate and design potential restorative actions; and prepare environmental documentation required before implementing any action. Restorative actions will seek to preserve both the heritage of Malakoff Diggins, while improving the conditions of the surrounding Humbug Creek watershed ecosystem that has been slowly healing for so long.

Of all the stream networks in the northern Sierra foothills, the South Yuba River experienced the most intensive hydraulic mining as measured in cubic yards of gravel per square mile, much of this from the 200- to 500-foot high cliffs at the 2-square mile Malakoff Diggins (see figure on next page). During its operation (1866-1900), Malakoff Diggins discharged approximately 29 million tons of sediment to the South Yuba River. The cliffs at Malakoff Diggins still erode today, bit-by-bit year-by-year,

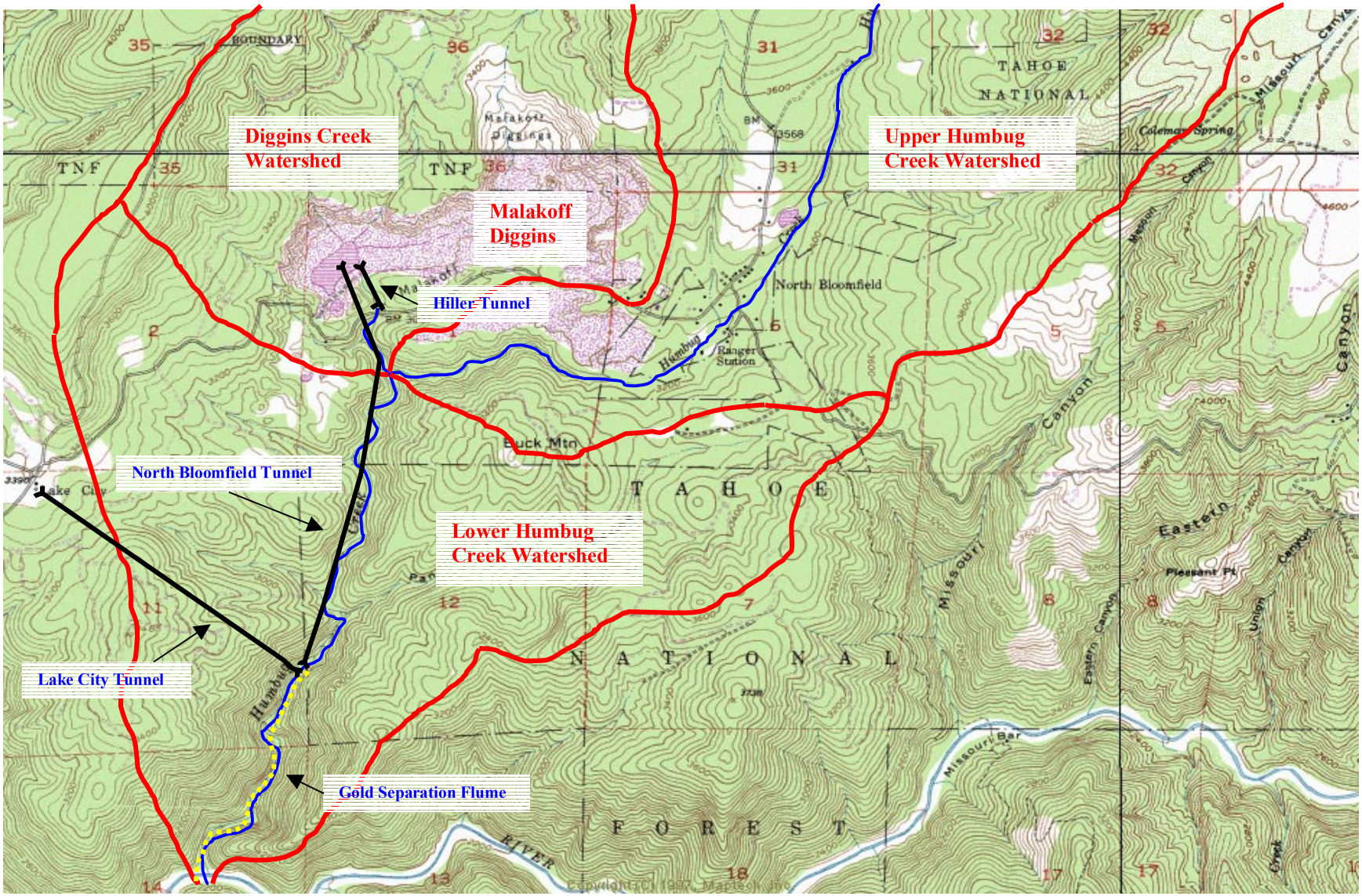
sometimes land-sliding tons of gravels and fine silts and clay material to the hydraulic pit floor. A suspended sediment yield of 2,464 pounds per minute was measured at the exit of Hiller Tunnel during a storm in 1979. This sediment is mobilized by four small creeks that drain the upper watershed and the hydraulic pit floor and is discharged through the Hiller Tunnel to Diggins Creek, which flows to Humbug Creek and eventually the South Yuba River, a State designated Wild and Scenic River (see Project Location Map A). Historically, mined material was also discharged to Humbug Creek via the Lake City and North Bloomfield Tunnels. It is not known whether the North Bloomfield Tunnel continues to discharge sediment to Humbug Creek, since the tunnel inlet is plugged by up to 100 feet of sediment. Other sources of sediment that discharge within the 10-square mile Humbug Creek watershed (see Project Location Map B) include smaller hydraulic mines, tailing from hard rock mines, soils and ephemeral stream courses disturbed by logging practices and road location and crossings.



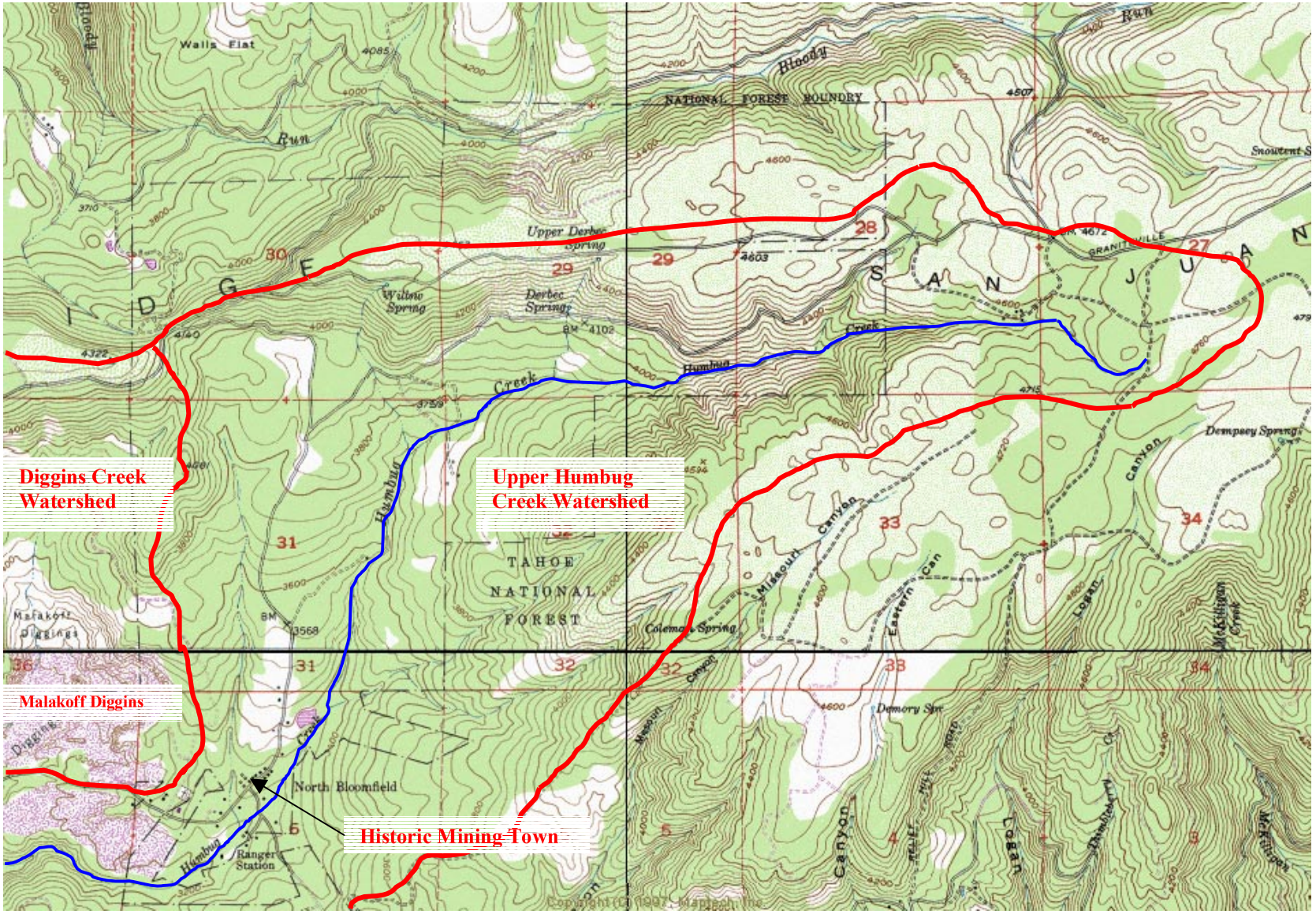
Average methylmercury levels in fish tissues sampled in the Sacramento River Basin were highest in the South Yuba and Bear River watersheds. Amount of gravel mined per square mile was also highest in the South Yuba. Note the South Fork Yuba (red), which receives runoff from Malakoff Diggins via Humbug Creek. (Alpers,

