

**Consultant's Report  
Plumas Watershed Forum  
Program Review**

*Prepared for:*

Plumas County Flood Control and  
Water Conservation District  
County of Plumas  
Courthouse  
Quincy, CA

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# Acronyms and Abbreviations

AF	acre-feet
BCR	benefit-cost ratio
CIMIS	California Irrigation Management Information System
CRM	Coordinated Resource Management Group
DWR	California Department of Water Resources
ET	evapotranspiration
EWA	environmental water account
Forum	Plumas Watershed Forum
FRWMS	Feather River Watershed Management Strategy
OMB	Office of Management and Budget
Plumas County	Plumas County Flood Control & Water Conservation District
RCD	Resource Conservation District
SCS	U.S. Soil Conservation Service (now U.S. Natural Resource Conservation Service)
SVGMD	Sierra Valley Groundwater Management District
TAC	Technical Advisory Committee
TAF	thousand acre-feet
USGS	U.S. Geological Survey

## **Background and Purpose of Review**

The Plumas Watershed Forum (Forum) was formed in 2003 as part of the *Monterey Settlement Agreement* (Agreement) stemming from litigation involving California's State Water Project (Planning and Conservation League et al. 2003). As provided in the Agreement, the Forum is composed of three voting members:

- Plumas County Flood Control and Water Conservation District (referred to hereafter as *Plumas County*) (governed by the Plumas County Board of Supervisors),
- California Department of Water Resources (DWR), and
- State Water Project contractors (other than the County of Plumas).

Plumas County largely comprises the mountainous watershed of the Feather River above Oroville Reservoir in the northern Sierra Nevada (Figure 1-1), in which are located several alluvial groundwater basins (Figure 1-2). The reservoir is a major component of the State Water Project, which delivers water to agricultural and urban contractors throughout the State of California.

The Forum's purpose is to plan and fund implementation of watershed management and restoration activities in the upper Feather River watershed for the mutual benefit of Plumas County and the State Water Project. The Agreement provided for payments to the Forum and Plumas County of \$1 million per year from 2003 through 2006, with an additional four years of payments upon completion of milestones in unrelated areas of the Agreement. The other milestones have not yet been achieved, but the Agreement provides that the parties may continue funding for the Forum "depending upon the success of the watershed work and the litigation situation".

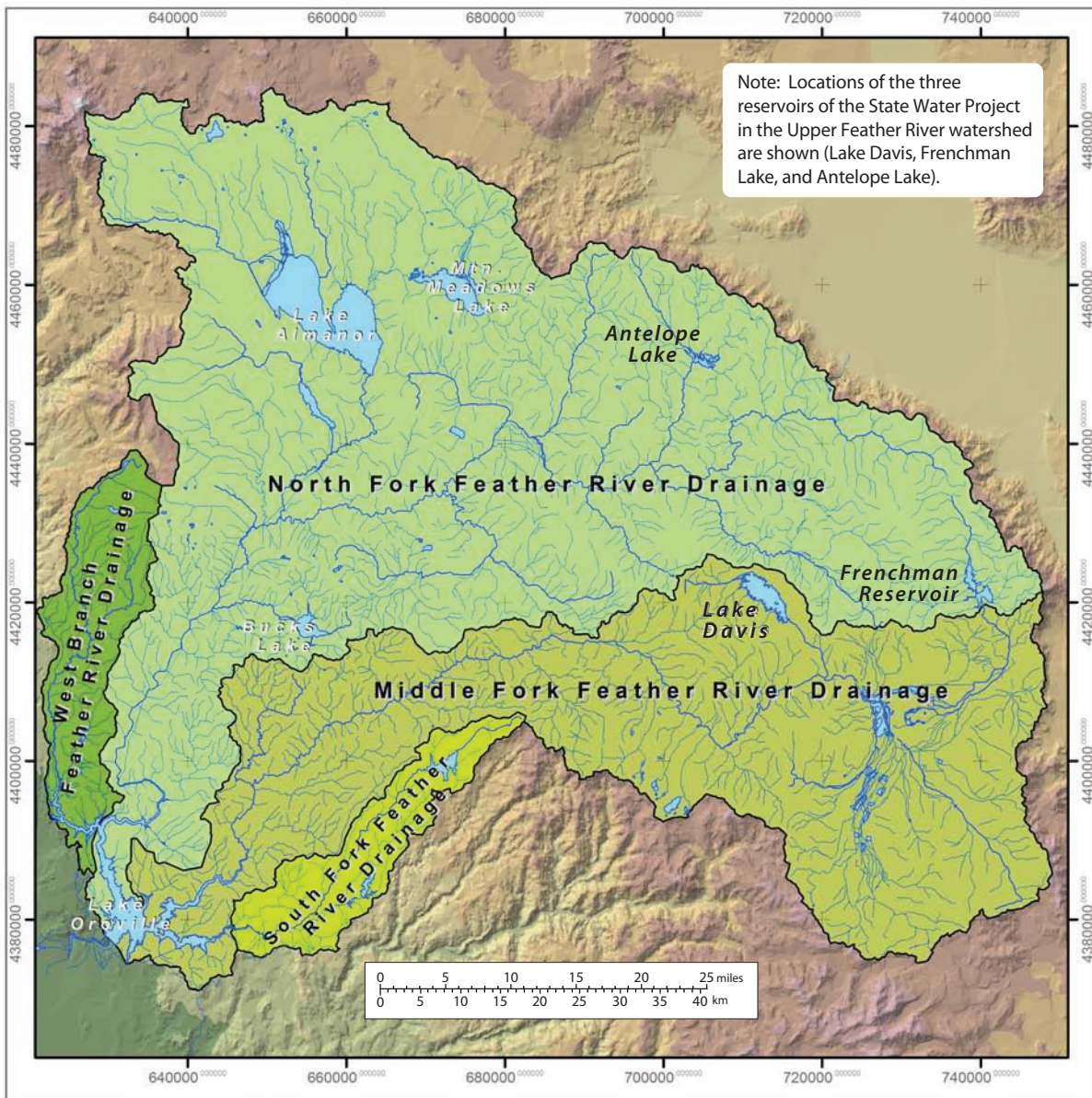
Additional information about the Agreement and the Forum is available at:

<http://countyofplumas.com/publicworks/watershed/index.htm>, and

[http://www.des.water.ca.gov/mitigation\\_restoration\\_branch/rpmi\\_section/projects/index.cfm](http://www.des.water.ca.gov/mitigation_restoration_branch/rpmi_section/projects/index.cfm).

To assist the parties in determining whether to continue funding, the Forum has directed that a program review be conducted by an independent evaluator.





**Legend**

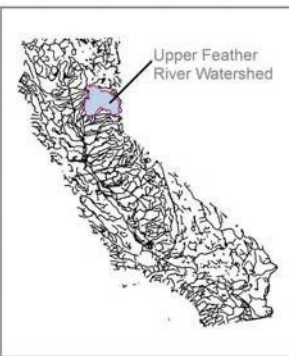
- Streams
- Lakes and reservoirs
- Rivers

**Major River Drainages**

- Middle Fork Feather River
- North Fork Feather River
- South Fork Feather River
- West Branch Feather River

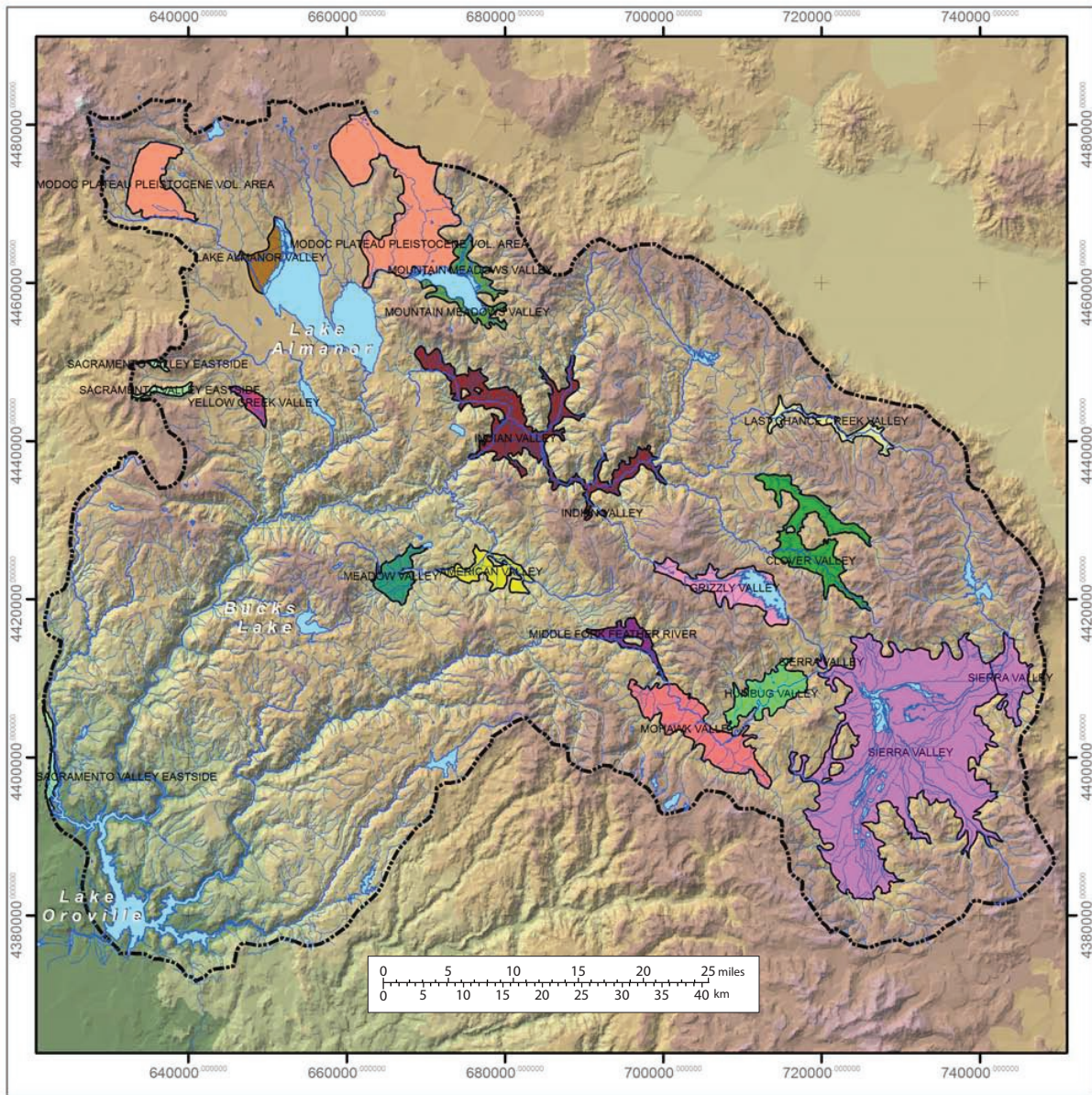
**UPPER FEATHER RIVER  
MAJOR RIVER DRAINAGES**

Watershed base map depicting the major river drainages of the North, Middle, South, and West Branch Feather River. The water from each major river drainage flows into Lake Oroville.



