AFRP- Annual Workplan 2000

***Initial Scope of Work to*:**

Restore the Ruddy segment of the Mining Reach on the Tuolumne River

PROPOSED AFRP CONTRIBUTION: $ ~1,500,000 (may vary up or down depending on level of funding ultimately provided at the end of FY99)

An Initial Scope of Work Submitted by:

The Tuolumne River Technical Advisory committee

SCOPE OF WORK

MJ Ruddy Segment – Mining Reach Project No. 2
Tuolumne River Restoration Projects

PROJECT APPLICANT

Turlock Irrigation District, 333 East Canal Drive, Turlock, CA 95380
For contract and project administration: Wilton Fryer, Water Planning Dept. Mgr.
209-883-8316, FAX 209-656-2143
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I SCOPE OF PROJECT

PROJECT LOCATION

The overall Mining Reach project covers a 6.1 mile length of channel and is located on the lower Tuolumne River, between river mile 34.2 and river mile 40.3, approximately 23 miles east of Modesto in Stanislaus County. Project No. 2 MJ Ruddy Segment is between river mile 36.5 and 37.6. The project location is shown in Figures 1 and 2.

OBJECTIVES:

1. Restore and increase habitat for natural salmon production. Improve salmonid spawning and rearing habitats by restoring an alternate bar (pool riffle) morphology, restoring spawning habitat within the meandering channel, and filling in-channel mining pits.

2. Reconstruct natural channel geometry scaled to current channel forming flows. Restore a fully vegetated riparian floodway width that will safely convey up to 15,000 cfs, the maximum regulated flood flows from Don Pedro Dam. Allow the river channel the ability to migrate within the restored floodway to improve and maintain riparian and salmonid habitat. Remove floodway bottlenecks created by inadequate berms that are subject to failure at threshold flows, (6,000 cfs) thus protecting aggregate extraction operations and other human structures from future flood damage.

3. Restore native riparian plant communities within their predicted hydrological regime. Restore native riparian communities on appropriate geomorphic surfaces (i.e., active channel and floodplain terraces) within the restored floodway. Restore habitats for special status species (e.g., egrets, ospreys, and herons).

4. Reduce salmonid fish predator habitat. Improve juvenile salmon survival by preventing future connection between the Tuolumne River and off-channel mining pits. Isolate off-channel aggregate extraction pits that were connected to the Tuolumne River by the January 1997 flood.

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

DESCRIPTION

The Mining Reach Project involves restoration of instream aquatic habitat and shaded riverine aquatic habitat for the primary benefit of San Joaquin fall-run chinook salmon within a 6.1 mile reach (River Mile 34.2 to 40.3) of the lower Tuolumne River below La Grange Dam. The Mining Reach Project will return this reach of the river to a more natural, dynamic channel morphology that will improve, restore and protect instream and riparian habitat for fall run chinook salmon survival, including restoring hydrological and geomorphic processes. Portions of the 6.1 mile long reach will be reformed with a system of setback dikes to create a 500 foot wide riparian floodplain corridor. This includes recreating a riffle and run pattern that follows the restored meander channel of the river along with native vegetation planted on restored river terraces in a mix similar to that found on undisturbed segments of the river. The project elements are within the MJ Ruddy Segment, river mile 36.5 to 37.6, the second of the four Mining Reach Projects.

The riparian reforestation is intended to provide food and shade for juvenile salmon as well as terrestrial habitat. Terrestrial species will benefit from a more continuous corridor of riparian habitat in the restored areas. The wider river floodway will allow channel meander to provide a sustainable and dynamic river morphology, i.e., flood flow-related channel-bed movement with periodic scour, that partially or fully restores the processes associated with natural salmon production and survival.

The setback dikes will require significant quantities of imported materials to fill in deep pit areas created by past gravel mining, but this will re-create a riffle and run pattern that follows the restored meander channel of the river. The channel will be hydraulically sized for the current regulated flows to be an active riverine channel with fully grown riparian vegetation. These regulated flows periodically could reach as high as 15,000 cfs for short periods. It is anticipated and planned that during these high flows events there will be some movement of the channel within the flood plain to expose added spawning materials and clean existing spawning gravels. Fluvial processes to maintain gravel quality are anticipated to start at a bank full flow of 4,500 cfs. To minimize long term future maintenance expenditures, this restoration work is being designed with the intent to provide a self maintaining riparian floodway channel once the revegetation is completed and established.