Mercury or quicksilver was used to separate the gold from gravels and sediment as part of the hydraulic mining process. Mercury was lost during mining operations at an estimated rate of 10 to 30 percent per year. During the early years of mine operations, quicksilver was used and a portion was lost in the mine pit. In later years, a portion of the quicksilver was lost within the Lake City and North Bloomfield Tunnels and a separation flume below the North Bloomfield Tunnel exit. Today, the hydraulic pit floor has been filled with eroding sediment. Ponds once present within the mine pit have been filled and may be considered a wetland environment. Mercury rich sediments are believed to be buried deep below the present day hydraulic pit floor, believed to be present in sediments of each tunnel and associated air shafts, and are thought to occur in the Humbug and Diggins Creek channels and in gravel and sediment terraces above both of the creeks. Methyl mercury (MeHg), a highly toxic form of organic mercury, is formed when elemental mercury, Hg(0), is converted to ionic mercury, Hg(II), and then into its organic form CH_3Hg^+ by microbially-mediated processes. These processes generally occur near the oxic-anoxic interfaces in stratified waterbodies, sediments, or wetlands. Methyl mercury is easily absorbed by fish tissue and is bioaccumulative within the food web (e.g., benthic invertebrates, amphibians, and osprey). The United States Geological Survey (USGS) is conducting a study on fish tissues in the Yuba River Basin that has shown levels of mercury that exceed the Food and Drug Administration (FDA) action threshold. Some of the highest mercury levels found were in Lake Englebright, a reservoir receiving sediment from the South Yuba River. Mercury was also found in the tissue of trout collected from Humbug Creek, though below state screening levels and the FDA action threshold. The South Yuba River receives sediment and waters from Malakoff Diggins and other hydraulic mines and hard rock mine tailings in the Humbug Creek and the South Yuba River watershed as a whole.

State Parks seeks funding to conduct research, evaluate and design restorative actions, prepare National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA)



Project Location Map A



Project Location Map B

documentation, and provide community outreach and education. Several historical studies on mass wasting, erosion rates and sediment discharge have been completed, yet questions still remain about the most effective means of reducing sediment discharge from Malakoff Diggins. Much of the data presented in these reports is over 20 years old and should be updated in order to make reasonable decisions about restorative actions and costs. No current or historic studies have been conducted to determine the source, nature, or extent of mercury found in tissues of fish in Humbug Creek. Answering questions related to mercury concentrations, locations, and speciation will be critical to determining a course of action that reduces methyl mercury discharge from mining-related sites and reduces the potential methylation of elemental mercury both within mining-related sites and at downstream locations. Determining appropriate measures to reduce sedimentation and mercury contamination is complicated by the fact that the property involved is part of a State Historic Park and a National Register Historic District, and is managed primarily for its historical values. A wide variety of cultural resources (e.g. historic buildings and landscapes, industrial features, and archaeological sites) exist throughout the project area. These must be identified, evaluated and protected from damage during implementation of restorative actions. As a public institution committed to providing accurate historical accounts and up to date information on current conditions, State Parks seeks to create educational materials and opportunities to foster a greater understanding of these important issues for local residents, park visitors, and those downstream in the entire Bay Delta system.

Hypothesis

The Malakoff Diggins historic hydraulic gold mine is thought to have a continuing negative effect on the water, sediment, and ecosystem quality of the Humbug Creek watershed and South Yuba River. Material eroding from cliffs and landslide areas at Malakoff Diggins are presumed to provide a significant seasonal source of fine and coarse sediment to the hydraulic pit floor. Fine sediments are thought to be remobilized and transferred out of Malakoff Diggins during storm events. These sediments, possibly aided by iron related cementation, may foul spawning gravels in Foothill Yellow-legged Frog (*Rana boylii*) and rainbow trout (*Oncorhynchus mykiss*) habitat. Mercury may be present in the sediment on and below the hydraulic pit floor and in the Hiller, Lake City, and North Bloomfield Tunnels. Mercury is likely transported by sediment in surface runoff and may be transported with groundwater to Humbug Creek and the South Yuba River both as highly toxic organic methylmercury and as elemental and ionic mercury attached to sediment particles. Bio-accumulated mercury is present in the Lake Englebright fishery, a reservoir receiving sediment from the South Yuba River, above state screening levels and the FDA action threshold. While a specific study hypothesis will be developed in the course of the study design, the following general hypotheses will be assessed by the project:

- Malakoff Diggins, Hiller, Lake City, and North Bloomfield Tunnels, and other mines within the Humbug Creek watershed are releasing sediment and elemental and methyl mercury in quantities that are impacting the ecosystem.
- Methyl mercury formation and release could be reduced through adjustments to physical and chemical conditions at source areas and where conditions favorable for methylation occur.
- Alteration or reduction of sediment transport mechanisms could significantly reduce sediment and mercury contamination both within mining-related sites and at downstream locations.

Goals and Objectives

Through sampling and field investigations, elements of the hypothesis stated above will be tested and revisions to the conceptual model will be made. Potential solutions will be considered and assessed for their efficacy and feasibility such that restorative and preventative efforts can be better focused, natural functions and processes maintained, and actions designed to avoid damage to cultural resources. The ultimate goal of such a research effort is to reduce the amount of sediment and mercury being released into Humbug Creek, South Yuba River, and Bay/Delta watersheds in order to

improve and protect ecosystems including the habitat of known at-risk, endangered, and threatened species and the quality of the fishery. The specific goals and objectives of the project are:

1. Prepare detailed study design and project plans for each planned investigation, study, and survey.
2. Conduct characterization study of mining-related sites, tunnels, and Diggins and Humbug Creeks.
   - Characterize surface water flow and surface/groundwater interaction at Malakoff Diggins, from the Hiller, Lake City, and North Bloomfield Tunnels and airshafts, and in Diggins and Humbug Creeks.
   - Characterize sources of sediment in and transport mechanisms from Malakoff Diggins, Hiller, Lake City, and North Bloomfield Tunnels, and along Diggins and Humbug Creeks.
   - Characterize mercury contamination on the hydraulic pit floor, at the tunnel and airshaft exits, at other mining-related sites, and in Diggins and Humbug Creeks.
3. Assess threats to the local ecosystem.
   - Assess methyl mercury uptake and threat to indicator species in the Diggins and Humbug Creek watersheds and locations prone to methylation.
   - Assess threat of impaired water quality (including mercury) to indicator species in the Diggins and Humbug Creek watershed.
   - Assess effects of sediment loading on indicator species habitat and population in Diggins and Humbug Creeks.
   - Develop reduction goals for sediment, total and methyl mercury, and other physical and chemical factors that threaten indicator species.
4. Assess cultural resource management needs.
   - Map resources present in a geographic information system (GIS)
   - Assess the significance of the cultural resources present
   - Assess likely impacts of proposed remedial and restorative measures on those resources
   - Propose restorative actions and other mitigation measures that minimize damage to significant cultural resources.
5. Determine possible solutions and restorative actions.
   - Establish and evaluate a list of potential restorative actions.
   - Prepare environmental documentation to assess and mitigate potential impacts from restorative actions.
   - Prepare designs for up to three identified restorative actions.

Sediment-choked Humbug Creek runs brown in a recent storm event.

A flooded North Bloomfield Tunnel airshaft may create ideal conditions for mercury methylation.

Iron rich sediment discharge to Humbug Creek may originate at Malakoff Diggins.

Photos courtesy of Charlie Alpers, USGS, 2001.

6. Educate the public about both the historic and environmental significance of the area.
    - Develop focused displays and informational videos and literature about mercury and sediment issues for use in the community and at the park museum.
    - Establish an interpretative walk to provide educational examples of ecosystem damage, natural recovery, and potential restoration opportunities.
    - Develop stakeholder group and encourage community involvement in all project elements.

Critical Questions

In order to address the problems that are present as a result of the Malakoff Diggins, the following critical questions must be answered during both the research component of the project and in the evaluation of potential restorative actions.