Source: Ecosystem Sciences 2005. *Integrated Regional Water Management Plan, Upper Feather River Watershed, California.*

00158.08 Evaluation Report (5-08)

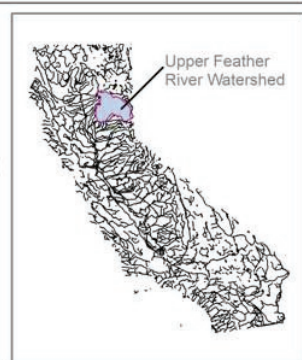


- Legend**
- Streams
  - Lakes and reservoirs
  - Rivers
  - Ground Water Basin**
  - American Valley
  - Clover Valley
  - Grizzly Valley
  - Humboldt Valley
  - Indian Valley
  - Lake Almanor Valley
  - Last Chance Creek Valley
  - Meadow Valley
  - Middle Fork FR
  - Modoc Plateau Pleist. Vol. Area
  - Mohawk Valley
  - Mountain Meadows Vly.
  - Sacramento Vly E Side
  - Sierra Valley
  - Yellow Creek Valley

**UPPER FEATHER RIVER WATERSHED  
GROUNDWATER BASINS**

Watershed base map depicting groundwater basins.

GIS Metadata Information  
Groundwater basins shapefile:  
California Spatial Information Library CASIL



00158.08 Evaluation Report (04-08)

Source: Ecosystem Sciences 2005. *Integrated Regional Water Management Plan, Upper Feather River Watershed, California.*

Jones & Stokes, a planning and environmental consulting firm based in Sacramento, was selected to conduct the review. The Forum directed that the review should evaluate all expenditures of settlement funds by the Forum in terms of meeting the goals of the Agreement (see below), the Forum's bylaws and policies, and the Feather River Watershed Management Strategy. The latter (Ecosystem Sciences 2004) is a planning document to guide watershed restoration and management consistent with the goals of the Agreement and the bylaws and policies. It was prepared by a contractor for the Forum, using some of the first increment of Forum funding.

## Goals of the Agreement

The agreement established the following four goals or intended benefits of the Forum's funding activities:

- (1) Improved retention (storage) of water for augmented baseflow in streams;
- (2) Improved water quality (specifically, reduced sedimentation), and stream bank protection;
- (3) Improved upland vegetative management; and
- (4) Improved groundwater retention/storage in major aquifers.

## Forum Expenditures

The Agreement requires that a majority of all funds paid to Plumas County be applied to watershed programs. Thus, slightly more than one-half of the funds were designated *A Funds* and directed at watershed restoration and management programs. The Agreement allows the remaining funds (in this case slightly less than one-half) to be spent for other purposes by Plumas County at its discretion but *with due consideration given for the needs of the Forum*. These were designated *B Funds*. *A Funds* include project funding and a share of program administration costs; these costs were approved by the Forum. *B Funds* include additional project funding approved by the Forum, independent expenditures by Plumas County, and a share of program administration costs. Tables 1-1, 1-2, and 1-3 show project funding expenditures, independent expenditures by Plumas County, and program administration costs. The detailed information in the three tables is summarized in Table 1-4, and the distribution of annual funding to the *A* and *B Funds* is shown in Table 1-5.

Locations of the Forum-funded projects (from both the *A-* and *B-Funds*) that are locationally specific are shown on Figure 1-3.

As shown in Table 1-4, Plumas County gave due consideration of the needs of the Forum in part by subjecting about 22% of the *B-Fund* expenditures (aside

**Table 1-1. Project Expenditures of the Plumas Watershed Forum (PWF), 2003–2007**

ID No.	Project Name	Project Sponsor	File Number	Date Forum Approved	Funding	Percent of Total Project Funding
<b>1-1A. PWF Funded Projects – A Fund</b>						
1	Sulphur Creek Data Collection	U.C. Davis Cooperative Extension	No file	8/03	\$3,000	0.13
2	Feather River Watershed Management Strategy	Plumas Watershed Forum	No file	5/04	\$27,780	1.24
3	SVGMD Monitoring Wells	Sierra Valley Groundwater Management District	None assigned	8/04	\$120,984	5.39
4	Charles Creek Reach of Last Chance Creek Restoration <sup>1</sup>	Feather River CRM	04-100	10/04	\$35,000	1.56
5	Hosselkus Creek Restoration <sup>1</sup>	Feather River CRM	04-100	10/04	\$80,000	3.56
6	Last Chance Creek Low Water Crossing/Channel Grade Control <sup>1</sup>	Plumas National Forest (in cooperation with Feather River CRM)	04-100	10/04	\$35,000	1.56
7	Rodgers Creek and Last Chance Creek Road Relocation	Plumas National Forest	None assigned	10/04	\$59,466	2.65
8	Feather River College Riparian Protection	Feather River College	05-325	5/05	\$92,453	4.12
9	Sierra Valley Aquifer Testing	Sierra Valley Groundwater Management District	05-300	5/05	\$30,000	1.34
10	Red Clover Creek Monitoring	Plumas Geohydrology	05-250	5/05, 5/06	\$28,000	1.25
11	Clark's Creek Aspen Restoration	Plumas National Forest	None assigned	5/05	\$84,500	3.76
12	Four Creeks Monitoring (10 permanent stations)	Feather River CRM	05-150	5/05	\$25,000	1.11
13	Last Chance Creek – Jordan Creek Restoration	Feather River CRM	05-175	5/05	\$64,000	2.85
14	Silver Creek in Meadow Valley (Burney's)	Feather River CRM	06-304	5/06	\$51,000	2.27
15	Spanish Creek in Meadow Valley (Kellet's)	Feather River CRM	06-304	5/06	\$147,000	6.55
16	Ramelli Ditch Replacement	Plumas National Forest	None assigned	5/06	\$85,000	3.79
17	Little Last Chance Creek Restoration	Feather River CRM	06-302	5/06	\$92,977	4.14
18	Dixie Creek Restoration	Feather River CRM	06-301	5/06	\$56,704	2.53

**Table 1-1. Continued**

ID No.	Project Name	Project Sponsor	File Number	Date Forum Approved	Funding	Percent of Total Project Funding
19	Last Chance Creek at Ferris Fields Restoration	Feather River CRM	06-303	5/06	\$107,011	4.77
20	Lake Davis Water Treatment Plant <sup>2</sup>	Plumas County Flood Control District	No file	5/05, 10/07	\$588,260	26.20
21	Upland Vegetation Management <sup>3</sup>	Plumas Corporation	None assigned	8/03	\$22,012	0.98
<b>Total A-Fund Expenditures</b>					<b>\$1,835,147</b>	<b>81.72</b>
<b>1-1B. PWF Funded Projects – B Fund</b>						
1	Upland Vegetation Management <sup>3</sup>	Plumas Corporation	None assigned	10/04, 5/05	\$80,743	3.60
2	Water Education Program	Plumas Unified School District	None assigned	8/04, 12/04	\$34,000	1.51
3	Last Chance Creek Isotope Monitoring	Plumas Geohydrology	04-175	10/04	\$23,000	1.02
4	Stream Restoration Project Coordination (Development) and Monitoring	Feather River CRM	04-100	10/04	\$70,000	3.12
5	Sierra Valley RCD Capacity Building	Sierra Valley RCD	None assigned	10/04 and 5/05	\$50,000	2.23
6	Feather River RCD Capacity Building	Feather River RCD	06-100	10/04 and 5/05	\$47,750	2.13
7	Forest Canopy Interception Study	Plumas Geohydrology	05-225	5/05	\$20,997	0.94
8	Feather River Watershed Public Awareness	Feather River CRM	05-200	5/05	\$33,668	1.50
9	Four Creeks – Concept Development	Feather River CRM	05-150	5/05	\$50,308	2.24
<b>Total B-Fund Expenditures</b>					<b>\$410,466</b>	<b>18.28</b>

Notes:

<sup>1</sup> Projects A4, A5, and A6 were originally included in a single proposal from the Feather River CRM. Project A6 was subsequently shifted to the Plumas National Forest for funding and implementation. Projects A4 and A5 were funded under a single contract with Feather River CRM.

<sup>2</sup> Project A20 replaced a previously approved floodplain study for Sierra Valley (\$475,000 in 8/03), which was augmented \$13,260 on 8/04 in response to project bids received, for a total of \$488,260. The subsequent reallocation to the Lake Davis Water Treatment Plant in 5/05 was for the same total amount. In 10/07, this project was augmented by \$100,000 from the A Fund to be reimbursed from the B Fund should Forum funding resume.

<sup>3</sup> Project A21 and B1 are the same project, but funding was drawn from both the A Fund and the B Fund.

**Table 1-2.** Independent Expenditures by Plumas County from the B Fund**1-2A. Independent Expenditures by Recipient**

	Recipient	Purpose of Expenditure	Amount
1	County of Plumas	Reimburse county general fund for loans to flood control district.	\$452,000
2	Ecosystem Sciences Foundation	Development of upper Feather River Integrated Regional Water Management plan.	\$100,035
3	Maidu Cultural and Development Group	Education and outreach to disadvantaged communities for development and implementation of upper Feather River Integrated Regional Water Management program.	\$68,128
4	Grizzly Lake Resort Improvement District	Water tank and well improvements for district awaiting return to surface water supply from Lake Davis.	\$100,000
5	Indian Valley Community Services District	Emergency well drilling for Greenville water supply.	\$50,000
6	Consultant – MWH Americas	Consultant for relicensing of FERC Project 2105 (Lake Almanor).	\$88,187
7	Consultant – Tom Hunter	Consultant for relicensing of FERC Projects 2105 (Lake Almanor) and 2107 (Poe).	\$1,130
8	Consultant – John Mills	Consultant for Integrated Regional Water Management program, coordination with Mountain Counties region, and State Water Plan.	\$177,083
9	Consultant – Leah Wills	Consultant for Integrated Regional Water Management program, FERC relicensings, forest management and coordination with U.S. Forest Service.	\$178,058
10	Attorney – Michael Jackson	Attorney for implementation of Quincy Library Group pilot project, FERC relicensings, and Integrated Regional Water Management program.	\$119,697
11	Consultant Expenses, 03–04 Consolidated	MWH Americas (FERC 2105), CH2M Hill (Almanor), Leah Wills (misc.).	\$81,000
12	Advocation, Inc.	Monitor state legislative activity.	\$12,684
13	Flood Control District	Travel and per diem.	\$22,008
14	Plumas County Counsel	Support for the Plumas Watershed Forum and for the Plumas County Flood Control District.	\$32,325
15	Sierra Institute	Completion of the Lake Almanor watershed assessment.	\$9,816
	TOTAL		\$1,492,151

**1-2B. Independent Expenditures by Activity**

Purpose of Expenditure	Amount
1 Direct assistance to special districts	\$150,000
2 Flood Control District travel and per diem	\$22,008
3 Consultants – FERC relicensing of PG&E projects on North Fork Feather River	\$186,393
4 Consultants – FERC relicensing of Project 2100/Oroville Facilities	\$15,471
5 Consultants – forest management/Quincy Library Group Pilot Project/Forest Service Coordination	\$117,207
6 Consultants – Implementation of Upper Feather Integrated Regional Water Management program	\$312,137
7 Consultants – bonds and state and federal legislation	\$85,632
8 Consultants – miscellaneous activities	\$37,978
9 Reimburse Plumas County General Fund for loans to Flood Control District	\$452,000
10 Plumas County Counsel	\$32,325
11 Consultant expenses – 03-04 consolidated	\$81,000
TOTAL	\$1,492,151

Note: Allocation of consultant expenditures by activity is approximate.

from administration costs) to the project-approval process of the Forum (i.e., \$410,000) rather than independently expending all of the available B Funds. Accordingly, only about 78% of the funds available for discretionary use were in fact expended in that way. In addition, some of the discretionary funding by Plumas County was expended for activities that would advance some of the Agreement's goals (see Section 3).