That portion of the reconstruction work in the flowing water of the river with heavy equipment is anticipated to be limited for fishery reasons to an annual opportunity window of 90 working days from mid-June through September of each season when the salmon are generally not in the river. Construction out of the water will occur through out the year with appropriate erosion control measures. The restoration plantings are also seasonally restricted to the winter months when planting materials are dormant, particularly directly planted cuttings. Construction design, revegetation design, permitting, and acquisition of conservation easements will be done for this Segment during the construction on the 7\11 Segment. Construction, revegetation, and monitoring will be funded as separate task elements.

The attached four maps, Figures 8 through 11 from the EA/IS, show how the typical design and restoration treatments are integrated within the entire Mining Reach Project, starting with the 7-11 Reach (RM 37.6-40.3), the M. J. Ruddy Reach (RM 36.5-37.6), the Warner-Deardorff Reach (RM

35.1-36.5), and finishing with the Reed Reach (RM 34.2-35.1).

Some of the dike and reconstruction materials will be mined from existing dredger tailing deposits, under County use permits, at the upstream end of the Mining Reach. Significant quantities of materials will be purchased from existing active mining areas on the backside of the setback levees to reduce haul costs. State regulations generally require that the materials come from suppliers operating under County use permits. If most of the materials are locally available they can be hauled to the project site on private roads, so the impact on public roads should be minimized. The project EA/IS identified and addressed mitigation for utilization and transportation of the various sources of restoration materials locally available for this project. Additional materials for the major setback levees may need to be imported into the site. There are additional deposits of dredger tailings along the Tuolumne River and near Snelling along the Merced River. We may have an option to also utilize some of the clean rock materials from January 1997 flood debris excavated from La Grange reservoir. However, the project materials cost estimates are based on cost information using the local mining sources adjacent to the river.

Creation of the riparian floodway habitat zone by the setback dikes will require the long term maintenance of project improvements. TID and MID will hold locally administered conservation easements that protects the public investment, but at the same time protects the property rights of the mining operators and landowners. Purchase of these conservation easements will be with AFRP funds.

II PROJECT JUSTIFICATION

The Tuolumne River is a major tributary of the San Joaquin River. The Don Pedro Project is the largest reservoir located above the fall-run chinook salmon spawning reach on the Tuolumne River. The Tuolumne River supports a population of fall-run chinook salmon, whose numbers have fluctuated from 40,000 fish in 1985, to a low of 100 fish in 1991, and is on another upward swing with 7,200 fish in 1997 and 7,900 in 1998. One of many stressors identified in recent studies on the Tuolumne River that limit salmonid populations is the aggregate extraction pits, which are a byproduct of extensive in-stream and off-channel mining. Many of these instream and off-channel pits have negatively impacted salmonid populations by stranding juveniles in ponds and fostering predator fish populations (bass). Additionally, spawning and rearing habitats have been negatively impacted by either complete removal during aggregate extraction, degradation by channel encroachment, or fine sediment infiltration. Many of the off-channel pits had a small topsoil berm separating them from the river. Common floods (e.g., 1983,1986,1995) of 6,000 cfs to 11,000 cfs have breached some of these berms. In addition, the January 1997 flood (estimated at 59,000 cfs) breached nearly every berm in the Mining Reach. Aggregate miners completed emergency repairs to separate some of the ponds from the Tuolumne River and placed the river back into its pre-flood channel in the fall of 1997. However, most of these emergency repairs are only a temporary solution, as shown by the breach of the Warner Segment dike in 1998 at flows of less than 7,000 cfs.

The fall run chinook salmon in the tributaries of the San Joaquin River are currently listed as a species of concern by the USFWS. Anadromous salmonid populations in the lower Tuolumne River require adequate ecosystem health to achieve and sustain their potential productivity. Restoring and maintaining dynamic geomorphic processes are crucial for insuring healthy river ecosystems with natural productive salmonid populations. When complete restoration of a river ecosystem is infeasible, as for alluvial rivers regulated by dams, limiting factors, such as limited available spawning riffles and associated habitat and periodic entrapment of juvenile salmon in mining pits during high river flows, must be identified for prioritizing actions that would best improve the ecosystem, particularly salmonid habitat.