Sediment:

- What are current sediment erosion rates and sediment yield for Diggins Creek, upper and lower Humbug Creek, and within the creek channels?
- What is the distribution of sediment sources within the four existing sub-basins that drain the Diggins Creek watershed, along upper and lower Humbug Creek, and within the creek channels?
- What is the current particle size distribution of sediments from the Diggins Creek watershed, along upper and lower Humbug Creek, and within the creek channels?
- Where are critical depositional zones downstream of Diggins Creek and downstream of other sediment sources within the Humbug Creek watershed?
- Which sediment sources may affect aquatic habitat quality within the Humbug Creek watershed?
- What effect does the sediment transport regime (timing, rate, and volume of sediment transported) and depositional environment (volume, depth, and particle size) have on habitat quality and reproduction success?

Mercury and Metals:

- What is the spatial extent and speciation of mercury in water, soil, and sediments at Malakoff Diggins, in ponds and wetlands, in Humbug and Diggins Creeks, within Hiller Tunnel, and discharging from flooded airshafts along the Lake City and North Bloomfield Tunnels?
- What is the mechanism for the transport and uptake of mercury species from each source area?
- What are the water chemistry conditions in the stream network and pond that would effect methylation and the fixing of mercury in elemental or ionic forms (pH, dissolved oxygen, total organic carbon, sulfate, sulfide, presence of other metals)?
- What other metal species are present in water, soil, and sediment within the watershed that could impact water quality, habitat, and reproduction?
- What is the relationship between groundwater and surface water flows between Humbug Creek and the airshafts along the North Bloomfield Tunnel?

Biological Investigation:

- What is the condition of fisheries and fish habitat in Diggins and Humbug Creeks?
- How does mercury enter, cycle through, and bioaccumulate in the local food web?
- What is the state of benthic macroinvertebrates, spawning gravels, and water quality in Diggins and Humbug Creeks, including iron related cementation?
- What level of sediment and mercury reduction is necessary to ensure success of indicator species and improve habitat?

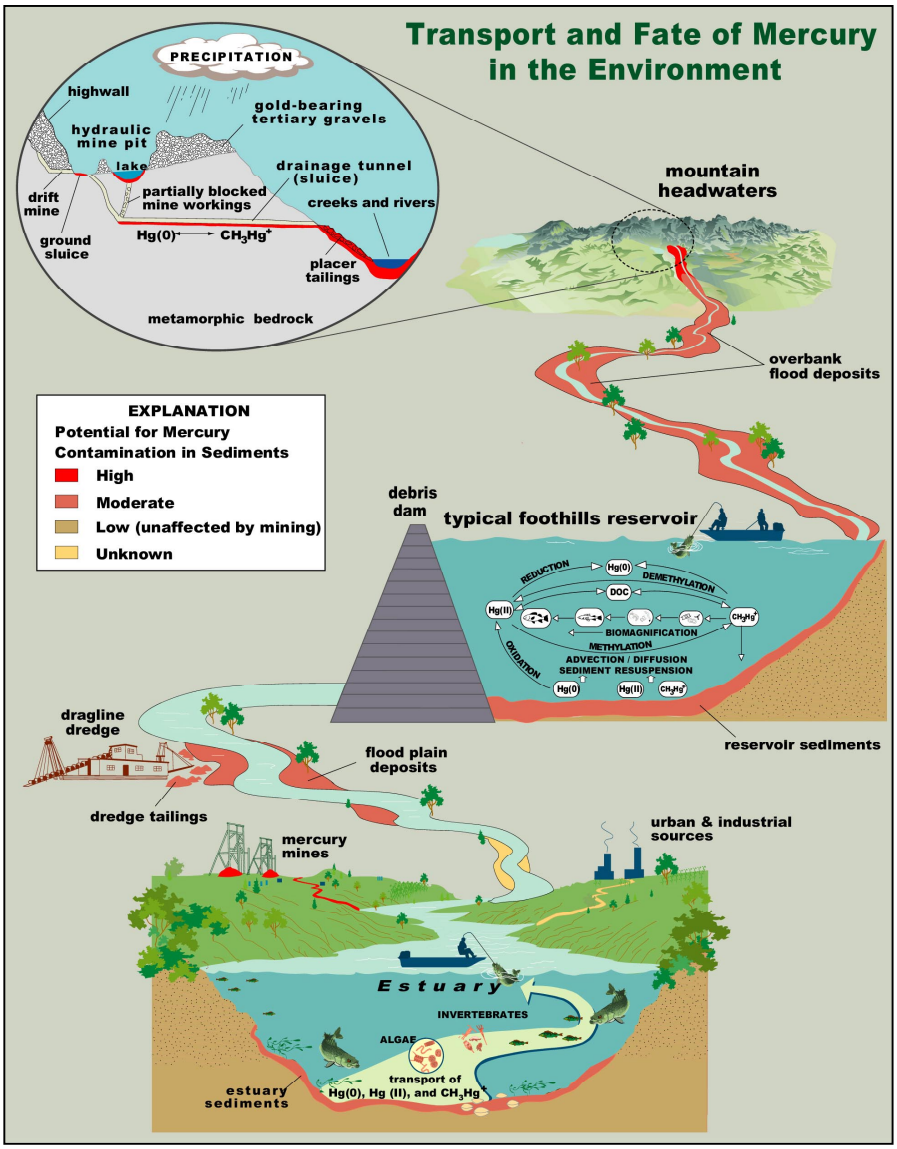
Restorative Action:

- What restorative actions would improve water and habitat quality?
- What cultural and natural resources would be affected by restorative actions and how would they be affected?
- Which restorative actions should be considered to avoid these impacts?
- What mitigation measures may be required to minimize unavoidable impacts on cultural and natural properties?

2. Justification

Conceptual Models

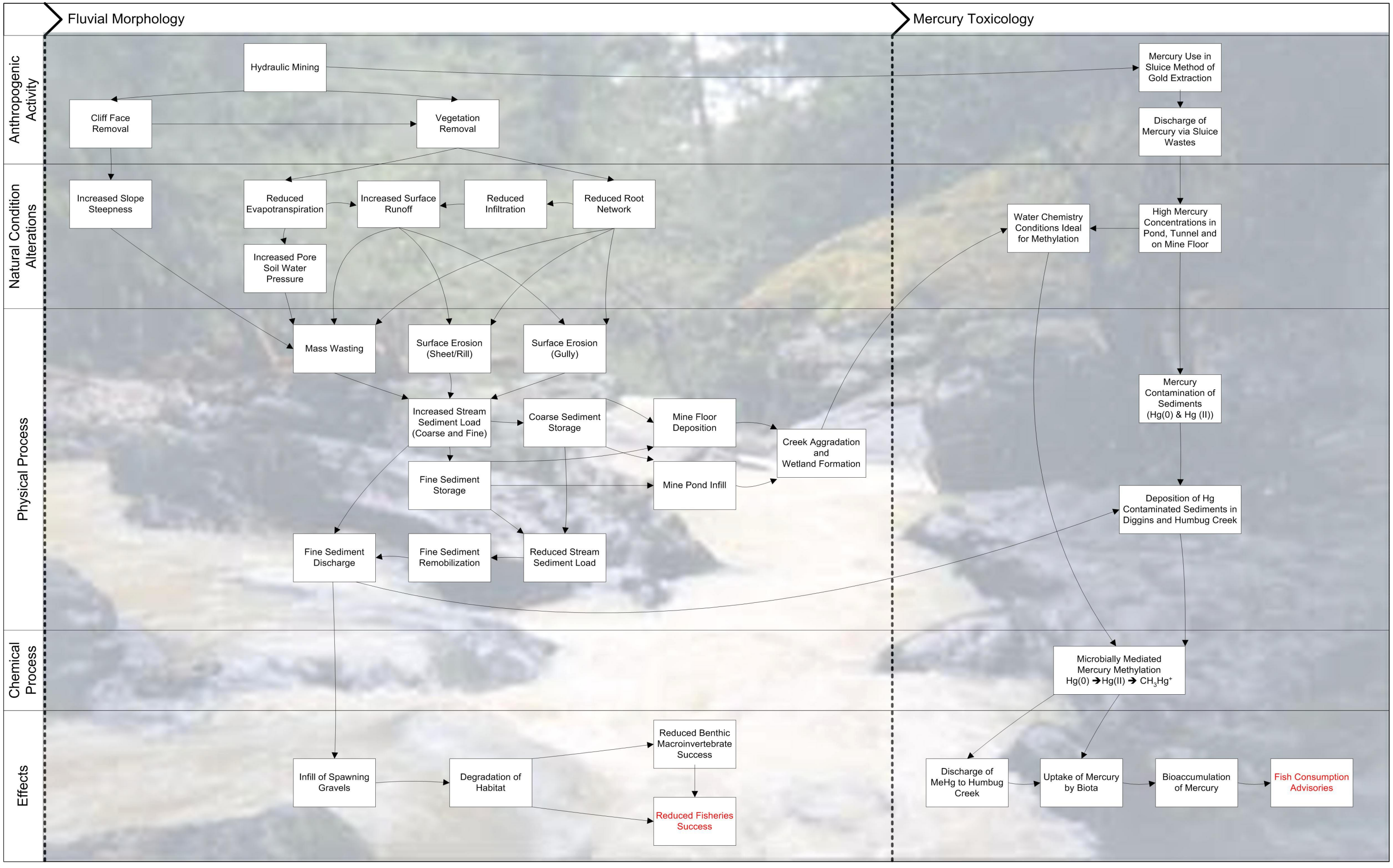
The landscape scale ecosystem interactions for a hydraulic mine are presented in the conceptual model to the right: Transport and Fate of Mercury in the Environment. While this is primarily a mercury related model, it also shows the deposition of sediment throughout the system as a transport vehicle for mercury. During mine operation, sediments and mercury transport began in the mountain headwaters. The gold bearing tertiary gravels were washed from the hillside into the mine pit. From there they were transported downstream through sluices and tunnels as a slurry where mercury was used to remove the gold. Heavy gold and gold-mercury amalgam was collected in riffles in the sluices and tunnels while the sand and gravel slurry was passed on to the receiving stream. Some of the mercury used was recovered with the gold, but a fraction was left in the gold extraction areas, and a fraction of that escaped downstream to the receiving waters. These waterways typically fed recreational and municipal reservoirs and lakes. Most sand and gravel (and attached mercury) were deposited here where water chemistry conditions are often ideal for methylation. Methyl mercury was then taken up by the local biota and passed along the food chain to fish and humans.