**Table 1-3.** Plumas Watershed Forum, Program Administration Costs by Fund

	A Fund	B Fund	Total
2004–05	\$42,227	\$64,470	\$106,697
2005–06	\$26,496	\$35,920	\$62,416
2006–07	\$38,200	\$6,684	\$44,884
2007–08	\$47,275	\$600	\$47,875
2008–09	\$50,000	\$0	\$50,000
<b>Total</b>	<b>\$204,199</b>	<b>\$107,675</b>	<b>\$311,874</b>

**Table 1-4.** Plumas Watershed Forum Expenditures in the 4-Year Funding Period (thousands of dollars)

	A Fund	B Fund	Total	Percent of Total
Project funding	1,835	410	2,246	54.1%
Plumas independent expenditures	n/a	1,492	1,492	35.9%
Contribution <sup>1</sup>	0.5	--	0.5	<0.1%
Administration	204	108	312	7.5%
Program review	75	--	75	1.8%
Unallocated funding	19	8	27	0.7%
<b>TOTAL</b>	<b>2,134</b>	<b>2,019</b>	<b>4,153</b>	
<b>Percent of Total</b>	<b>51.4%</b>	<b>48.6%</b>		

<sup>1</sup> Legislative Education Day



**Table 1-5.** Plumas Watershed Forum Revenue for the 4-Year Funding Period (thousands of dollars)

Settlement Payment	A Fund	B Fund	Total
June 2003	500	500	1,000
June 2004	500	500	1,000
June 2006	500	500	1,000
June 2007	500	500	1,000
Interest Earnings	154	31	185
TOTAL	2,154	2,031	4,185
Percent of Total	51.5%	48.5%	

Note: Differences between total expenditures (Table 1-4) and total revenues (this table) for each fund possibly are a result of: (1) initially A and B Funds were maintained by the Plumas County Auditor in a single account which included other grant funds (they were subsequently segregated into separate funds), and (2) no annual report was produced in the first year of the program (2003-2004) so that information about expenditures and revenues is less detailed than for subsequent years.

## Organization of This Report

This report is organized to reflect the purposes of the program review established by the Forum. The main sections of the report are as follows:

**Section 2 – Relationship of Funded Projects to Forum Goals and Policies** presents a review of 29 projects funded by the Forum in terms of consistency with goals of the Agreement and the Forum’s specific strategies.

**Section 3 – Uses of Forum Funds for Non-Project Activities** is a review of the independent expenditures by Plumas County and their relationship to Agreement goals and Forum needs.

**Section 4 – Review of Program Administration** identifies program-administration improvements that could be made to improve proposal, funding agreement, and project reporting processes; program monitoring; and periodic review of program effectiveness.

**Section 5 – Assessment of Program Effectiveness** assesses program expenditures with respect to improving watershed health and providing benefits to the State Water Project and Plumas County. It includes a prognosis for long-term benefits that can result from continuation of watershed restoration work conducted to date in the upper Feather River watershed.

# Relationship of Funded Projects to Forum Goals and Policies

## Introduction

The Forum approved funding for 29 projects<sup>1</sup> during the 4-year funding period. Nearly 82% of these projects were funded from the A Fund and 18% from the B Fund (Table 1-4). A-Fund projects tended to be watershed intervention actions, and B-Fund projects tended to be intervention support, although this distinction is not consistent (Table 1-1). This funding was intended to contribute to watershed restoration and help the Forum meet the goals of the Agreement to improve groundwater storage and augment base flow, reduce bank erosion, and improve management of upland vegetation. The funding was also intended to be consistent with the Forum's bylaws and strategies, which were adopted to direct funding at goal attainment.

As noted in Section 1, Forum bylaws and the Feather River Watershed Management Strategy help guide the Forum's funding allocations. Although the earliest funding did not have the benefit of an adopted strategy, all of the later funding proposals were required to address project consistency with the strategies established in the latter document.

This review assumes that, because they were all approved by the Forum, both A-Fund and B-Fund projects are intended to be "watershed programs," as specified by the Agreement, and advance the goals of the Agreement in some way.

The purpose of this section is to review all of the project funding in terms of project consistency with the goals of the Agreement and the bylaws and implementation strategies of the Forum. A correlative purpose is to identify lessons learned in the 4-year funding process. A summary of all of the relevant policy—the goals of the Agreement and the Forum's adopted bylaws and strategies—is provided in Appendix A.

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<sup>1</sup> Table 1-1 shows a total of 30 projects (21 projects funded from the A Fund and 9 projects funded from the B Fund), but projects A21 and B1 are actually the same project (funded through both the A Fund and B Fund). Thus, there were 29 distinct projects.

# Project Evaluation

This program review entailed compilation of a project-evaluation matrix for each of the 29 funded projects listed in Table 1-1; the matrices compose Appendix B of this evaluation. The compilation was accomplished by reviewing project proposals, project funding agreements, annual and final reports, and sponsor invoices to the Forum from the Forum's files; by reviewing draft evaluations with project sponsors and the Forum's Technical Advisory Committee (TAC) and seeking additional documentation or project clarification; and by reviewing information submitted by the public at large through a comments solicitation process conducted by the Forum TAC.

The matrix was designed to record the degree to which each project contributed to each goal of the Agreement and was consistent with key Forum bylaws and strategy; those policies are summarized in Appendix A. For this purpose, the following coding system was used:

- 3 – direct goal contribution or direct policy consistency,
- 2 – demonstrated indirect contribution or consistency,
- 1 – indeterminate contribution or consistency, or
- 0 – no contribution or consistency.

Code 3 indicates that watershed intervention/restoration action, action planning, or action monitoring was involved in a project. Code 2 indicates that intervention support was involved. Code 1 allows that intervention or intervention support may or may not result from a project. Code 0 is reserved for cases where it can be unequivocally concluded that a project would not make even an indirect contribution to a goal or would not be consistent with a strategy.

Coding was performed by a natural resource planner who is familiar with the upper Feather River watershed and the restoration program there, the background and goals of the Agreement, state and federal interests in regional water supply, and fluvial geomorphology, riparian ecology, and hydrology of groundwater basins.

## Results of Project Evaluations

### Project Consistency with Goals and Policies

Although projects are not classified by type as part of Forum proposal solicitation or funding, several project categories became apparent during this program review. These categories are shown in Table 2-1 together with the percent of Forum project funding represented by each category. The table shows that:

- the largest percentage of funding was directed at stream intervention projects (47%), sponsored primarily by the Feather River Coordinated Resource Management Group (CRM), as well as by the U.S. Forest Service;
- the next largest percentage of funding was for supplementing local funding for a replacement water treatment plant to treat water from Lake Davis—a component of the State Water Project—for domestic consumption in the City of Portola in eastern Plumas County (26%);
- research, not directed by a research plan, accounted for 10% of the funding;
- upper watershed intervention (fuels management and aspen restoration projects) involved 8% of the funding;
- landowner outreach and support for landowner intervention entailed 4%; and
- public outreach and education accounted for 3%.

A review of the project evaluations in Appendix B will show that, for each project, consistency with each goal of the Agreement, Forum strategy, and Forum bylaw is estimated using the numerical codes noted above. Using percentage of total Forum funding as the indicator, Table 2-2 presents the percentages of projects scored for each level of consistency with each goal, strategy, and bylaw. This is combined data based on project-by-project coding summaries in Appendix C.

**Table 2-1.** Types of Funded Projects

Type of Forum-Funded Project	Projects	Percent of Forum Project Funding
Planning Expenditures	A2	1.2
Stream Intervention Projects (includes planning and monitoring by interveners)	A4, A5, A6, A7, A8, A12, A13, A14, A15, A16, A17, A18, A19, B4, B9	46.8
Upland Watershed Intervention	A11, A21, B1	8.3
Research	A1, A3, A9, A10, B3, B7	10.1
Landowner Outreach (including landowner intervention support)	B5, B6	4.4
Public Outreach	B2, B8	3.0
Other	A20	26.2

Note: Total project expenditure was \$2,245,613.

**Table 2-2.** Summary of Consistency of Projects with Monterey Settlement Agreement Goals and Forum Strategies and Bylaws

	Percent of Total Project Funding			
	3	2	1	0
	Directly Consistent	Indirectly Consistent	Indeterminate Consistency	Not Consistent
<b>Goal Consistency</b>				
Goal 1 – Augmented base flow	38%	14%	48%	4%
Goal 2 – Sediment/bank protection	51%	12%	4%	33%
Goal 3 – Upland vegetation management	10%	5%	8%	76%
Goal 4 – Groundwater storage	34%	14%	49%	4%
<b>Strategy and Bylaw Consistency</b>				
Eastside location	96%	4%	0%	0%
Non-road decommissioning	96%	1%	0%	3%
In high-sediment priority watershed	67%	32%	0%	1%
Addresses Sierra Valley overdraft	11%	33%	5%	52%
Restores meadow functions	34%	13%	48%	5%
Restores riparian potential	41%	13%	44%	1%
Increases upland vegetation	6%	5%	13%	76%
Multi-resource benefit	80%	10%	9%	1%
Leverages other funding	85%	10%	2%	3%
Landowner contribution	58%	1%	10%	31%
Landowner participation	72%	3%	16%	8%
Documents publically available	96%	0%	0%	0%
Involves/supports intervention	63%	6%	31%	0%
Monitoring of project success	73%	1%	0%	26%
Educational component	22%	6%	36%	36%
Innovative intervention/monitoring	28%	1%	13%	57%
Funding supplement	83%	11%	2%	3%
Linked to strategic plan	92%	7%	1%	0%
Groundwater retention in meadows	70%	11%	15%	4%
Likely to attain performance criteria	77%	16%	1%	6%

	Percent of Total Project Funding			
	3	2	1	0
	Directly Consistent	Indirectly Consistent	Indeterminate Consistency	Not Consistent
Increase education/awareness	22%	6%	36%	36%
Upper reservoir focus	32%	1%	4%	62%
Consistent with long-range plan	94%	4%	1%	0%
<b>Project Results</b>	Y	N	na (project incomplete)	
Implementation documented	73%	11%	16%	
Success documented	12%	34%	51%	
<b>Evaluation Rating</b>	Average Code Value			
Goal consistency	1.8			
Strategy and bylaw consistency	2.2			
Aggregated consistency	2.0			

## Consistency with Goals of the Agreement

Results in Table 2-2 under *Goal Consistency* indicate that the percentages of funding that contributed either directly or indirectly to the Forum’s goals were modest, especially for the long term if the overall watershed restoration program outlined in Section 5 is to be successful:

- 52% and 48% for Goals 1 and 4, increased groundwater storage and augmented base flow;
- 63% for Goal 2, erosion reduction; and
- 15% for Goal 3, upland vegetation management.

In addition, a large percentage of projects (nearly 50%) *may* have contributed to Goals 1 and 4 (increased groundwater storage and augmented base flow), but this was not demonstrated in the project proposals or shown to have occurred in the final project reports. For those projects, such potential benefits conceivably occurred (or may occur in the future).

Seven of the 29 funded projects did not contribute directly or indirectly to at least one of the goals of the Agreement (Appendices B or C). Six of them (A1, A3, A9, A10, B3, B7) were research projects not directly tied to subsequent action. (Monitoring projects conducted by the Feather River CRM [A12 and B4] were tied to subsequent intervention design and thus were considered to contribute to

goals of the agreement and are not classified as research projects in this review.) Thus, although these six projects may eventually result in furtherance of the goals of the agreement, this is unclear at present. These particular research projects either produced interim or somewhat inconclusive results or, in the case of the Sierra Valley Groundwater Management District, led to improved understanding the aquifer characteristics but not to any groundwater management action to date. These projects involved 10% of total Forum funding.