The Tuolumne River Technical Advisory Committee (TRTAC) was formed as part of a FERC Settlement Agreement between the Districts and 10 other stakeholders in 1995. The TRTAC has developed a final draft integrated, long-term fish and riparian habitat restoration plan and monitoring program that utilizes adaptive management for enhancing the natural production of salmon. The TRTAC and the AFRP have each funded $117,500 towards developing this integrated restoration plan, including a public outreach program. The river has been divided into seven reaches with individual segments representing specific types of restoration projects within each reach. Some of these projects focus on restoration of geomorphic processes, others for riparian restoration and predator reduction, and still others deal with gravel re-introduction and cleaning.

The floods of January 1997 provided a unique opportunity during the development of the Restoration Plan to design a 6.1 mile model riparian habitat floodway with a system of setback dikes. The ecological benefits of a restored floodway, with increased flood capacity downstream of La Grange providing a long-term flood protection in this reach and capacity for a more variable flood flow regime, presents an opportunity with common objectives among the irrigation districts, landowners, mining interests, and those interested in restoration. The goal of this project is to restore riparian habitats, salmonid habitats, and a continuous floodway through this six mile reach of the Tuolumne River. Expanding the floodway capacity in the Mining Reach will also allow improvements in fluvial processes in the spawning areas upstream of this choke point.

III MONITORING PROGRAM

A detailed mitigation and monitoring program for the Mining Reach was developed with the project EA/IS. Assuming continued funding for this and the remainder of the Mining Reach segments, Tables 1 and 2 from the EA\IS summarize the basic monitoring program and cost estimates over the life of the restoration project.

The monitoring activities can be grouped into three basic areas:

1. Physical & Geomorphic Processes:
   Pre and post construction changes will be recorded from the as-built engineering drawings. This assures that the desired channel contours, cross sections, and thalweg line were built as designed and these as-built records can be used to assess future geomorphological changes after major flood events. Bed mobility using tracer rocks will be used to evaluate fluvial processes. Gravel quality will be monitored under the FERC Settlement Agreement (FSA) monitoring program.

2. Riparian habitat:
   Revegetation will require annual inspections during the first few years to confirm survival of planted materials, perform replanting if deemed necessary, and to assess natural changes in the vegetation mix. This will be part of the contractor's warrantee period. Monitoring vegetation

would then be reduced to evaluations after significant flood events. The riparian forest restoration planting is designed to accommodate monitoring. There are 18 different hexagonal planting units classed by predominant vegetation type. These planting units are grouped together to recreate the diverse mosaic of vegetation patches and strings found on undisturbed areas along the Tuolumne River corridor. The center point for any "hex" can be relocated for monitoring at a later date.

3. Fishery Resources changes:
   This will involve evaluation of pre and post project changes in habitat conditions and populations for both fish predators and salmon. Monitoring criteria would include items such as flow velocity, temperature, comparisons of estimated transit time through the old vs. new stream channel, combined with sampling observations of fish populations and spawning riffle conditions.

Pre project monitoring started in 1998 on the 7\11 Segment. Post project monitoring will start after the completion of the 7\11 Segment and increase as more segments are restored. Generally the monitoring for a given segment will extend for 2 years after the completion of construction. The more detailed monitoring plan is available through the District as is the mitigation monitoring outlined in the EA\IS. The project specific monitoring was designed to compliment the fishery monitoring requirements of the 1995 FERC Settlement Agreement (FSA). The Districts and CCSF spend an average of $100,000 per year on FSA monitoring for the Tuolumne River. Annual monitoring summaries will be provided to the TRTAC, and other interested parties upon request.

The first level of peer review comes from the biologists that make up the regular representation on the TRTAC. There is a monitoring subcommittee of the TRTAC charged with close technical review of the FSA and project specific monitoring. Recently the UC Davis Centers for Water and Wildland Resources was asked to evaluate competing fry and smolt survival methods currently used on the Tuolumne River. Stillwater Sciences provides technical design of monitoring programs and statistical analysis of the results.

TABLE 1 Mining Reach Monitoring schedule based on a sequence of hypothesized flows, to illustrate the monitoring elements.