Landscape scale conceptual model furnished by Charlie Alpers, USGS, 2001

A detailed site-specific Fluvial Morphology and Toxicology Conceptual Model can be found on the following page. This model shows the potential processes at work at Malakoff Diggins. The model will be refined and improved throughout the course of the project to include more specific locations.

Site Specific Fluvial Morphology and Toxicology Conceptual Model



and process interactions, thereby reducing the amount of uncertainty about the relationship between ecosystem elements. As areas are tested for mercury and assessed for sediment contributions, the model will be revised to distinguish between processes and changes in conditions at specific locations. The model will be used as a tool for both educational purposes and to better design remedial and restorative actions.

The research approach to this project has been selected in order to gather the information necessary to engage in the implementation of ecosystem restorative actions. The design of such a broad characterization study will require careful consideration of many variables. Specific designs are beyond the scope of this proposal. Best professional judgment has been used to estimate the number of samples required and a sense of spatial distribution, though some of these elements may be subject to change.

Adaptive Management

The proposed project fits directly within the Adaptive Management Process framework as presented in the Draft Stage I Implementation Plan. The established ecosystem restoration goals are to reduce sediment and mercury loading to Humbug Creek, South Yuba River and Bay/Delta watersheds. The conceptual model will be evaluated throughout the course of the project to improve upon its accuracy and to identify critical pathways that may be interrupted in order to accomplish the ecosystem restoration goals. This will provide a means of reassessing the problem, revising the goals and objectives, and redefining the model before restorative actions are fully implemented. The design of potential restorative actions will serve as the basis for acquiring implementation funding.

3. Approach

The approach for the proposed project includes developing field work plans; field sampling and surveys; assessment; data analysis; modeling; restorative action evaluation; preparing NEPA/CEQA documents; design of restorative actions; and community education and involvement. Project activities will be divided into eight project elements: field work planning, source characterization, physical process assessment, effects assessment, cultural resource, feasibility study and design, NEPA/CEQA planning, and community relations/education. A database and GIS will be developed and populated with physical and chemical data and survey observations to aid in data analysis, modeling, and presentation.

Activities

Field Work Planning Elements

FP1. Prepare a sampling and analysis plan (SAP) the components of which will include the following: project description, schedule, organization, project goals and objectives, data quality objectives, sampling design, sampling locations, sampling methods and procedures, field measurement and survey procedures, sample collection and shipment, sample integrity, field notes and logbooks, analytical laboratory and field methodology, equipment decontamination, management of investigation-derived waste, data reduction, validation and reporting, statistical analysis, and data analysis and presentation of results.

FP2. Prepare a quality assurance project plan (QAPP) the components of which will include the following: project description, project objectives, project schedule, project organization and responsibilities, quality control samples, sample integrity requirements, field notes and logbooks, analytical procedures and calibration, selection of analytical

methods, calibration procedures and frequencies for analytical systems, quality assurance objectives, quality control requirements, calculation of data quality indicators, internal quality control requirements, data reduction, validation and reporting, field data reduction and reporting, laboratory data reduction and reporting, routine assessments, audits, and corrective actions.

FP3. Prepare a health and safety plan (HASP) the components of which will include the following: project background, site description, site history, planned activities, site-specific hazard evaluation, training requirements, personal protection requirements, medical surveillance, environmental monitoring and sampling, site control, on-site communications, site control zones, site safety inspections, safe work practices, decontamination, and emergency response planning.

Source Characterization Elements:

SC1. Assess the extent and speciation of mercury in sediments on the hydraulic pit floor and within pond deposits. Assess presence and speciation of mercury in bed material and suspended sediments at bottom of major drainages on the pit floor to verify lack of upslope mercury sources. Assess presence and speciation of mercury in suspended sediments and bed load in the Hiller Tunnel, Diggins Creek, and upper and lower Humbug Creek, in tailings and terraces along Humbug and Diggins Creeks, in sediments at the exit of the Lake City and North Bloomfield Tunnels, in the air shafts along the North Bloomfield Tunnel, and in tailings associated with other hydraulic and hard rock mines along Humbug Creek. Assess seasonal variation (winter, spring, and summer) in presence of mercury, mercury speciation, and rate of methylation.

SC2. Assess sources of soil and sediment mass wasting and surface erosion processes. The assessment will include updating erosion rates for the major landslide features such as the eastern slump, and other sediment sources within the mine including the cliff faces and hydraulic pit floor. An update of erosion rates is required as the hydraulic pit floor and some of the slides are slowly becoming stabilized by vegetation. The assessment will also include sources other than Malakoff Diggins, including other hydraulic mines, hard rock mine tailings, remnant terraces, drainages below logging areas, drainages from unpaved road networks, and other actively eroding hill slopes. Finally, the assessment will include in-channel sources such as cutbank areas and mobile bed load. Characterization will be conducted during three storm events of varying duration and at peak, median, and low flow to account for seasonal variation in erosional processes and rate, volume, and size of sediment generated.

SC3. Create a suspended sediment yield and mobile bed load map for the Diggins Creek watershed, upper and lower Humbug Creeks, and within the creek channels illustrating high-yield areas in need of special erosion prevention actions. Include landslide hazards, slope, soil, and aspect issues. Prepare erosion and sediment characterization report

SC4. Create total and methyl mercury hot spot and methylation hazard maps. Prepare mercury characterization report.

Physical Process Elements:

PP1. Measure flow, suspended sediment, bedload, and particle size distribution at discharge points onto the hydraulic pit floor for the four sub-basins above Malakoff Diggins, in streams along the hydraulic pit floor before discharging to Hiller Tunnel and pond, within the pond, through the Hiller Tunnel, in Diggins Creek, in Humbug Creek above the town of North Bloomfield, above and below Diggins Creek confluence, below discharge points

of flowing air shafts, at the exit of the Lake City and North Bloomfield Tunnels, and at the confluence with the South Yuba River. Characterization will be conducted during three storm events of varying duration and at peak, median, and low flow to account for seasonal variation in flow and erosional processes. Conduct transport modeling and prepare sediment transport and hydrologic conditions report.

PP2. Measure flow, suspended sediment, and particle size distribution in the South Yuba River above and below confluence with Humbug Creek. Characterization will be conducted during three storm events of varying duration and at peak, median, and low flow to account for upstream sources of sediment.

PP3. Install and monitor stream gages on Humbug Creek above Diggins Creek and above confluence with the South Yuba River to generate a historical discharge record.

PP4. Measure particle size distribution of sediment in tailings and terraces along Humbug and Diggins Creeks.

PP5. Assess hydrologic relationship between groundwater seepage from tunnels and tunnel airshafts and surface water in Diggins and Humbug Creek. Assessment will be conducted during dry and wet seasons (fall and spring) to account for seasonal variation in surface water and groundwater elevations. An assessment of local hydrogeology is beyond the scope of this effort.

Effects Assessment Elements:

EA1. Conduct habitat surveys and assess environmental impacts associated with fine sediment in local ecosystem including spawning gravels, benthic invertebrates, rainbow trout (*Oncorhynchus mykiss*), and Foothill Yellow-legged Frog (*Rana boylii*) habitat in upper and lower Humbug Creek and Diggins Creek. Surveys will be conducted during the spring, summer, and winter. Prepare a habitat survey and impact assessment report.

EA2. Establish seasonal goals for reduction of fine sediments and improvements to habitat in local ecosystem.

EA3. Assess mercury in the food web of the mine, Diggins Creek, and Humbug Creek. Assess environmental impacts associated with methyl mercury in local ecosystem. Assess seasonal changes (spring, summer, and winter) in mercury cycling and compartments within the food web. Prepare mercury/heavy metals fate and transport report.

EA4. Establish seasonal goals for reduction of methyl and elemental mercury in water, soil, and sediment compartments of local ecosystem.