The only non-research project that did not clearly further the goals of the agreement was project A20—a supplement of local funding for a replacement water treatment plant to treat water from Lake Davis for domestic use within the watershed. However, because the use of Lake Davis water for domestic supply may cause a reduction in the current level of groundwater withdrawal from the Humbug Valley alluvial groundwater basin (see project A20 in Appendix B), the project *may*, in fact, contribute to two of the goals of the Agreement (increased groundwater storage and augmented base flow), but this possibility was not analyzed and was not the rationale for the Forum’s funding of the project. Considering the goals of the agreement, the Forum probably should not have approved this as an A-Fund project.

## Consistency with Forum Strategies and Bylaws

Table 2-2 also characterizes portions of Forum funding that were consistent with 30 Forum strategies and three Forum bylaws. Consistency is widespread. The following conclusions are notable:

- Nearly 70% of project funding clearly involved intervention or intervention direct support.
- Only about 5% of the projects were funded solely by the Forum; the Forum funding was leveraged into additional funding for 95% of project funding.
- 90% of project funding will result in multiple resource benefits.
- About 29% of the project funding was for innovative projects.
- A relatively small amount of funding (11-15%) was directed at upland vegetation management.
- Landowners did not contribute funding for 31-41% of projects funded and did not participate in 8%–24% of projects funded.
- A significant portion of projects (26%) were not required to monitor project success.
- About 6%–7% of the project funding was for projects unlikely to attain performance criteria.

## Documentation of Project Implementation and Success

Table 2-2 also shows project results in terms of percentages of Forum funding that resulted in documentation of project implementation and project success. *Project implementation* refers to whether or not all of the project elements in the project scope of work of the funding agreements were completed, according to the Forum's files. *Project success* refers to whether or not the project objectives were met or appear to be being met, according to monitoring and performance criteria established in the funding agreements (if defined in the funding agreement), as documented in the Forum's files. In some cases, the Forum's files regarding project implementation and/or success were supplemented by information obtained through discussions with the project sponsors, but this supplementation did not entail researching other documents suggested by the sponsors where such research would have involved investigative tracking and analysis of referenced information that was not in readily interpretable form. The assumption used was that, for the most part, the information needed to address project implementation and success should be part of the Forum's files, as a result of document submittal by project sponsors and organized record-keeping by Plumas County.

The results shown in Table 2-2 differentiate between "yes", project implementation or success was substantiated, "no", it was not, or "na" (not applicable), meaning that the project has not yet been implemented, or, in the case of project success, that the project was implemented in the latter part of 2007, and initiation of monitoring will begin this year.

Table 2-2 shows that *documentation of project implementation* is fairly complete (for 73% of project funding, which involved 18 of the 29 funded projects), but is missing for 6 projects comprising 11% of Forum funding. For the latter, either all project elements were not completed, or the documentation of such has not been provided. Staff turnover at either the project sponsor or Plumas County may account for the latter. More detailed information about incomplete documentation is provided in Table 2-3 below. Also note that 5 projects, constituting 16% of Forum funding, have not yet been implemented or fully implemented.

Table 2-2 shows that *documentation of project success* has been lacking for a significant portion of the funded projects. For projects constituting only 12% of Forum funding (9 projects) is documentation of success complete. For about 34% of Forum funding (11 projects), such documentation is lacking. The nature of this problem is examined in Table 2-3 below. Also note that for 8 projects, constituting 51% of Forum funding, pending or recent project implementation has not yet allowed monitoring to be conducted (other than for pre-project conditions).

A detailed assessment of the nature of documentation of project implementation and success is provided in Table 2-3.



**Table 2-3.** Detailed Status of Documentation of Project Implementation and Success

Status	Number of Projects <sup>1</sup>	Percent of Forum Funding <sup>1</sup>
<b>Project Implementation</b>		
Yes: final report submitted	5	11%
Yes: project product, but no final report, submitted	3	32%
Yes: inferred from quarterly reports/invoices; no final report submitted	12	34%
No: project implementation not documented	2	2%
No: implementation of all project elements not documented	4	9%
na: project completion pending	4	15%
na: project completion pending but overdue	2	3%
<b>Project Success</b>		
Yes: monitoring report submitted	3	4%
Yes: successful project product, but no monitoring report submitted	2	1%
Yes: no monitoring report submitted, but applicable monitoring results apparently on sponsor's website <sup>2</sup>	3	8%
No: monitoring was proposed/required, but results not in Forum's files	6	8%
No: no monitoring was proposed/required	4	9%
No: no monitoring was proposed/required, but project success apparent	3	10%
na: project completion pending or very recent	7	50%
na: project completion pending but overdue	2	3%
<sup>1</sup> Totals do not equal total number of Forum-funded projects or 100% of Forum funding because a few projects were assigned more than one status category.		
<sup>2</sup> Applicable to the Feather River CRM. This program evaluation did not include an analysis of whether all of the monitoring results required by funding agreements are available on the website, but it appears that in general they are.		

## Lessons Learned

Each project evaluation matrix in Appendix B includes an entry for lessons learned from funding or conducting the project. They are summarized here as follows:

- **Establishing Funding Rationale.** Goals of the Agreement provide a sharp focus for guiding project funding. The Forum should make written findings documenting how each proposed project is expected to further the goals of the Agreement and is consistent with the Forum's strategies and other policies. The Forum should also establish a project record and funding agreement for all projects, even for projects sponsored by one of its members.
- **Needed Strategy Amendments.** Several amendments of the adopted strategy are needed to sharpen the program focus and ensure that funds are focused on intervention and essential support to address the goals of the Agreement directly (see Recommendations below).
- **Research Plan.** In collaboration with watershed stakeholders and a panel of technical experts, the Forum need to take an active role in formulating a research program by developing a research plan that identifies and prioritizes issues about restoration of the upper Feather River watershed, for which more information is needed.
- **Restoration Focus.** Pond-and-plug projects provide a very direct and effective means of meeting the goals of the Agreement. Monitoring has verified benefits of pond-and-plug technology: attenuated peak flow, extended duration of base flow, and lower summer stream temperatures (indicating that base flow is augmented by discharge of new meadow storage).
- **Stream Grade Control.** Grade control projects are also very effective means of meeting the goals of the Agreement.
- **Aspen Restoration.** Aspen restoration can meet all four goals of the Agreement and can be highly consistent with the Forum's strategies.
- **Upland Vegetation Management.** Appropriately, project funding includes intervention and awareness efforts to benefit upland systems, with correlative benefits to riparian/aquatic systems, contributing to attainment of the goals of the Agreement.
- **Road Removal.** Approving projects involving road obliteration in stream environments is counter to the Forum's adopted strategy of relying upon the U.S. Forest Service to fund its road decommissioning program and using Forum funds for other types of interventions but may be necessary for some projects because the U.S. Forest Service does not have sufficient internal funding for all needed road decommissioning.
- **Watershed Awareness.** Progress toward meeting the goals of the Agreement can be made indirectly by funding watershed awareness/education programs. Forum funding for proposed new outreach

programs can provide major catalysts for establishment of ongoing successful programs.

- **Project Development.** Considerable effort must be made to develop projects and assess their performance, which should be accommodated by Forum funding.
- **Project Effects Monitoring.** Limited monitoring of groundwater depths should continue to be a part of direct intervention projects since it is the variable most highly related to the goals of the Agreement and important to assessing predicted benefits of the restoration program (see Section 5).
- **Project Cost Sharing.** Project sponsors should contribute funding to projects that provide sponsor benefits beyond watershed restoration.
- **Landowner Contribution.** Landowner contribution and participation should be better defined and documented.
- **Landowner Outreach.** Projects that entail several private properties require considerable landowner coordination effort, which should be adequately scoped in proposals and funded.
- **Some Specific Project Sponsors**
  - **Sierra Valley Groundwater Management District.** Future funding directed at assisting the Sierra Valley Groundwater Management District (SVGMD) can now be focused on using the new hydrogeologic information (obtained with Forum funding) to effectively implement groundwater conservation during drought periods.
  - **Plumas Corporation.** In future Forum funding, the fire-safe council and the Quincy Library Group elements of Plumas Corporation's Upland Vegetation Management Program should be separated for accounting and program-effectiveness/review purposes since they contribute differently to the degree of implementation of Forum goals and policies.
  - **Resource Conservation District (RCD) Capacity Building.** Forum funding for capacity building of RCDs was successful in that the RCD programs and activities initiated/supported by the funding (seed money) have continued and expanded through acquisition of funding from other sources. Future Forum funding should be focused on helping the RCDs increase watershed-intervention expertise, fund landowner projects that demonstrably contribute to the Forum's goals, and facilitate landowner cooperation on multi-ownership projects.

## Consultant's Recommendations

The program evaluation described in this section reveals that Forum funding was generally effective at advancing the goals of the Agreement. Indeed, a significant amount was spent directly increasing groundwater storage and augmenting base flow via projects of the Feather River CRM and U.S. Forest Service. But as suggested in the analyses above, several improvements to the project funding program could improve the Forum's effectiveness:

- **Focus Future Forum Funding.** Funding of direct intervention should be increased so as to accelerate the restoration of basin storage capacity, augment base flow, and reduce bank erosion. Other funding levels should be increased as needed to ensure that local watershed education/awareness, landowner outreach, and fuel-reduction activities in the watershed are functionally compatible. Funding among project types according to Table 2-4 would be beneficial.
- **Document Funding Rationale.** The Forum make written findings documenting how each proposed project is expected to further the goals of the Agreement and is consistent with the Forum's strategies and other policies. The Forum should establish a project record and funding agreement for all projects, even for projects sponsored by one of its members.
- **Amend the Feather River Watershed Management Strategy.** The WMS should be amended in several ways:
  - The maps and list of priority watersheds should be reconciled since they are not in agreement (see maps on WMS page 12 and 18 and the list on WMS page 18); for example, Sulphur Creek is listed, but its watershed is not shown on the maps.
  - The tier-type descriptions of projects need to be improved, others added, and all prioritized. Tier types are needed for upland vegetation management projects, for example. The first-tier Type 1 description should be clarified to include pond-and-plug or, more generally, stream-profile restoration.
  - The strategy of "increasing upland vegetation cover" in upland areas of the watershed should be refocused to manage natural fuels and reduce the extent and severity of wildland fire while maintaining continuous vegetation cover.
  - Project selection criteria should be expanded to include a focus on each of the four goals of the Agreement: improved groundwater storage, augmented base flow, improved upland vegetation management, and reduced bank erosion

**Table 2-4.** Recommended Funding Levels

Type of Forum-Funded Project	Percent of Forum Project Funding	
	2003–2007	Recommended
Planning Expenditures	1.2	3
Stream Intervention Projects (includes planning and monitoring by interveners)	46.8	67
Upland Watershed Intervention	8.3	15
Research	10.1	5
Landowner Outreach (including landowner intervention support)	4.4	5
Public Outreach	3.0	5
Other	26.2	0

- **Allow Project Development Projects.** If the project is the development of direct intervention projects, the Forum’s funding agreement should require submittal of the resultant project proposal(s). A reimbursement reservation may be used for this purpose.
- **Ensure Goal-Attainment Focus of Proposals.** Proposals to the Forum should continue to be organized around the goals of the Agreement that are to be addressed. Proposed monitoring and evaluation (i.e., identification of monitoring indicators and evaluation criteria) should be designed to document the degree to which the goals of the Agreement will be advanced.
- **Revise Monitoring Provisions of RFPs.** Distinguish monitoring of project performance/success from monitoring of project implementation. Both types of “monitoring” are important but are confused in the project proposal process.
  - **Project Implementation Verification.** Project proposals should continue to specify project implementation milestones and performance criteria for them, and the Forum should establish a tracking system to ensure that all elements of the funded project are implemented.
  - **Project Success Monitoring.** Proposal guidelines should be revised to ensure that proposed project performance monitoring is focused on performance indicators that measure success in advancing the four goals of the Agreement.
- **Verify Post-Project Land Management Plans.** The Forum should require and fund development and submittal of post-project land management plans or agreements so that it can ensure that a long-term benefit at each site is likely. A reimbursement reservation may be used to ensure plan completion.