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<tr><th></th><th>1999</th><th>2000</th><th>2001</th><th>2002</th><th>2003</th><th>2004</th><th>2005</th><th>2006</th><th>2007</th><th>2008</th></tr>
<tr><td colspan="2">Hypothetical annual peak discharge in cfs</td><td>3650</td><td>7280</td><td>2980</td><td>1200</td><td>10400</td><td>8010</td><td>6870</td><td></td><td></td></tr>
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<tr><td>MONITORING ELEMENTS</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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</table>

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

TABLE 2 Estimated costs for Mining Reach Monitoring using hypothesized monitoring schedule.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
MONITORING BUDGET										
Geomorphic Processes	1,600	6,700	31,80	8,000	8,700	107,200	71,100	53,500		
Fisheries Resources	5,400	14,900	17,000	19,100	19,000	9,400	4,200	2,100		
Riparian Resources		9,600	11,800	18,900	27,900	21,600	22,200	29,800	10,400	9,600
Annual Report	4,500	5,400	7,600	6,100	3,700	9,100	7,000	4,800	1,000	500
TOTAL	**11,500**	**36,600**	**68,200**	**52,100**	**59,200**	**147,300**	**104,400**	**90,200**	**11,400**	**10,100**

TABLE 3 Summary of Ecological & biological objectives, hypotheses, and monitoring parameters and approaches:

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

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

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

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

WORK & DELIVERABLES

The work can be divided into the following components:

1) Pre & post construction project monitoring;
2) Environmental documentation and permits;
3) Engineering design and construction management;
4) ROW, appraisals and conservation easements;
5) Construction and revegetation.

For consistency with current projects, it is anticipated that new task orders will be established with the current firms providing monitoring, environmental documentation and permitting, ROW and appraisal services, engineering design and native plant propagation services for the Mining Reach and SRP projects. The actual restoration construction is anticipated to be in the form of a sole source "bid" with the aggregate leasehold interest. This is considered a cost containment methodology because of the aggregate operators' ability to control scheduling, access, and materials availability as the leasehold interest in the project area. Having the operator follow the same level of project specifications and inspections as under a competitive bid process controls the quality control under a sole source bid. The aggregate operator in the project area is also affiliated with a heavy construction firm capable managing such a project as this.

There are four construction portions, 2-A to 2-D, and one overall revegetation component in this segment of the Mining Reach, as shown in Figure 9 from the EA\IS. The attached spreadsheets, "Table 4 Mining Reach - MJ Ruddy Segment Budget" and "Table 5 Quarterly Project Budget Estimates", detail the cost break down. These project tasks will be obtained under several contracts for services and separate contracts for construction and revegetation. The construction funds from CALFED and AFRP will be pooled for the purpose of letting only one construction contract. The four construction portions, 2-A to 2-D, were identified with a specific funding source only for the purpose of developing a project budget.

Construction budgets are based on engineering estimates from similar projects and materials cost information provided by the aggregate industry. The quantities of materials are based on early conceptual estimates. More detailed estimates of quantities and the aerial extent of project features will be developed during the engineering design phase of the project work. Service contract estimates are based on the level of effort from prior segments of the Mining Reach project.

PROJECT BUDGET

The entire Project No. 2, MJ Ruddy Segment, is anticipated to cost $6,373,000. The AFRP is being asked to fund 49% of the project, CALFED has authorized funding the 50% of the estimated costs, and the Districts have a budget of $75,000 for CEQA, NEPA, and project permitting.

<u>The USFWS-AFRP is being asked to fund $3,143,000 of public works construction,</u>

including $1,898,000 for set back dike and floodway reconstruction, $364,000 for engineering & ROW tasks, $219,000 for project monitoring, $200,000 for conservation easements, $114,000 for construction management (6%), $80,000 for project management (3%), and a $268,000 construction contingency (10%).

The total amount being requested from CALFED is $3,155,000, consisting of $375,000 for revegetation, $2,276,000 for setback dike construction and floodplain reconstruction, $159,000 for construction management (6%), $80,000 for project management (3%), and a $265,000 construction contingency (10%).