EA5. Conduct a survey to provide an updated estimate of the number, speciation, and age of fishery present in Humbug Creek above and below Diggins Creek, below the falls, and near confluence with the South Yuba River. Surveys will be conducted during the spring and summer. Prepare a fisheries survey report.

Cultural Resource Elements (incremental funding option):

CR1. Assess the presence of cultural and archeological sites throughout the study area through intensive field survey, historical photo interpretation and literature search. Assess the significance of the cultural resources present in the project area.

CR2. Assess likely impacts of proposed restorative actions on cultural resources. Propose actions and other mitigation measures to minimize damage to significant cultural resources. Identify findings and proposed resource protection measures in a cultural resource treatment plan.

Feasibility Study and Design Elements (incremental funding option):

FS1. Conduct a feasibility study to identify, screen, and provide a detailed evaluation of potential actions to restore habitat in and reduce the impact of sediment, mercury, and other metals on the Humbug Creek ecosystem. Potential restorative actions may include but are not limited to the following:

- Restorative action that involves physically removing and disposing of mercury contaminated sediment in a small portion of potentially each type of source area.
- Restorative action to reduce the opportunity for methylation by altering water chemistry (pH, dissolved oxygen, total organic carbon, iron, sulfide, sulfate, temperature), physical characteristics (depth, vegetation, flow), and sediment exposure.
- Restorative action to divert water from a drainage in the upper watershed above the mine to reduce erosion of cliffs, transport of sediment across hydraulic pit floor, resuspension of fine sediment on hydraulic pit floor, and discharges to Diggins Creek. The objective of the flow diversion would be to reduce hydraulic transport of sediment and mercury out of Malakoff Diggins to Diggins Creek.
- Restorative action to assess the efficacy of techniques used to flush fine-grained sediment from spawning gravels in Diggins and Humbug Creeks.
- Restorative action addressing stabilization of the eastern slide/slump area using below grade horizontal drains. The objective would be to reduce the potential occurrence of additional slides and associated mud and debris flow during storm events.
- Restorative action involving the installation of velocity breaks on the hydraulic pit floor below one of the drainages from the upper watershed to promote deposition and reduce resuspension of fine silt and clay particles.

FS2. Prepare a conceptual and final design for up to three different restorative actions identified in the feasibility study. Prepare plans and specifications necessary to solicit bids for restorative action implementation/construction in a future project phase.

NEPA/CEQA Planning Elements (incremental funding option):

PE1. Prepare an environmental impact report/ impact statement to evaluate the potential impacts and identify mitigation measures necessary to reduce impacts associated with implementation of restorative actions selected in the feasibility study.

Community Relations/ Education Elements

CE1. Establish a local Humbug Creek stakeholder group (comprised of adjacent property owners, local government, watershed groups and conservancies, and the general public); facilitate project planning, data reporting, strategy development, and restorative action evaluation meetings with stakeholder group; facilitate public meetings relating to research findings, feasibility study findings, and NEPA/CEQA findings; and maintain stakeholder group during transition phase between this project and future watershed management activities.

CE2. Facilitate citizen involvement as part of sampling, assessment, and monitoring activities planned under this proposal. Includes training, oversight, and data reduction activities.

CE3. Educational activities are not a direct component of the sediment and mercury reduction activities of this proposal, but do serve to build support with local stakeholder groups for such activities. These activities will include the generation of materials and curricula,

which dovetail with current information presented to Park visitors. This information will be presented to or will be available for stakeholder groups, at the Park museum in the town of North Bloomfield, at local schools, and as part of campfire programs. In addition, interpretive hikes will be conducted for park visitors and youth groups.

CE4. Workshops and professional papers will also be used to demonstrate the approaches and techniques required to characterize contamination, assess ecosystem impacts, model and analyze, develop restoration goals, conduct feasibility studies, and plan for restorative actions necessary to address mercury and sedimentation problems associated with mines throughout the Sierra Nevada and Coastal Ranges surrounding the Bay Delta Ecosystem.

4. Feasibility

The proposed project is in large part a characterization and feasibility assessment effort. The methods and protocol for such physical and chemical parameter monitoring are well-established and standard procedure for countless environmental professionals. The required laboratory analyses are likewise standardized and well understood. There is no question that competent personnel and facilities are capable of generating reliable and useful data for the project.

The synthesis of this information will require some special expertise to determine the meaning behind the numbers, but again competent scientists are presently involved in the effort and will ensure that the results are used to select the most practicable ecosystem restorative actions. Sediment loads are known to be high from the Diggins and Humbug Creek watersheds, as are the levels of mercury in surrounding ecosystems. A great deal of creativity and ingenuity are required in the generation of solutions that are not only practical but also effective. This characterization and feasibility assessment project must be completed if any restorative actions are to be successful. Local citizen groups, agencies, and the Yuba Watershed Council have been involved in the preparation and review of this proposal and full support the proposed efforts.

5. Performance Measures

Performance measures for the project will be detailed in a project performance evaluation plan and include the successful characterization of:

- Erosion processes at Malakoff Diggins and other sites in the watershed, magnitude and transport of sediment out of Malakoff Diggins and other sites in the watershed.
- Hydraulic and hydrologic flow conditions in the Malakoff Diggins, the tunnels and airshafts, and Diggins and Humbug Creeks.
- Concentrations, speciation, fate, and transport of mercury in the watershed.
- Chemical processes leading to and locations that are ideal for mercury methylation.
- Environmental impact of sediment and mercury on indicator species and habitats.
- Cultural resources associated with Malakoff Diggins and the town of North Bloomfield.
- Establish seasonal goals for reduction of sediment and mercury to improve habitat and indicator species success

These characterization components will be evaluated based on the number of samples collected and the completion of products such as maps, models, and reports. Additionally, the characterization of Malakoff Diggins and other sources within the Humbug Creek watershed will help establish seasonal goals for reduction of sediment and mercury, allow for the evaluation of multiple restorative actions, and the design of the most feasible actions. The number of restorative actions evaluated and the completion of the design of up to three of the restorative actions will serve as measures of success for the assessment and synthesis portion of the project.

An EIS/EIR will be developed to identify, evaluate, and mitigate potential impacts from proposed restorative actions. Educational materials will be created and displayed as well as used in Park programming. The success of this component will be the number of individuals participating in programs and receiving educational information.

6. Data Handling and Storage

Field samples will be collected and shipped by overnight express mail to the analytical laboratory. Data returned from the laboratory will be entered into a database and will be housed electronically on site with the selected consultant and/or at State Parks offices. Data as well as all electronic reports, GIS maps and data files, and other electronic project related materials will be housed on the consultant's and/or State Parks servers, which will be backed up daily, each week a full system backup will be removed to a secure offsite location. Upon completion of the project all final data and information will be turned over to State Parks where it can be made publicly available upon request. Information will be incorporated into educational materials at the park museum and will become part of the visitor experience to the park.

7. Expected Products and Outcomes

- Field work plans
- Erosion, sediment, and mercury characterization report
- Sediment transport and hydrologic conditions report
- Mercury and other heavy metals fate and transport report
- Habitat survey and impact assessment report
- Fisheries survey report
- Database and GIS data layers
- Physical and chemical models
- Mercury methylation hazards map
- Erosion process and hazards map
- Permanent flow gauging stations
- Water quality monitoring report
- Cultural resources map and treatment plan report
- Stakeholder group and citizen monitoring team
- Educational materials and programming
- Workshop/seminar/project presentations
- Feasibility study report
- EIS/EIR report
- Basis of design, plans, and specifications
- Project performance evaluation plan
- Annual and final project reports
- Quarterly status reports

8. Work Schedule

A detailed work schedule is provided in a timeline format on the following four pages.

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

1. Ecosystem Restoration Program (ERP), Science Program and Central Valley Project Improvement Act (CVPIA) Priorities

1.1 ERP Strategic Goals

Goal 6: Sediment and Water Quality

ERP Goal 6, which is concerned with sediment and water quality, is strongly addressed by the proposed project at Malakoff Diggins. Direct consideration is given to the presence of methyl mercury and the identification of areas where ideal conditions for methylation exist. The