- **Establish a Monitoring Plan.** A scientific panel of the Forum TAC should be convened to establish a monitoring plan for direct intervention projects funded by the Forum. The plan should identify issues to be addressed through monitoring, feasible monitoring indicators, and types of monitoring-data analyses to be conducted. The Forum should provide funding to the Feather River CRM, and perhaps other organizations if coordinated with the CRM, to conduct the monitoring work. (See also recommendation for a monitoring plan in Section 5.)
- **Establish a Research Plan.** A scientific panel of the Forum TAC should be convened to establish a research plan germane to the goals of the Agreement to guide funding of research proposals. Rather than responding only to proposals, the Forum should proactively establish scientific issues regarding the restoration program that cannot be addressed through project monitoring alone but require other scientific analysis. (See also recommendation for a research plan in Section 5.)
- **Define Leveraging.** In achieving the strategy of leveraging other funding with Forum funds, the Forum should consider construing this as applicable when Forum funds are used to restore a river segment adjacent to a segment restored with funds from other sources.

## Section 3

# Uses of Forum B Funds

## Introduction

This section provides an inventory of B Funds (minority funds), examines the extent to which the expenditure of these funds advanced the goals of the Agreement and policies of the Forum, evaluates the success of local-organization capacity building funded by the Forum, and presents recommendations for future uses of B Funds.

## Expenditures of B Funds to Meet Forum's Needs

B-Funds constituted slightly less than 50% of total Forum funding (Table 1-4). B Funds may be spent discretionarily by Plumas County, and spending need not be for watershed purposes as long as it is for flood-control and water conservation district purposes and due consideration is given to the needs of the Forum.

Plumas County gave consideration to the needs of the Forum by agreeing to fund all of the B-Fund projects described in Section 2 out of its discretionary share. This amounted to \$410,466, which was directed at upland vegetation management, RCD capacity building, public education and outreach, additional project development for A-Fund types of projects, and research. The Forum, together with Plumas County, approved each of the nine projects funded from the B Fund. B-Fund projects, like A-Fund projects, are intended to contribute directly or indirectly to watershed restoration and advance the goals of the Agreement.

Plumas County's truly independent expenditures—totaling \$1.49 million—were less than 50% of total Forum funding (\$4.15 million); in fact, they were 36% of total Forum funding (Tables 1-2 and 1-4). Most of these funds were spent on water-related issues (Table 1-2) but not necessarily on efforts to advance the goals of the Agreement. Two of the expenditures did, however, and several of them may indirectly contribute to reaching goals of the Agreement, as evidenced by the consistency assessment in Table 3-1. These funds were spent for a variety of purposes, as shown, including proceedings involving streamflow requirements for the major streams in the upper Feather River watershed, developing an Integrated Regional Water Management plan and program, supporting upland

**Table 3-1.** Relation to Agreement Goals and Forum Strategies of the Independent Expenditures by Plumas County

Recipent	Purpose of Expenditure	Amount	Percent of Total	Evaluation Code*		
				Goal 1/4	Goal 2	Goal 3
				Groundwater Storage and Base Flow Augmented	Reduced Sediment	Improved Upland Vegetation
1 County of Plumas	Reimburse county general fund for loans to flood control district.	\$452,000	30.3%	0	0	0
2 Ecosystem Sciences Foundation	Development of upper Feather River Integrated Regional Water Management plan.	\$100,035	6.7%	2	2	2
3 Maidu Cultural and Development Group	Education and outreach to disadvantaged communities for development and implementation of upper Feather River Integrated Regional Water Management program.	\$68,128	4.6%	2	2	2
4 Grizzly Lake Resort Improvement District	Water tank and well improvements for district awaiting return to surface water supply from Lake Davis.	\$100,000	6.7%	0	0	0
5 Indian Valley Community Services District	Emergency well drilling for Greenville water supply.	\$50,000	3.4%	0	0	0
6 Consultant – MWH Americas	Consultant for relicensing of FERC Project 2105 (Lake Almanor).	\$88,187	5.9%	1	1	1
7 Consultant – Tom Hunter	Consultant for relicensing of FERC Projects 2105 (Lake Almanor) and 2107 (Poe).	\$1,130	0.1%	1	1	1
8 Consultant – John Mills	Consultant for Integrated Regional Water Management program, coordination with Mountain Counties region, and State Water Plan.	\$177,083	11.9%	1	1	1



Table 3-1. Continued

Recipient	Purpose of Expenditure	Amount	Percent of Total	Evaluation Code*			
				Goal 1/4	Goal 2	Goal 3	
				Groundwater Storage and Base Flow Augmented	Reduced Sediment	Improved Upland Vegetation	
9	Consultant – Leah Wills	Consultant for Integrated Regional Water Management program, FERC relicensing, forest management and coordination with U.S. Forest Service.	\$178,058	11.9%	1	1	1
10	Attorney – Michael Jackson	Attorney for implementation of Quincy Library Group pilot project, FERC relicensing, and Integrated Regional Water Management program.	\$119,697	8.0%	1	1	1
11	Consultant Expenses, 03–04 Consolidated	MWH Americas (FERC 2105), CH2M Hill (Almanor), Leah Wills (misc.).	\$81,000	5.4%	1	1	1
12	Advocaton, Inc.	Monitor state legislative activity.	\$12,684	0.9%	1	1	1
13	Flood Control District	Travel and per diem.	\$22,008	1.5%	1	1	1
14	Plumas County Counsel	Support for the Plumas Watershed Forum and for the Plumas County Flood Control District.	\$32,325	2.2%	1	1	1
15	Sierra Institute	Completion of the Lake Almanor watershed assessment.	\$9,816	0.7%	1	1	1
TOTAL			\$1,492,151				
			3	2	1	0	
Percent of total project funding by Evaluation Code			0%	11%	49%	40%	← Applicable to all goals.

\* Evaluation Codes: 3 – direct goal contribution, 2 – demonstrated indirect contribution, 1 – indeterminate contribution, or 0 – no contribution.

vegetation management programs, and reaching out to an economically disadvantaged group.

According to the Agreement, any disagreement between members of the Forum, or between Plumas and the Forum, with respect to appropriate uses of A and B Funds should be resolved by retention of a third-party, neutral expert who is reasonably acceptable to all members of the Forum. During the initial funding period, no such disagreements were encountered.

## Success of Capacity Building in the Watershed Organizations

The Forum allocated funding to capacity building and the functioning of local organizations in the upper Feather River watershed that were best able to conduct the activities needed to advance the goals of the Agreement.

The Feather River CRM has been planning, constructing, and monitoring watershed restoration projects in the watershed for 23 years. The Forum funded its restoration projects (including monitoring) in the amount of \$779,000 (19% of Forum funding). It also funded a public outreach program directed by the CRM. These projects helped the CRM to increase its capacity to conduct watershed restoration and monitoring and publicize the importance of the restoration work.

Public awareness of watershed is a key element of a successful restoration program. Public awareness begins with children, and the Forum funded development of a year-long 6<sup>th</sup>-grade course in watershed education/awareness in Plumas County schools. The course continues today, having subsequently secured funding from other sources; it is a new, successful component of the county's instructional program. This is another instance of capacity building.

The RCDs in Plumas County—Feather River and Sierra Valley—are particularly important to the watershed restoration program, providing a linkage between government programs and landowners. The scale of the watershed restoration program envisioned in Section 5 cannot possibly proceed without the cooperation of many property owners. The RCDs provide the necessary outreach. The RCDs also attract funding from a variety of sources to help landowners conduct resource management projects that, in general, benefit the condition of the watershed. The Forum's funding allowed the Sierra Valley RCD to recover from inactivity and sponsor landowner outreach and resource improvement projects. It is now carrying on with funding from other sources. The Feather River RCD used Forum funding for direct intervention projects and was empowered to seek out and obtain funding from other sources, although less successfully than the Sierra Valley RCD.

One of the four goals of the Agreement calls for improved upland vegetation management. Improvements to benefit the watershed are focused on reducing

the susceptibility of the watershed's pine forests to soil-destroying wildland fire. The Forum granted funding to the Plumas Corporation to build capacity and administer fuel management programs on two fronts: the Plumas County Fire Safe Council, taking action on private lands, and the Quincy Library Group, supporting the U.S. Forest Service in conducting the vegetation management program specified in the Herger-Feinstein Quincy Library Group Forest Recovery Act. As with the other capacity-building projects, this project allowed the sponsor to establish an appropriate level of program management and conduct the work necessary to obtain fuel-treatment funding from other sources.

## Consultant's Recommendations for Future Use of B Funds

The primary recommendation of this review is that more funding should be provided to increase the rate of direct watershed intervention, which advances the goals of the Agreement. Although this recommendation lies primarily with A-Fund expenditures, discussed in the preceding section (Section 2), the thrust of the recommendation carries over to the B Funds as well:

- **Redefine Majority/Minority Funds.** The Agreement requires that the “majority” of the funds shall be spent for watershed restoration purposes. Rather than the 50.1% to 49.9% split currently assumed, this provision should be interpreted to mean that at least 60% of the funds should be spent on direct watershed restoration and support of watershed restoration, with a target of 75%. The recommended minimum is about the actual amount for the 4-year funding period (61.5%) if administrative funds are included. The higher target is important if alluvial basin storage is to be increased and base flow augmented, as described in Section 5 of this report. This would leave 25%–40% of Forum funding usable by Plumas County at its discretion.
- **Continue Use of a Portion of B Funds for Plumas County Flood Control and Water Conservation District Purposes at the County's Sole Discretion.** Plumas County should be able to continue using a portion of the B Funds for district-related purposes at its discretion, limiting such funding to water resource protection, watershed restoration, and existing public health and safety issues related to water resources. Of the independent expenditures to date (Table 3-1), repayment of loans to the district, some of the activities of the district's consultants, and the monitoring of state legislative activity may not have met this suggested criteria fully, but review of Table 3-1 clearly indicates that Plumas County limited use of its discretionary funds to projects related to the purposes of the Plumas County Flood Control and Water Conservation District. Accordingly, the Forum does not have an interest in the specific uses of the discretionary funds for district purposes once its needs have been given due consideration (such as per the first recommendation above).

- **Accelerate Direct Intervention.** The most effective way for the county to use B Funds to further its long-term interests is to help accelerate the direct watershed intervention program led by the Feather River CRM and the U.S. Forest Service so that a substantial level of watershed-wide restoration is attained, as described in Section 5. To this end, Plumas County should strive to commit one-half of its discretionary funds to B-Fund projects that the Forum approves to advance the goals of the Agreement.
- **Reassess Local Organization Capacity When Funding Becomes Available.** If new funding becomes available, the Forum should determine at that time the capacity of the CRM, Plumas Corporation, the Feather River and Sierra Valley RCDs, and the Plumas Unified School District to continue to support watershed restoration. It may be that additional capacity building of the RCDs and schools may not be needed since the organizations successfully leveraged Forum funding to attract other funding. The CRM capacity would need to be increased commensurate with an increase in restoration activity; this capacity increase might be met through more project-development funding. Capacity of the Plumas Corporation to continue to improve upland vegetation management may need to be sustained with Forum funding if other funding for administrative purposes has not been acquired.
- **Improve Local Practices Affecting Water Quality.** New uses for discretionary funds should involve improving local government and public utility best management practices for water resource protection in furtherance of the water quality goal of the Agreement.