TABLE 4 PROJECT BUDGET SUMMARY

MJ RUDDY SEGMENT Rm 36.5 to 37.6 Revised 20-Aug-99

Construction Task From M&T Figure 4	Description of work		Funding Revisions	Option by fund source
Phase 2A	Setback Dike & Restore Floodplain		407,000	AFRP
Phase 2B	Reconstruct Channel Form		174,000	CALFED
Phase 2C	Setback Dike & Restore Floodplain		2,102,000	CALFED
Phase 2D	Setback Dike & Restore Floodplain		1,491,000	AFRP
		sub total	4,174,000	
All Phases	CEQA, NEPA, Permits		75,000	Districts
All Phases	Revegetation		375,000	CALFED
All Phases	Monitoring (EA\IS plan: yrs 2001 – 2002)		219,000	AFRP
All Phases	Conservation Easements		200,000	AFRP
All Phases	Design & ROW Engineering	8%	364,000	AFRP
		sub total	1,233,000	
All Phases	Contingency	10%	533,000	
All Phases	Construction Management	6%	273,000	
All Phases	Project Management	3%	160,000	
	PROJECT TOTAL		**6,373,000**	
CALFED Share	Construction	55%	2,276,000	
	Revegetation	100%	375,000	
		sub total	2,651,000	
	Contingency	10%	265,000	
	Construction Management	6%	159,000	
	Project Management	3%	80,000	
	CALFED Total	**50%**	**3,155,000**	
AFRP Share	Construction	45%	1,898,000	
	Monitoring	100%	219,000	
	Conservation Easements	100%	200,000	
	Design & ROW Engineering	100%	364,000	
		Sub total	2,681,000	
	Contingency	10%	268,000	
	Construction Management	6%	114,000	
	Project Management	3%	80,000	
	AFRP Total	**49%**	**3,143,000**	

Comments: 1. Monitoring reflects the estimates developed for the EA\IS on this

TABLE 5 QUARTERLY PROJECT BUDGET ESTIMATES ($1,000'S)

MJ RUDDY SEGMENT Rm. 36.5 to 37.6

Task	%	1999		2000				2001		2002	Total Cost Estimates	Funding Source
		Jul - Sep	Oct -Dec	Jan - Mar	Apr - Jun	Jul - Sep	Oct -Dec	Jan - Mar	Apr - Dec			
Phase 2A					100	200	107				407	AFRP
Phase 2B						157		17			174	CALFED
Phase 2C					200	800	890	212			2,102	CALFED
Phase 2D					200	525	615	151			1,491	AFRP
Sub total		-	-	-	500	1,682	1,612	380	-	-	4,174	
Revegetation			75				150	100	25	25	375	CALFED
Monitoring (1)		15		10				15	50	60	219	AFRP
Easements				200							200	AFRP
Engineering	8%		175	175	14						364	AFRP
CEQA, NEPA, permits				50	25						75	Districts
Sub total		15	250	435	39	-	150	115	75	85	1,233	
CALFED Share												
Construction	55%	-	-	-	200	957	890	229	-	-	2,276	
Revegetation	100%	-	75	-	-	-	150	100	25	25	375	
		-	75	-	200	957	1,040	329	25	25	2,651	
Contingency	10%	-	8	-	20	96	104	33	3	3	265	
Construction Mgt.	6%	-	5	-	12	57	62	20	2	2	159	
Project Mgt.	3%	-	2	-	6	29	31	10	1	1	80	
CALFED Total	**50%**	-	89	-	238	1,139	1,238	392	30	30	**3,155**	

TABLE 5 (cont)

Task	%	1999		2000				2001		2002	Total Cost	Funding
		Jul - Sep	Oct -Dec	Jan - Mar	Apr - Jun	Jul - Sep	Oct -Dec	Jan - Mar	Apr - Dec		Estimates	Source
AFRP Share												
Construction	45%	-	-	-	300	725	722	151	-	-	1,898	
Monitoring	100%	15	-	10	-	-	-	15	50	60	219	
Easements	100%	-	-	200	-	-	-	-	-	-	200	
Engineering	100%		175	175	14	-	-	-	-	-	364	
sub total		15	175	385	314	725	722	166	50	60	2,681	
Contingency	10%	2	18	39	31	73	72	17	5	6	268	
Construction Mgt.	6%	-	-	-	18	44	43	9	-	-	114	
Project Mgt.	3%	0	5	12	9	22	22	5	2	2	80	
AFRP Total	**49%**	17	198	435	373	863	859	197	57	68	**3,143**	
PROJECT TOTAL		**17**	**337**	**460**	**611**	**2,002**	**2,097**	**588**	**86**	**98**	**6,373**	

Comment: (1) The balance of $69,000 in the overall $219,000 monitoring budget will be spent in years 2003 to 2007.