Proposed Project Schedule

Task	Activity	Duration	Begin Date	End Date
FP	***Field Work Planning***	***90 days***	***06/03/02***	***10/04/02***
FP1	**Prepare SAP**	**90 days**	**06/03/02**	**10/04/02**
	Prepare draft	60 days	06/03/02	08/23/02
	Issue Draft SAP	0 days	08/23/02	08/23/02
	Prepare final	30 days	08/26/02	10/04/02
	Issue Final SAP	0 days	10/04/02	10/04/02
FP2	**Prepare QAPP**	**90 days**	**06/03/02**	**10/04/02**
	Prepare draft	60 days	06/03/02	08/23/02
	Issue Draft QAPP	0 days	08/23/02	08/23/02
	Prepare final	30 days	08/26/02	10/04/02
	Issue Final QAPP	0 days	10/04/02	10/04/02
FP3	**Prepare HASP**	**90 days**	**06/03/02**	**10/04/02**
	Prepare draft	60 days	06/03/02	08/23/02
	Issue Draft HASP	0 days	08/23/02	08/23/02
	Prepare final	30 days	08/26/02	10/04/02
	Issue Final HASP	0 days	10/04/02	10/04/02
SC	***Source Characterization***	***346 days***	***10/07/02***	***02/02/04***
SC1	**Mercury Study**	**179 days**	**01/06/03**	**09/11/03**
	Winter Study	14 days	01/06/03	01/23/03
	Spring Study	14 days	04/28/03	05/15/03
	Summer Study	14 days	08/25/03	09/11/03
SC2	**Erosion and Sediment Study**	**159 days**	**10/07/02**	**05/15/03**
	Source area survey	7 days	10/07/02	10/15/02
	Low flow sampling	14 days	10/07/02	10/24/02
	Storm event sampling (3 events of varying duration)	50 days	01/06/03	03/14/03
	Median flow sampling	14 days	04/28/03	05/15/03
SC3	**Sediment yield/bed load mapping**	**81 days**	**06/16/03**	**10/06/03**
	Prepare draft map	14 days	06/16/03	07/03/03
	Issue draft map	0 days	07/03/03	07/03/03
	Prepare final map	7 days	07/04/03	07/14/03
	Issue final map	0 days	07/14/03	07/14/03
	Prepare draft report	60 days	06/16/03	09/05/03
	Issue draft erosion and sediment characterization report	0 days	09/05/03	09/05/03
	Prepare final report	21 days	09/08/03	10/06/03
	Issue final erosion and sediment characterization report	0 days	10/06/03	10/06/03
SC4	**Mercury hot spot and methylation hazard mapping**	**81 days**	**10/13/03**	**02/02/04**
	Prepare draft map	14 days	10/13/03	10/30/03
	Issue draft map	0 days	10/30/03	10/30/03
	Prepare final map	7 days	10/31/03	11/10/03
	Issue final map	0 days	11/10/03	11/10/03

Proposed Project Schedule (continued)

Task	Activity	Duration	Begin Date	End Date
SC4	**Mercury hot spot and methylation hazard mapping**		**10/13/03**	**02/02/04**
	Prepare draft mercury characterization report	60 days	10/13/03	01/02/04
	Prepare draft report	60 days	10/13/03	01/02/04
	Issue draft mercury characterization report	0 days	01/02/04	01/02/04
	Prepare final report	21 days	01/05/04	02/02/04
	Issue final mercury characterization report	0 days	02/02/04	02/02/04
PP	***Physical Process Assessment***	***285 days***	***10/07/02***	***11/07/03***
PP1	**PP1 Flow and sediment transport study**	**280 days**	**10/14/02**	**11/07/03**
	Low flow sampling	14 days	10/14/02	10/31/02
	Storm event sampling (3 events of varying duration)	50 days	01/06/03	03/14/03
	Median flow sampling	14 days	04/28/03	05/15/03
	Transport modeling	90 days	03/17/03	07/18/03
	Prepare draft report	60 days	06/16/03	09/05/03
	Issue draft sediment transport and hydrologic conditions report	0 days	09/05/03	09/05/03
	Prepare final report	45 days	09/08/03	11/07/03
	Issue final sediment transport and hydrologic conditions report	0 days	11/07/03	11/07/03
PP2	**SYR flow and sediment transport study**	**143 days**	**10/14/02**	**04/30/03**
	Low flow sampling	3 days	10/14/02	10/16/02
	Storm event sampling (3 events of varying duration)	50 days	01/06/03	03/14/03
	Median flow sampling	3 days	04/28/03	04/30/03
PP3	**Stream gaging**	**260 days**	**10/07/02**	**10/03/03**
	Install stream gages	5 days	10/07/02	10/11/02
	Monitor stream gages	255 days	10/14/02	10/03/03
PP4	**Physical characteristics of mine tailings**	**3 days**	**10/07/02**	**10/09/02**
	Collect sediment samples	3 days	10/07/02	10/09/02
PP5	**Groundwater seepage study**	**154 days**	**10/14/02**	**05/15/03**
	Fall Study	14 days	10/14/02	10/31/02
	Spring study	14 days	04/28/03	05/15/03
EA	***Effects Assessment***	***289 days***	***01/06/03***	***02/12/04***
EA1	**Habitat survey and impact assessment**	**269 days**	**01/06/03**	**01/15/04**
	Winter study	14 days	01/06/03	01/23/03
	Spring study	14 days	04/28/03	05/15/03
	Summer study	14 days	08/25/03	09/11/03
	Prepare draft report	60 days	09/12/03	12/04/03
	Issue draft habitat survey and impact assessment report	0 days	12/04/03	12/04/03
	Prepare final report	30 days	12/05/03	01/15/04
	Issue final habitat survey and impact assessment report	0 days	01/15/04	01/15/04
EA2	**Sediment reduction goal setting**	**60 days**	**09/12/03**	**12/04/03**

Proposed Project Schedule (continued)

Task	Activity	Duration	Begin Date	End Date
EA3	**Mercury cycling and impacts assessment**	**289 days**	**01/06/03**	**02/12/04**
	Winter study	14 days	01/06/03	01/23/03
	Spring study	14 days	04/28/03	05/15/03
	Summer study	14 days	08/25/03	09/11/03
	Prepare draft report	60 days	10/10/03	01/01/04
	Issue draft mercury/heavy metals fate and transport report	0 days	01/01/04	01/01/04
	Prepare final report	30 days	01/02/04	02/12/04
	Issue final mercury/heavy metals fate and transport report	0 days	02/12/04	02/12/04
EA4	**Mercury reduction goal setting**	**60 days**	**10/10/03**	**01/01/04**
EA5	**Fisheries survey**	**159 days**	**04/28/03**	**12/04/03**
	Spring study	14 days	04/28/03	05/15/03
	Summer study	14 days	08/25/03	09/11/03
	Prepare draft report	30 days	09/12/03	10/23/03
	Issue draft fisheries survey report	0 days	10/23/03	10/23/03
	Prepare final report	30 days	10/24/03	12/04/03
	Issue final fisheries survey report	0 days	12/04/03	12/04/03
CR	***Cultural Resource Assessment (incremental funding option)***	***120 days***	***10/07/02***	***03/21/03***
CR1	**Cultural and archeological resource survey**	**30 days**	**10/07/02**	**11/15/02**
CR2	**Impact assessment and mitigation measures**	**90 days**	**11/18/02**	**03/21/03**
	Prepare draft	60 days	11/18/02	02/07/03
	Issue Draft Cultural Resources Treatment Plan	0 days	02/07/03	02/07/03
	Prepare final	30 days	02/10/03	03/21/03
	Issue Final Cultural Resources Treatment Plan	0 days	03/21/03	03/21/03
FS	***Feasibility Study and Design (incremental funding option)***	***355 days***	***01/02/04***	***05/12/05***
FS1	**Conduct feasibility study**	**90 days**	**01/02/04**	**05/06/04**
	Prepare draft	60 days	01/02/04	03/25/04
	Issue draft feasibility study	0 days	03/25/04	03/25/04
	Prepare final	30 days	03/26/04	05/06/04
	Issue final Feasibility Study	0 days	05/06/04	05/06/04
FS2	**Prepare design, plans, and specifications**	**120 days**	**11/26/04**	**05/12/05**
	Prepare conceptual design	30 days	11/26/04	01/06/05
	Issue Conceptual Design	0 days	01/06/05	01/06/05
	Prepare final Design	30 days	01/07/05	02/17/05
	Issue final Design	0 days	02/17/05	02/17/05
	Prepare draft plans and specifications	30 days	02/18/05	03/31/05
	Issue draft plans and specifications	0 days	03/31/05	03/31/05
	Prepare final plans and specifications	30 days	04/01/05	05/12/05
	Issue final plans and specifications	0 days	05/12/05	05/12/05

Proposed Project Schedule (continued)