# Review of Program Administration

## Introduction

This section provides a review of the administration of the Plumas Watershed Forum's funding activities. The results here build on the results of Sections 1 and 2 but focus upon how funds are administered rather than on goals and policies of the Agreement/Forum.

After the initial funding period, the Forum realized that an *administrative policy* needed to be established to guide its funding activities. The policy formulated in October 2005 includes the following provisions (<http://www.countyofplumas.com/publicworks/watershed/policy/Project%20Administration%20Policy.pdf>):

- **Project Funding Agreement.** A general form for project funding agreements was established. It requires inclusion of a (1) project description in the form a scope of work and schedule; (2) funding provisions including (a) total amount and provisions requiring that (b) invoices for work completed shall include progress reports identifying tasks completed and related expenditures, and (c) reallocation of funds from one budget line-item to another, including expenditure of any designated contingency funds requires approved of the County; (3) a line-item budget; (4) a provision that if the project is completed below budget and received additional funding from another source(s), Forum and other funding will be diminished on a proportionate basis; (5) requirements that annual progress reports and a final report must be submitted, to include information described below in the *Project Evaluation Process* section; and (6) miscellaneous legal contractual provisions.
- **Design and Permit Review.** A provision was established that if a funded project includes a design phase, that Plumas County must review and approve design plans prior to construction. Another provision requires that any needed permits be reviewed by the County (but does not indicate whether this requires permit applications to other agencies to be reviewed, or simply that copies of issued permits be provided to the County).
- **Project Progress and Payment of Invoices.** This provision reiterates some of the elements of the first provision above, and in addition requires that prior to final payment that Plumas County verify that all deliverables have been received. It also provides that the County will inspect fieldwork upon completion of construction phases of projects.

## Size of Administrative Expenditures

Table 1-3 in Section 1 presents an annual accounting of expenditures for administration of the Forum's funding program, summarized here in Table 4-1.

**Table 4-1.** Plumas Watershed Forum, Program Administration Costs by Fund

	A Fund	B Fund	Total
Total	\$204,199	\$107,675	\$311,874
Percent of Fund Expenditures	9.6%	5.3%	7.5%

As shown, administrative costs were a small, reasonable fraction of the funding. Administrative costs for the A Fund were about twice the costs for the B Fund. Forum TAC representatives from DWR and Plumas County could not ascertain particular reasons for this differential in rates of administrative costs between the two funds.

The relatively small administrative costs, especially for the B Fund, suggest that more project planning and project review programs could be adopted by the Forum without resulting in excessive administrative costs. Additional Forum efforts recommended in this report include development of a research plan, a monitoring plan, and a project evaluation process.

## Defining Majority/Minority Uses of Funds

The Agreement text states (Section IV, A.3, Use of Funds): "*Funding of Watershed Programs.* Plumas [recipient of funding from DWR] shall apply a majority of all funds received each year ... to Watershed Programs." Plumas has committed more than 50% of funding to watershed programs intended to advance the goals of the Agreement. Section 3 describes how a considerable portion of the B Funds (minority funds), as well as A Funds, are used for watershed programs.

Allocating projects to A Funding or B Funding is an administrative function of the Forum. As noted in Section 2, A-Fund projects tended to be watershed intervention actions, and B-Fund projects tended to be intervention support, although this distinction was not always consistent. Written criteria for making this distinction do not exist, but DWR and Plumas County staff concur with the intervention-versus-support distinction. Functionally, the distinction seems to be based on criteria that specify that A-Fund projects will be considered mandatory watershed programs, and B-Fund projects will be considered additional watershed programs that Plumas County will provide through a share of its discretionary spending as a result of due consideration of the needs of the Forum.

## Proposal Evaluation Process

The Forum established a process for evaluating proposals for project funding as part of its adoption of the Feather River Watershed Management Strategy. On page 23, it lists 14 criteria to be scored, weighted, and combined into a total score. These criteria include some of the criteria in the project evaluation matrices used in this program review (Appendix B), but interestingly, the goals of the Agreement and many of the Forum's strategies are not among them. The criteria are in some ways simply a checklist of proposal requirements rather than evaluation criteria. Thus, the existing evaluation criteria are not an adequate tool for effectuating implementation of adopted planning policy for watershed restoration. This may be the reason why the Forum TAC chose not to develop formal project ratings using these criteria. The criteria were initially used by individual TAC members, but an integrated final score was not established for any of the projects.

In terms of adopted strategies, Feather River Watershed Management Strategy project-rating criteria award points or projects defined by tier/type project categories. However, as discussed in Section 2, those categories are too narrowly drawn and do not focus on goals of the Agreement. The criteria also include a "Land/Water Management Plan," but the meaning of this is unclear. The criteria also refer to "Sustainability," "Establishing Baseline Conditions," and other undefined terminology. For the proposal evaluation process to be used, with results formally recorded, the description of the evaluation criteria and process in the Feather River Watershed Management Strategy needs to be improved. Use of such a system would greatly enhance the transparency and objectivity of the funding process.

## Project Evaluation Process

The Forum does not have a thorough project-success review program in place. As noted in the *Introduction* section above, after the first few projects the Forum's funding agreements have included a provision requiring the submittal of a final report containing the following information:

- the scope of work that actually occurred;
- assessment of project progress in meeting project-established project objectives;
- photographs of any physical work;
- delivery of required data, reports, plans, and other items required in the agreement; and
- final statement of funds expended, including total project funds from all sources.

As noted in Section 2, a final report containing information about these five items exists for only 20% of the projects (in terms of total funded amount).

During the initial funding period, the process of reimbursing project sponsors up to funding agreement limits was based on a review of invoices to determine if each of the items in the scope of work and project agreement, in general, were accomplished. If so, payment was issued. However, assurance of project implementation does not address project progress in meeting objectives. Moreover, the final statement of cost sharing, of interest to the Forum, and other submittals of interest to the Forum (e.g., proposals developed with Forum funding, project monitoring results, post-project landowner management plans, etc.) are generally absent from the Forum's files. Although required by Forum administration policy, it appears that Plumas County did not impose a system of reserving payment on a portion of the funded amount until the final progress report with the specified information was received.

## Annual Funding Reviews

The Forum's bylaws (Section 9) require it to provide an annual review of Plumas County's financial reporting:

The Forum shall, at its annual October meeting, review the prior fiscal year's income and expenditures, as prepared by the Plumas County Auditor-Controller for the Plumas Flood Control and Water Conservation District, and the district shall hold, utilize, and carry forward the funds as set forth in the Settlement text.

The Forum's three annual reports indicate that the Forum provided this annual review during noticed public meetings on October 26, 2004; October 25, 2005; and October 24, 2006. It was at these meetings that discussions about allocating projects to the A Fund or B Fund occurred (see *Defining Majority/Minority Uses of Funds* section above).

## Annual Progress Reports

Forum bylaws, Section 10, require progress reports to be issued annually by the Forum:

The Forum shall direct Plumas' preparation of an annual progress report in layperson's language, with Technical Committee review, and with technical appendices as necessary, in order to assist public education and awareness. The report should be finalized by the annual October meeting.

Plumas County has prepared three annual progress reports, two approved by the Forum and the third report pending approval: January 11, 2006 (fiscal year [FY] 2002–2003 and FY 2003–2004); May 22, 2007 (FY 2005–2006); and October 23, 2007 (FY 2006–2007). No FY 2004–2005 progress report exists.

These reports, which have gradually improved over time, are well written and in layperson's language. The TAC reviews and modifies them as needed during its administrative reviews. The reports include a summary of annual activities, a



discussion of the relationship of Forum funding to integrated regional water management planning, financial reports, Forum meeting agendas and minutes, and project reports. The Forum's annual reports could be improved by adding a lead section that analyzes to what degree annual funding advanced the goals of the Agreement.

## Consultant's Recommendations

- **Focus Annual Reports on Goal Advancement.** Improve the Forum's annual reports and thereby focus the achievements of the Forum by adding a section that analyzes how annual funding advanced the goals of the Agreement. Quantify results to the degree possible, using parameters described in Section 5 of this report.
- **Establish Guidelines or Fund Allocations.** Definitions should be articulated about the types of projects that are A-Fund expenditures, B-Fund expenditures approved by the Forum, or independent B-Fund expenditures by Plumas County. Guidelines should be established to help determine if an expenditure from the B Fund should be approved by the Forum or designated as a truly independent expenditure of Plumas County.
- **Use a Proposal Evaluation Process Similar to but Improved Upon the Process Specified in the Feather River Watershed Management Strategy.** The adopted Feather River Watershed Management Strategy appears to call for an objective proposal scoring system, which would inject a high level of transparency and objectivity into the funding process. However, scoring, using specified scoring system, does not produce a funding decision. The process should also involve identifying and documenting, in addition to criteria-based scores, any special circumstances or special considerations that would justify overriding the scoring results. This approach would set forth objective data and explain in writing the subjective judgments that confirmed or overrode the objective data.
- **Establish Reimbursement Reservation.** The Forum should withhold a certain percentage of project funding (e.g., 5%–10%, depending upon the funded amount) until the required final project report and other required documents are submitted by the project sponsor. Where projects are planned for implementation for more than a 1-year period, similar reservations should be made to ensure submittal of required annual reports.
- **Improve Project Implementation Tracking.** Forum files in the Plumas County courthouse should be better organized and more complete. A central tracking system should be established that lists funded projects, funded amounts, and approval dates and indicates whether project funding agreements have been executed, whether annual and final project reports have been submitted, the status of invoicing and payments; and whether reserved funds (see item above) have been released.
- **Improve Project Success Tracking.** Final invoices should not be paid unless required annual and final reports and ancillary documents have been submitted and compared to provisions of the funding agreement. These

reports should each contain all of the elements in Standard Contract Section 16 – Annual Progress and Final Report, including the five items listed in the Project Evaluation Process section above.

- **Separate Files for Successive Grants.** Separate project files should be maintained for each separate Forum-approved project, i.e., documentation of subsequent funding for continuation of earlier projects should not be combined with original project documents.
- **Separate Projects.** Disparate projects conducted by a particular sponsor should not be combined in proposals to the Forum or in Forum funding agreements (e.g., Plumas Corporation's administrative support of the Plumas County Fire Safe Council and the Quincy Library Group should be separated into distinct proposals and funding agreements) since they are separate activities and meet the goals of the Agreement differently.

## Assessment of Program Effectiveness

This section discusses the benefits of the ongoing watershed restoration work that has been conducted in the upper Feather River watershed since the mid-1980s, especially benefits for the State Water Project, and the prognosis for future benefits to be realized.

### Need for Watershed Restoration

The scale of potential watershed restoration in the watershed is great, and efforts to date have only just begun to reverse the extensive degradation of the region's water resources. As described more fully in a series of studies,<sup>1</sup> large-scale instability of the region's soils and streams was induced in the 1880s, primarily by construction of logging railroads, intensive grazing livestock in mountain meadows and adjoining uplands, and unauthorized burning of the floodplains and neighboring forests for forage production. Additional watershed instability was induced by road construction, high-grade logging, and other human activities. These disturbances led to initiation of floodplain drainage courses and elevated rates of runoff and weakened streambanks due to loss of vegetative cover, leading to drainage channel formation and channel instability in the form of channel downcutting and, subsequent to 1940, channel widening.