Task	Activity	Duration	Begin Date	End Date
PE	***NEPA/CEQA Planning (incremental funding option)***	***165 days***	***04/09/04***	***11/25/04***
PE1	**Prepare EIS/EIR report**	**165 days**	**04/09/04**	**11/25/04**
	Prepare notice of preparation	14 days	04/09/04	04/28/04
	Issue notice of preparation	0 days	04/28/04	04/28/04
	Comment period on notice of preparation	30 days	04/29/04	06/09/04
	Prepare draft EIS/EIR	60 days	06/10/04	09/01/04
	Issue Draft EIS/EIR	0 days	09/01/04	09/01/04
	Public comment period	30 days	09/02/04	10/13/04
	Public meeting	1 day	10/14/04	10/14/04
	Prepare final EIS/EIR	30 days	10/15/04	11/25/04
	Issue Final EIS/EIR	0 days	11/25/04	11/25/04
CE	***Community Relations/Education***	***771 days***	***06/03/02***	***05/16/05***
CE1	**Stakeholder group/ public meetings**	**771 days**	**06/03/02**	**05/16/05**
	Initial informational meeting	1 day	06/03/02	06/03/02
	Project planning meeting	1 day	06/17/02	06/17/02
	Monthly meetings	771 days	06/03/02	05/16/05
	Quarterly data reporting meeting	241 days	12/16/02	11/17/03
	Strategy development meeting	1 day	01/02/04	01/02/04
	Research findings public meeting	1 day	01/05/04	01/05/04
	Feasibility study findings public meeting	1 day	03/29/04	03/29/04
	Conceptual design public meeting	1 day	11/29/04	11/29/04
CE2	**Facilitate citizen involvement**	**279 days**	**09/17/02**	**10/10/03**
	Citizen training	14 days	09/17/02	10/04/02
	Monitoring oversight	244 days	10/07/02	09/11/03
	Data reduction/transfer	21 days	09/12/03	10/10/03
CE3	**Educational material, curricula, and events**	**770 days**	**06/03/02**	**05/13/05**
	Develop materials and curricula	60 days	06/03/02	08/23/02
	Group presentations	710 days	08/26/02	05/13/05
	Interpretive program	710 days	08/26/02	05/13/05
CE4	**Information transfer/ workshops/ seminars**	**440 days**	**09/08/03**	**05/13/05**
	Workshop participation	440 days	09/08/03	05/13/05
	Professional paper preparation	440 days	09/08/03	05/13/05
	Seminar presentations	440 days	09/08/03	05/13/05
PM	***Project Management***	***771 days***	***06/03/02***	***05/16/05***
	Staff and subcontractor oversight/meetings	771 days	06/03/02	05/16/05
	Project Performance Evaluation Plan	30 days	06/03/02	07/12/02
	Quarterly programmatic and fiscal status reports (twelve)	696 days	09/16/02	05/16/05
	Annual Report (three)	530 days	05/06/03	05/16/05
	Final Project Report	30 days	04/05/05	05/16/05

problems associated with mercury contamination at this site are poorly understood; the proposed project characterizes toxic contamination and its role in the food web of Diggins and Humbug Creeks. Contaminated sediments are recognized as an important factor in the periodic toxicity of the San Francisco Bay/Delta, and must be assessed locally to contribute to an enhanced regional understanding. Furthermore, a better understanding of sediment loads will improve understanding of sediment impacts to in-stream habitat (e.g., spawning gravels). Improving and maintaining water and sediment quality conditions that support diverse aquatic ecosystems and mitigate toxic impacts to aquatic organisms, wildlife, and people are clear goals of the proposed research, feasibility study, and design elements.

Goal 1: At-Risk Species

The Foothill Yellow-legged Frog (*Rana boylii*) is a small stream-dwelling species that has been largely affected by land use activities such as logging and mining. Additional understanding of habitat requirements for this sensitive species is needed. The mercury and sediment study components of the proposed project includes habitat surveys and related work to establish goals for mercury and fine sediment reduction in order to improve the success of and local habitat for this species. The scientific understanding provided through the proposed project is a necessary precursor to addressing the habitat issues that must be mitigated in order to support species recovery, if listed.

Goal 2: Ecosystem Processes and Biotic Communities

An evaluation of the ecosystem processes and biotic communities affected by abandoned gold mine sites and wastes will help achieve the goal of rehabilitating natural processes in favor of native communities. Through reduction of mercury movement and/or transformation and sediment loading, the ecological health of the stream network in and around Diggins and Humbug Creeks will be improved, encouraging the rehabilitation of self-sustaining biotic communities. Mercury uptake and habitat surveys will provide data related to bioaccumulation in the food web, the presence and speciation of benthic invertebrates, amphibians, and fishery, and the quality of spawning gravels within the streams of the study area.

1.2 Multi-Regional Priorities

MR-3: Implement Environmental Education Actions Throughout the Geographic Scope

In addition to highlighting the diversity of California's natural resources and environment, State Parks also represents the history and culture of the state. Environmental education is a strong component of State Parks, with site-specific programs active at each park. The legacy of Gold Rush-era activities is an important part of California's history but also provides a great deal of significant information regarding the conditions of our current landscape. While other state parks highlight gold mining, Malakoff Diggins is the only state park focused on hydraulic gold mining. The historic events at Malakoff Diggins are valuably highlighted and displayed at the state park; however, the legacy of nineteenth century hydraulic mining and the current environmental conditions of the park are not fully presented. The proposed work will enable the development of a site-specific environmental education program, for use at the park, in the community, and at local schools, that considers both history and culture in tandem with current environmental circumstances and the process used to restore the ecosystem. Malakoff Diggins provides an ideal case for studying how scientific understanding of past environmental actions enables understanding of the present conditions of the local landscape.

MR-5: Ensure that Restoration is Not Threatened by Degraded Environmental Water Quality

The proposed project addresses Multi-Regional Priority 5 through evaluation of degraded water quality due to: (a) mercury contamination, and (b) loading of fine sediment in tributary streams to the Sacramento River.

Knowledge derived from the project will support an enhanced understanding of the long-term contamination effects of historic gold mining. Data collected concerning the extent and form of remnant mercury in Malakoff Diggins and associated tunnels and drainages, as well as the presence and speciation of mercury in Diggins and Humbug Creek watersheds, will enhance the understanding of mercury transport in this system. Water chemical conditions and mercury transformation will also be assessed in order to provide understanding of methyl mercury uptake in the food web, impacts in the local ecosystem, and to identify locations where ideal conditions for methylation exist. Findings from this study will support development of mercury reduction goals and appropriate restorative actions that target the most scientifically sound and cost-effective ways to eliminate or reduce such contamination.

Historic mining activities have also degraded water quality through increased sedimentation. Sediment sources will be identified within the Diggins and Humbug Creek watersheds. The magnitude of fine sediment loading to Diggins and Humbug Creeks will be assessed, ecological effects of fine sediments identified, sediment reduction goals developed, and appropriate restorative actions evaluated for reducing fine sediment loads.

1.3 Sacramento Region Goals

The proposed project supports restoration priorities for the Sacramento Region. Specifically, Goal 7 to develop conceptual models to support river, stream, and riparian habitat restoration is addressed. A conceptual ecosystem model for the Malakoff Diggins area will assist with evaluation of restorative actions as well as contribute to the regional understanding of restoration needs. Environmental impacts due to mine wastes are poorly understood and could be undermining existing restoration efforts in the Sacramento Region and throughout CALFED Bay Delta solution area; while mercury was historically used in areas near small creeks in the Sierra Nevada foothills, transport of these metals has continued far downstream. An evaluation of mercury in the Malakoff Diggins area streams provides data needed to identify sources of high-level bioavailable mercury in the Sacramento River and tributaries.

By targeting mine wastes and abandoned mine sites, the project furthermore supports Sacramento Region Goal 7 by providing new information useful in evaluating treatment and remediation techniques. The study area is an excellent location for conducting demonstration projects that might be effective in mitigating contamination at other abandoned mine sites and locations where mine wastes are impacting ecosystems.

2. Relationship to Other Ecosystem Restoration Projects

Because of the significant human and wildlife health concerns related to toxic mercury consumption, in 1999, the USGS in cooperation with local, state, and federal agencies, conducted a pilot study to characterize mercury and methyl mercury occurrence and distribution. The waters, sediment, and biota of the South Yuba River (including Malakoff Diggins), Deer Creek, and Bear River watersheds, those watersheds most severely impacted by hydraulic mining and mercury contamination, made up the study area. The study investigated and identified mercury occurrence and evaluated bioaccumulation pathways and trophic positions within

different fish communities. The USGS study concluded that there is additional need for investigation of mercury contamination in habitats affected by historic gold mining and hydraulic mining in particular (May et. al 2000). The USGS study, along with other recent work, is providing new insights into mercury processes including distribution, ongoing transport, transformation, and bioaccumulation. This project proposes watershed- and source-specific research, modeling, goal setting, feasibility studies, and design of restorative actions to provide additional understanding of and proposed actions to limit the impacts of mercury on the Diggins and Humbug Creek watersheds.

The hypotheses, goals, objectives, and critical questions to be evaluated under this proposed project will also serve to benefit the ongoing studies of the Upper Yuba River Studies Program (UYRSP). The UYRSP has recently issued work plans for sediment studies, upstream and downstream habitat studies, and studies to address water and sediment quality issues necessary to support anadromous fisheries. This project will provide valuable, source-specific data to address the following topics in the UYRSP work plans:

- Identification of existing sediment sources
- Determine existing sediment concentrations and loads
- Define factors affecting sediment transport
- Inventory of over-summering, spawning, and rearing habitat
- Fisheries studies
- Assess sediment and river water quality
- Assess methyl mercury availability and methylation potential
- Assess bioaccumulation of mercury in fish

Water quality monitoring is also being conducted by the South Yuba River Citizens League (SYRCL) under a Proposition 204 grant and by State Parks under the South Yuba Comprehensive Management Plan Phase I. This project proposes to supplement these two large-scale efforts with detailed, source and contaminant specific monitoring.

3. Requests for Next Phase Funding

Not applicable.

4. Previous Recipients of CALFED Program or CVPIA funding

Project Name	*Project Status*	*Progress*	*Accomplishments*
South Yuba Comprehensive Management Plan Phase I. 98-G1029	Field work completed September 2001. Completing analysis of data and final report.	Field work completed September 2001. Partial analysis of data completed.	Large amount of field data collected. Found water quality problems in river. Working with county health department and USEPA to resolve.
South Yuba Comprehensive Management Plan Phase II	Grant awarded on June 7, 2001	Waiting for CALFED to contact us regarding contract.	Contract has not been signed yet.

5. System Wide Ecosystem Benefits

The Central Valley Region of the California State Water Quality Control Board (CVRWQCB) Water Quality Control Plan (i.e., Basin Plan) sets forth water quality standards for the Sacramento and San Joaquin River basins. Beneficial uses are assigned to these waterways in order to protect water quality. The protection and enhancement of existing and potential beneficial uses are the primary goals of the SWQCB water quality planning. The following are the existing beneficial uses for the waters of the Malakoff Diggins study area:

- Municipal and domestic water supply
- Irrigation and stock watering
- Recreation
- Cold freshwater habitat
- Cold water spawning
- Wildlife habitat
- Power generation

With the exception of power generation, all of the existing beneficial uses of these waters focus on human consumption and recreation, wildlife consumption, and aquatic habitat. The occurrence of mercury in these waters, and methyl mercury in particular, has serious consequences regarding these beneficial uses.

Furthermore, in 1999 the Basin Plan went through triennial review to make changes consistent with new regulations, technologies, policies and physical changes within the region. This review led to inclusion of a mercury load reduction program as a high priority measure. This Basin Plan amendment underscores the urgency and importance of a better understanding of mercury contamination and related issues in California waters. Mercury contamination is a significant problem for the Bay-Delta because the accumulation of toxic mercury in organisms poses a threat to predator species and humans who consume these organisms (mainly fish). Mercury cycling in the aquatic environment is not well understood and therefore undermine efforts to determine which types of mercury to control for protection of beneficial uses. The CVRWQCB is therefore supporting efforts to complete needed research and data collection in order to accomplish needed Basin Plan revisions. The Board is furthermore interested in restorative actions that deal with the mercury contamination issue.

6. Additional Information for Proposals Containing Land Acquisition

Not applicable.

C. Qualifications

California State Parks- Gold Mines Sector, U.S. Forest Service, and U.S. Bureau of Land Management

State Parks will serve as the lead agency and contracting party responsible for reporting, accounting, and payments under this application. State Parks will subcontract, in accordance with state regulations, the technical work identified in this proposal. Therefore, biographical sketches of principal investigators are not provided, as a subcontractor has not been identified. The U.S. Bureau of Land Management (BLM) and U.S. Forest Service (USFS), Tahoe National Forest will provide technical oversight and guidance on research methodology, surveys, and interpretation of results. Collectively, the agencies technical expertise includes the following areas: geology, hydrogeology, hydrology, water quality, fluvial geomorphology, soils, biology, ecology, archeology, planning, NEPA/CEQA analyses, GIS, and community relations. All three agencies will work together, under a memorandum of understanding, to supervise a project manager responsible for management of all subcontracted work under this application. All three

agencies are active members of the Yuba Watershed Council, which has managed, supervised, or provided technical assistance for seven grants totaling 2.3 million dollars within the Yuba River watershed.

Tetra Tech Inc.

Tetra Tech has assisted State Parks in the preparation of this grant application and will actively compete for the opportunity to demonstrate our expertise at characterizing sediment and heavy metal source, fate, and transport in the Humbug Creek watershed, evaluating mine and stream restoration alternatives, and planning and designing the preferred restoration alternatives.

Tetra Tech's mine restoration expertise includes site characterization, fishery, vegetation, and habitat surveys, wetland and riparian surveys, risk assessment, evaluation of restoration alternatives, design of mine waste repositories, design of treatment systems for acid mine and acid rock drainage, sediment, and heavy metal stabilization and recovery, cost estimating and feasibility studies, environmental impact analysis, permitting, revegetation, stream bed restoration, surface water management, erosion control and sediment runoff engineering, reclamation and restoration, construction management, and community relations support.

Tetra Tech is proficient in a variety of capabilities necessary to support its mine reclamation and environmental restoration. Tetra Tech has expertise in geochemistry, hydrogeology, hydrology, sediment transport, biology, air quality, mercury fate and transport, field collection and analysis of sediment and water samples, water treatment and management, permitting, air sampling, and environmental impact report and environmental impact statement preparation.

Tetra Tech's recent mercury, sediment, and mining-related environmental research, planning, design, and restoration activities include:

- *Quantification of Mercury Flux at Sulphur Bank Mercury Mine*
- *Bolinas Lagoon Sedimentation Study*
- *Stream Restoration at Lower Indian Creek Placer Mine*
- *Mercury Synoptic Surveys and Conceptual Model for Guadalupe River Watershed*
- *Mercury Experiment to Assess Atmospheric Loading in Canada and the US (METAALICUS)*
- *Aquatic Cycling of Mercury in Everglades (ACME) Project*

D. Cost

1. Budget

A detailed budget and justification has been submitted as required with the online forms.

2. Cost Sharing

There are no additional matching funds being contributed by State Parks, USFS, or BLM. However, in kind contributions from each partner will include staff time for project and subcontractor management, financial management, technical review and technical oversight of the project. Each partner has tentatively approved the in kind contributions and will develop and sign a memorandum of understanding within 30 days of notification of project approval.

E. Local Involvement

The Yuba Watershed Council

In the fall of 1997, a group of local, state, and federal agencies, conservation and environmental organizations, and neighborhood associations began meeting to discuss the application of a grant under Proposition 204, the Safe, Clean, Reliable Water Supply Act. This diverse group of representatives became the Yuba Watershed Council (YWC) and has continued to meet, plan, and coordinate activities including several Coordinated Resource Management Plans (CRMPs), citizen monitoring activities, and ecosystem restoration projects.

The YWC envisions the Yuba watershed as a biologically diverse, productive, and sustainable watershed containing:

- Rivers, streams and lakes that flow clear and clean, are free from pollution, and support healthy aquatic and riparian ecosystems.
- A landscape that reflects a diversity of terrestrial ecosystems and provides habitat to support healthy fish, wildlife and plant communities.
- A viable socioeconomic environment.

Further, the YWC is a community forum of stakeholders which is taking the initiative to:

- Better appreciate the complex watershed relationships in the Yuba River watershed and its environs.
- Protect, restore, and enhance watershed resources where needed.
- Maintain a sustainable watershed resource base for future generations.

The YWC will serve in an advisory role for the proposed projects at Malakoff Diggins and will aid in bringing information and resources to the table.

The South Yuba River Citizens League

The SYRCL is a community-based educational nonprofit corporation committed to the protection, preservation and restoration of the entire Yuba Watershed. SYRCL was founded in 1983 by a coalition of property owners, businesses and river-lovers concerned that the South Yuba River was being threatened by several hydroelectric and dam projects. Following the successful campaign to defeat these projects, SYRCL has expanded to become California's largest and most effective single-watershed organization. Most recently, SYRCL sponsored the successful passage of Senate Bill 496, making the South Yuba River California's first new Wild and Scenic River since 1989. Because SYRCL is a broad community-based coalition of local interests it has the necessary links to local constituents to be certain that all key players are involved. SYRCL works to fulfill its mission by aggressively seeking environmental solutions by utilizing the tools of education, organization, collaboration, litigation and legislation. SYRCL will be a major participant in this proposed project, helping to establish a local Humbug Creek stakeholder group, assisting in citizen monitoring activities, and participating in the process of evaluating restorative actions for Malakoff Diggins and the Humbug Creek watershed.

Sierra Nevada Network for Education and Research

The need for coordinated conservation planning in the Sierra Nevada has resulted in region-wide discussions and analyses of goals and operating principles for such an effort. The California State University System has coordinated its considerable research and education resources into the Sierra Nevada Network for Education and Research (SNNER). The SNNER is an informal network of individuals, county supervisors, state and federal agency personnel, academicians,

and others interested in conserving the natural resources of the Sierra Nevada. The SNNER facilitates communication among parties interested and invested in coordinated research and planning for the Sierra Nevada. Locally, the SNNER works with the Tahoe National Forest, the Bear River CRMP group, and the Yuba Monitoring Program. State Parks will coordinate sharing of data and project findings with other researchers through SNNER. Through coordination with the SNNER, State Parks will also keep the Delta Tributaries Mercury Council informed of project findings. The Delta Tributaries Mercury Council is currently developing a strategic plan to focus federal remediation funds necessary to reduce mercury loading in fish tissue in the Sacramento River watershed.

F. Compliance with Standard Terms and Conditions

State Parks agree to comply with the standard state and federal contract terms and conditions as presented in Attachments D and E of the Proposal Solicitation Package.

G. Literature Cited

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