The network of incised channels that spread throughout the alluvium-filled intermontane basins today act as a drain for the near-surface sediments, preventing them from effectively storing winter precipitation or supporting vigorous, channel-stabilizing riparian vegetation. As a result of the loss of near-surface groundwater storage capacity, a significant shift in the timing of runoff to the Feather River at Lake Oroville Reservoir has occurred, diminishing streamflow during the dry season and increasing rapid runoff during winter storms. As a result of diminished riparian vegetation and higher peak flows, the alluvial aquifers continue to be eroded, and heavy sediment loads continue to enter downstream power reservoirs and Oroville Reservoir. Wildland fire in untreated upland vegetation continues to contribute episodically but substantially to the sediment load. These conditions have adverse effects on montane ecosystems because changes in ground cover and vegetation type, as well as increased

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<sup>1</sup> U.S. Soil Conservation Service 1989, Benoit et al. 1989, Plumas Corporation 1992, Lindquist 1999, Lindquist and Wilcox 2000, Wilcox 2005, all available from <http://www.feather-river-crm.org/publications.htm> or by contacting the Feather River CRM, Quincy, CA.

intermittency of some streamflow, translate into reductions in habitat suitability and species diversity.

Some government programs in past decades exacerbated the degradation episode. With the purpose of improving agricultural productivity of the meadowlands, comprising the inter-montane alluvial basins, efforts were made to reduce seasonal flooding. Projects were undertaken to lower downstream grade controls (i.e., channel bedrock) and remove riparian vegetation to drain floodwaters more rapidly from meadow floodplains upstream. Unfortunately, these projects accelerated the process of stream downcutting and widening and thereby diminished the production of meadow forage used by the region's ranching/farming communities.

As environmental consciousness and knowledge became ascendant in the 1970s, the U.S. Forest Service, the U.S. Soil Conservation Service (now the U.S. Natural Resource Conservation Service), and Pacific Gas & Electric (PG&E) began to understand the nature and societal price of the watershed degradation episode. Interest in watershed restoration among residents of the watershed grew rapidly, and organizations such as the U.S. Forest Service and the Feather River CRM—a consortium of local, state, and federal interests—began studying the problem and undertaking direct action to address it. Watershed consciousness grew through efforts of the CRM, teachers in the public school system, landowners and their organizations, local government, and state and federal agencies charged with stewardship of the region's natural resources. Today, a robust, diverse, and highly active restoration program to counter the degradation episode is ongoing in the watershed, bringing benefits to local, state, and federal publics.

The need for the watershed restoration program has recently grown substantially, as global warming is predicted to reduce the Sierra Nevada snowpack that stores winter precipitation for slow release in the early dry season. Enhanced water storage in the floodplains of the upper Feather River watershed can offset some of the reduction of snow storage.

Benefits of watershed restoration, described in this section of the program evaluation, have been divided into three categories:

- water supply,
- water quality, and
- improved watershed awareness/ethics, with implications for both water supply and water quality.

As requested by the Forum, benefits to water supply are given the most in-depth evaluation.

## Water Supply Benefits

Two of the Forum's four goals call for enhanced groundwater storage in intermontane alluvial basins in the upper Feather River watershed and a resultant increase in dry-season streamflow. Such augmented base flow can conceivably be used by the State Water Project at Oroville Reservoir for water supply or enhanced instream environmental benefits through increased instream releases. Both uses have social utility and monetary value.

The base flow enhancement opportunity results from a unique geologic fact: The upper Feather River watershed is part of the Basin and Range province that drains westward across the northern end of the Sierra Nevada to the Sacramento Valley. The basins that alternate with ranges across the watershed are filled with large volumes of unconsolidated (non-indurated) alluvium, which store large quantities of groundwater. The watershed, which receives considerable precipitation because of its northern latitude and the reduced rain-shadow effect of the lower crest elevations at the north end of the range, drains toward the Sacramento Valley and into Oroville Reservoir, where waters can be put to beneficial use throughout the State of California.

Before the Forum was created, sponsors of watershed restoration projects in the Feather River watershed (e.g., the Feather River CRM) began their efforts with a focus on what would become the Forum's third goal—improved bank protection and reduced sediment yield—which reduces the rate of filling of downstream power reservoirs and, ultimately, Oroville Reservoir. Power production interests (i.e., PG&E) provided much of the initial financial support of the CRM.

Reductions in reservoir filling translate into water supply, flood management, and power production benefits since more reservoir operational storage volume remains available. The benefits of upper Feather River watershed restoration on sediment yield to date, as well as ultimate benefits once the restoration program is substantially complete, are considered by most investigators to be substantial.

This section, however, focuses on the water-supply benefits of reversing stream incision of the watershed's groundwater basins to increase alluvial basin storage and delay water release into the dry season when flood storage in Oroville Reservoir is no longer reserved. This augmented dry-season flow can potentially be used by the State Water Project and valued at the marginal price of new water supply.

It should be noted that this assessment of program effectiveness and benefits of augmented base flow does not address implications of water rights law. One recommendation at the close of this section is that such a study be commissioned by the Forum.

## Strategy: Reversing Stream Incision

Beginning in 1992, the Feather River CRM expanded its focus to include reversing stream incision (entrenchment) and restoring stream elevations in the inter-montane alluvial groundwater basins. Entrenched stream systems dominate all of the basins. At least 190,000 acre-feet (AF), or 190 thousand acre-feet (TAF), of seasonal groundwater storage volume were lost to incision based on the estimate described below. Without this storage, this volume is delivered to Oroville Reservoir during the rainy season when flood storage and releases to the ocean dominate water supply management and make it difficult to use the early-arriving water.

The Feather River CRM has developed a restoration approach—*pond and plug*—that obliterates the stream incision and restores the stream channel to the surfaces of the alluvial aquifer. The U.S. Forest Service has developed techniques to use road crossings to restore higher water surface elevations. Groundwater storage increases in relation to the increased elevation of the bottom of the channel and proportionate to the width of the alluvial body through which the stream passes. This increase in groundwater storage volume from CRM projects has been substantial to date, but a large potential increase remains. Once incision is reversed, the benefits of increased streamflow during the dry season are expected to last in perpetuity if modern land management principles prevail over the long term.

The program to reverse the effects of the era of stream incision can result in important water-supply benefits and reduced sediment-handling costs that benefit citizens statewide. Moreover, ancillary effects are also of great value, including increased riparian habitat, improved fish habitat, and increased forage for deer and livestock.

## Approach and Basis for Estimating Water-Supply Benefits

To estimate water-supply benefits of the restoration program, potential physical changes in shallow groundwater storage volume must first be estimated. Most commonly, this is directly related to the resulting rise in channel-bottom elevation. It is also governed by the specific yield (effective porosity) of the near-surface alluvium. Then, because raising water surface elevations induces greater plant cover, increases in evapotranspiration (ET) must be deducted from the volume increase. The effect of the new storage volume on storing winter runoff and enhancing streamflow in the dry season must then be estimated. Finally, the temporal flow of costs and benefits must be set forth, and the economic efficiency arrayed for a most-likely scenario and for other arguably reasonable scenarios. These steps are described in the subsection *Potential Water-Supply Benefits*, below. The scientific basis for each of these steps is described in this subsection.

**Estimating Basin Storage Volume Lost to Incision.** Estimates of average prevalent maximum incision depths for each alluvial basin in the watershed were based on U.S. Soil Conservation Service (1989) estimates as adjusted by the Feather River CRM's field hydrologist and stream restoration leader. These estimates generally apply to the incision in the central portion of each alluvial basin. They are used to estimate volume drained by incision by multiplying these maximum depths times the basin area and applying a shape factor of 0.50. The shape factor results from assuming that the resultant lowering of the water table forms a wedge that extends from the incised stream to the edge of the basin but diminishes proportionately to the thinning of the alluvium to zero lowering at the basin edge. (In cross section this is a very flat triangle on each side of the stream, the area of which is one-half times the valley half-width times the maximum depth.)

Estimates of the sizes of the 11 alluvial basins in the watershed were made by DWR in Bulletin 118 (California Department of Water Resources 2003).

**Estimating Specific Yield.** Specific yield is the percentage of the alluvial volume that can be filled with water and, subsequently, drained by gravity. Porosities and the specific yield of sediments have been extensively studied over many years, primarily based on texture. Estimating methods vary and are difficult to apply. Results vary widely within and between alluvial bodies, even for the same textural classes. Considerable uncertainty is therefore involved in estimating average specific yield.

*Silty fine sand* is the most prevalent texture of the alluvial deposits in the watershed, with frequent gravel and cobble layers and less-frequent fine-grained (clayey) inclusions. Churchill (1988) refers to most of these soils as *loamy sands* and *sandy loams*. Recent studies in the watershed have documented this dominant sandy texture (preponderance of *silty sand*, *sandy gravel*, *sand*, and *sand-gravel mixes* [Cornwell and Brown 2008] and *clayey sand* [DWR 2002]). The dominant sandy texture suggests a relatively large specific yield.

Davis and DeWiest (1966) estimate specific-yield values of 38%–46% for sands, whereas the U.S. Geological Survey (USGS) (1967) gives a range of 21%–27%. The difference may be because Davis and DeWiest specifically address non-indurated sediments, which are present in the Feather River alluvial basins, whereas USGS refers to “rock textures” and appears to combine data from both indurated and non-indurated materials (indurated having correspondingly less porosity), which often comprise pumped groundwater aquifers. USGS reviewed a large number of scientific papers discussing specific yield estimations, some of which are more in line with the values of Davis and DeWiest.

In a study recently conducted at a meadow restoration site in the watershed along Clark's Creek, a tributary to Last Chance Creek (Cornwell and Brown 2008), an average porosity of 35% was estimated from a suite of field samples but was used in subsequent calculations as if corresponded to specific yield, which is also known as *effective porosity*. This possible inconsistency needs to be rectified.

A specific yield of one third, or 33%, midway between the DeWiest and Davis (1966) and USGS (1967) values, is used in this section as the most likely value for purposes of estimating groundwater storage benefits for this program review. However, effects on calculated results are assessed for a range in specific yield values from 20% to 33%.

**Accommodating Evapotranspiration Losses.** Watershed investigators have noted that restoring groundwater elevations to nearer the ground surfaces induces additional vegetative growth and thereby increases ET losses of groundwater to the atmosphere, making some of the enhanced storage unavailable for streamflow enhancement. Thus, in converting storage enhancement to streamflow enhancement, it is necessary to first depreciate gross storage volume for annual ET losses.

A recent study in the upper Feather River watershed of ET losses that used spectral imagery and was calibrated to ground conditions (Loheide and Gorelick 2005) provides a good estimate of the difference in growing-season ET losses between fully degraded (incised) meadows and fully restored meadows. This work was also conducted in the Last Chance Creek watershed. It showed that daily ET losses in June were 3 millimeters per day from a fully degraded site, and 5 millimeters per day from a fully restored site. Using the distribution pattern of ET throughout the year (large ET in June, minor ET in fall and winter) from the California Irrigation Management Information System (CIMIS) web site (<http://www.cimis.water.ca.gov/cimis/welcome.jsp>) and data from Buntingville on the Modoc Plateau near the upper Feather River watershed, these values were converted to annual values. The result is that restoration induces an estimated 1.7 feet of ET loss annually between a fully degraded site and a fully restored site.

The fully degraded site used in the study had incision of up to 15 feet; for this assessment, sites with 10 feet or more of incision were considered to be fully degraded. Lesser incised sites would induce proportionately lesser ET increases when restored. The result of this assumption is that 0.17 feet of each new foot of storage is lost to new ET. In other words, 83% of the new storage is available for delayed streamflow augmentation.

**Converting New Storage to New Streamflow.** Stream-groundwater interactions have been a subject of considerable study over the past 20 years. The water-supply issue for a program that restores near-surface groundwater storage capacity in the Feather River watershed is how the increased volume of storage translates to increased streamflow downstream during the dry season. A study of this relationship in the upper Feather River watershed was recently conducted by Kavvas et al. (2005) using the stream-profile restoration completed by the Feather River CRM in the Last Chance subwatershed. Their results, based on a well-established method of modeling groundwater flow toward a discharge point and examining actual streamflow data for a wet year, indicate that streamflow enhancement in the dry season (i.e., June–October) downstream of the project area is essentially equal to the volume of new seasonal storage created by the project. (The modeled flow enhancement was 2,258 AF for a project that created 2,265 AF of new storage capacity.) That is to say, the ratio of dry-season



flow enhancement to created storage was shown to be 1.00. This modeling took into account actual floodplain geometry and hydraulic properties of floodplain materials.

The implication is that groundwater storage created by reversing stream incision in the upper Feather River watershed, being shallow alluvial storage in a mesic environment, is likely to be used annually by the floodplain alluvial systems to defer runoff from the wet to the dry season. The source of waters recharging the new aquifer storage include streamflow infiltration through streambanks, shallow subsurface inflow from adjoining uplands (which is apparently significant; see Bohn 2007), and direct precipitation on the floodplain.

**Determining Economic Efficiency.** The economic efficiency of creating new shallow storage in alluvial aquifers is determined by estimating restoration costs, using the extensive experience of the Feather River CRM, and estimating the value of the new volume of streamflow during the dry season.

A project would be considered economically efficient if the ratio of monetary benefits to costs is 1.00 or greater. However, prior to computing this benefit-cost ratio (BCR), all future costs and future benefits are discounted to their present values. For practical purposes, cost-benefit analysis can ignore inflation. The choice of an appropriate discount rate is crucial, however, and requires several considerations (National Center for Environmental Decision-Making Research 2008).

First, society, in making public investments, should use a riskless discount rate, reflecting an assumption that the government will not default on its debts. Second, if a project displaces consumption by undertaking the public investment, then the appropriate discount rate is the consumer's after-tax time preference, a relatively low rate of return. If a project displaces private investment, the investment displaced is at a higher before-tax rate of return.

Because most benefits will occur long into the future, almost any reasonable discount rate, even one reflecting consumption time preference rather than private rate of return, will suggest that the project is inefficient. For these reasons, attention turns from efficiency concerns, that is, getting the right private and public rates of return, to equity concerns, taking into account the rights of future generations. A zero rate means that the well being of future generations is given equal weight to the well being of the current generation.

The guidance given for federal decision making by the federal Office of Management and Budget (OMB) is to use a 7% discount rate but to conduct sensitivity analyses using 5% and 9% rates.

For intergenerational deliberations, a lower rate is argued. Assuming a future growth rate of per capita income of 1% to 2% and an elasticity of utility for marginal income of 1.5, discount rates as low as 1.5% to 3% may be selected, the latter corresponding to the rate of long-term U.S. Treasury bonds.

Accordingly, for the long-term watershed restoration project addressed in this section, OMB's recommended rate is initially chosen, but implications of lesser rates (as low as 3%) are identified.

## Potential Water-Supply Benefits

To estimate the ultimate feasible water-supply benefits of the watershed restoration program, a methodology for estimating water-supply benefits, as described at the beginning of the previous section, was incorporated into an Excel spreadsheet model (see Appendix D, Upper Feather River Watershed Water Yield Enhancement Model). The model computes annual monetary benefits and restoration costs over the period of years that would accrue in restoring stream and groundwater elevations in the watershed to their pre-incision condition wherever feasible.

The steps for the computation performed in Appendix D, and the results, are as follows:

**Volume of Sediments Dewatered by Incision.** This computation is accomplished by multiplying the acreage of each alluvial groundwater basin in the upper Feather River watershed (as inventoried by DWR) by estimates of maximum sustained incision depths for each basin. A shape factor of 0.50 is applied to account for gradual thinning of the dewatered sediment wedge, with zero at the basin boundaries. The estimates of incision from the U.S. Department of Agriculture Soil Conservation Service (SCS) and USFS from pre-1850 to 1989 provided the initial basis for the maximum sustained incision in each basin. The staff of the Feather River CRM (Wilcox and Benoit pers. comm.) compared these values to values in its inventory and project files and adjusted them accordingly. This procedure integrates the most extensive field data of the most experienced basin investigators. The estimates for each basin are likely accurate within 25% of the actual value, and with compensating errors, the final estimated sediment volume is probably accurate to within 10%–20% of the actual volume. The estimated total dewatered sediment volume in the upper Feather River watershed is about 576,000 AF, or 576 TAF.

**Volume of Groundwater Storage Lost to Incision.** This estimate is made by applying a specific yield or effective porosity of 33% to the foregoing dewatered sediment volume. The resulting water volume is about 190 TAF.

**Maximum Feasible Extent of Watershed Restoration and Attainable Storage Volume.** Watershed restoration planners at the Feather River CRM estimated the percent of area within the combined groundwater basins that cannot feasibly be restored due to the presence of infrastructure, towns, or residences. Their estimate of 70% feasibility reduces the potential new groundwater storage volume to about 133 TAF.

**Increased Evapotranspiration and Net New Groundwater Storage.** An ET loss estimate described above of 17% of each new vertical foot of storage

reduces the net groundwater available for base flow augmentation during the dry season to about 110 TAF.

**Enhancement of Streamflow During the Dry Season (Base Flow Augmentation) Resulting from Natural Recharge of the New Groundwater Storage.** Based on a factor of 1.00 resulting from groundwater flow modeling for a typical restoration project in the watershed (Kavvas et al. 2005, discussed above), the base flow augmentation would be about 110 TAF annually.

**Comparison of Costs and Benefits.** This step involves determining annual and cumulative income from, and costs of, achieving the new dry-season base flow augmentation; it involves computing the present values of each future income and cost using a discount rate of 7% and, from the present net value estimate, the benefit/cost ratio for the restoration of shallow floodplain storage in the upper Feather River watershed.

Value is measured as the current marginal value of a new acre-foot of water. The value of the potential base flow augmentation is associated with its delivery to Lake Oroville where it may be diverted for use or released instream as part of the environmental water account (EWA). The current price for the EWA is \$150 per AF. This price may undervalue the actual future cost of water, which is expected to rise faster than inflation.

The annual costs of the watershed restoration program required to restore all feasibly restorable watershed lands over a 50-year period were estimated from a summary of meadow projects (primarily pond and plug) conducted by the Feather River CRM to date (see Table 5-1). For each project, the summary includes an estimate of the rise in water table and the area over which the water table was affected. A shape factor of 0.50 was applied to these estimates to determine estimated new storage volume. The average cost determined from this project data is \$550 per AF of restored alluvial volume. When applied to the restorable alluvial volume, the data indicate that the feasible extent of restoration could be completed in 50 years at a cost of \$4.43 million per year. If a shorter or longer restoration period is anticipated, the annual cost would increase or decrease proportionately.

As the watershed restoration program proceeds, benefits increase annually, as shown for the 50-year restoration period and the 100-year analysis period in the Appendix D spreadsheet. A comparison of the cumulative costs and benefits over the restoration period shows that the program for reversing the dewatering effects of stream incision has a BCR of about 1 if only the first 50 years are considered but 1.14 if a 100-year period is considered. In the second 50-year period, no program costs are required but benefits continue to accrue.

Benefits would continue to accrue for the time period beyond 100 years, but when a 7% discount rate is used, the contribution to the present value of benefits becomes negligible.

**Table 5-1.** Costs of New Groundwater Storage from Feather River CRM Meadow Restoration Projects

Map Number	Project Name	Year(s)	Channel Length (miles)	Acreage Restored	Cost	Groundwater Rise (ft)	Landowner Owner	Project Type	Cost per AF storage	Storage (AF)
1	Red Clover Demonstration	1985-96	1	70	\$172,000	9	Private	Rock dams	\$546	315
2	Big Flat	1995	0.78	47	\$189,000	7	Public	Pond and plug	\$1,149	165
3	Bagley Creek II	1996	0.26	10	\$9,000	3	Public	Pond and plug	\$600	15
4	Boulder Creek	1997	0.75	20	\$25,000	5	Public	Sediment traps	\$500	50
5	Rowland Creek	1997	2	50	\$5,000	2	Public	Channel structure	\$100	50
6	Ward Creek	1999	0.76	165	\$220,000	9	Private	Pond and plug	\$296	743
7	Clarks Creek	2001	0.81	56	\$90,000	4	Public	Pond and plug	\$804	112
8	Stone Dairy	2001	0.43	20	\$70,000	8	Public	Pond and plug	\$875	80
9	Carmen Creek (Knuthson Meadow)	2001	1.5	200	\$213,000	10	Public	Pond and plug	\$213	1,000
10	Hosselkus Creek	2002	0.28	25	\$170,000	4	Private	Pond and plug	\$3,400	50
11	Upper Last Chance/Matley Ranch	2002	1.6	300	\$250,000	3	Private	Pond and plug	\$556	450
12	Elizabethtown/Hwy 70	2002	0.06	5	\$30,000	5	Private	Pond and plug	\$2,400	13
13	Carmen Creek (Three-Cornered Meadow)	2002	1	45	\$133,000	7	Public	Pond and plug	\$844	158
14	Greenhorn Creek-New England	2002	0.13	10	\$5,500	3	Private	Pond and plug	\$367	15
15	Last Chance-PNF	2003	4.1	800	\$650,000	6	Public	Pond and plug	\$271	2,400
16	Poplar Creek	2003	0.15	15	\$130,000	5	Private	Pond and Plug/ FP Culverts	\$3,467	38
17	Humbug-Charles	2004	0.44	60	\$201,000	4	Private	Pond and plug	\$1,675	120
2	Big Flat Modification	2004	0.57	0	\$12,000	0	Public	Riffle augmentation	\$0	0

Table 5-1. Continued

Map Number	Project Name	Year(s)	Channel Length (miles)	Acreage Restored	Cost	Groundwater Rise (ft)	Landowner Owner	Project Type	Cost per AF storage	Storage (AF)
11	Last Chance-Charles	2004	0.38	80	\$55,000	2	Private	Pond and plug	\$688	80
18	Dooley Crk/Downing Mdw	2005	1	80	\$55,000	4	Pvt/Pub	Pond and plug	\$344	160
15	Jordan Flat Supplemental	2005	0.34	50	\$64,000	7	Public	Pond and plug	\$366	175
17	Humbug-Charles II	2006	0.4	5	\$29,000	5	Private	Pond and plug	\$2,320	13
10	Hosselkus Creek II	2006	0.45	35	\$110,000	4	Private	Pond and plug	\$1,571	70
19	Red Clover/McReynolds Creek	2006	4.2	375	\$1,300,000	10	Private	Pond and plug	\$693	1,875
20	Rapp-Guidici	2007	0.4	13	\$170,720	5	Private	Pond and plug	\$5,253	33
21	Dixie Creek	2007	0.38	12	\$61,000	7	Private	Pond and plug	\$1,452	42
15	Last Chance-Ferris Fields	2007	0.85	85	\$139,000	5	Public	Pond and plug	\$654	213
22	Smith Creek	2008	0.76	30	\$173,000	7	Private	Pond and plug/ boulder vanes	\$1,648	105
23	Little Last Chance (Ramelli/Goss)	2008	4	750	\$582,000	3	Private	Riffle augmentation	\$517	1,125
TOTAL			29.78	3413	\$5,313,220					9,661
COST PER ACRE-FOOT OF NEW STORAGE										<u>\$ 550</u>

Note: Storage is acre-feet of gross alluvium storage volume; stored water volume is less (see text).

**Implications of Other Potentially Reasonable Assumptions.** The following alternative assumptions were also quantified and examined:

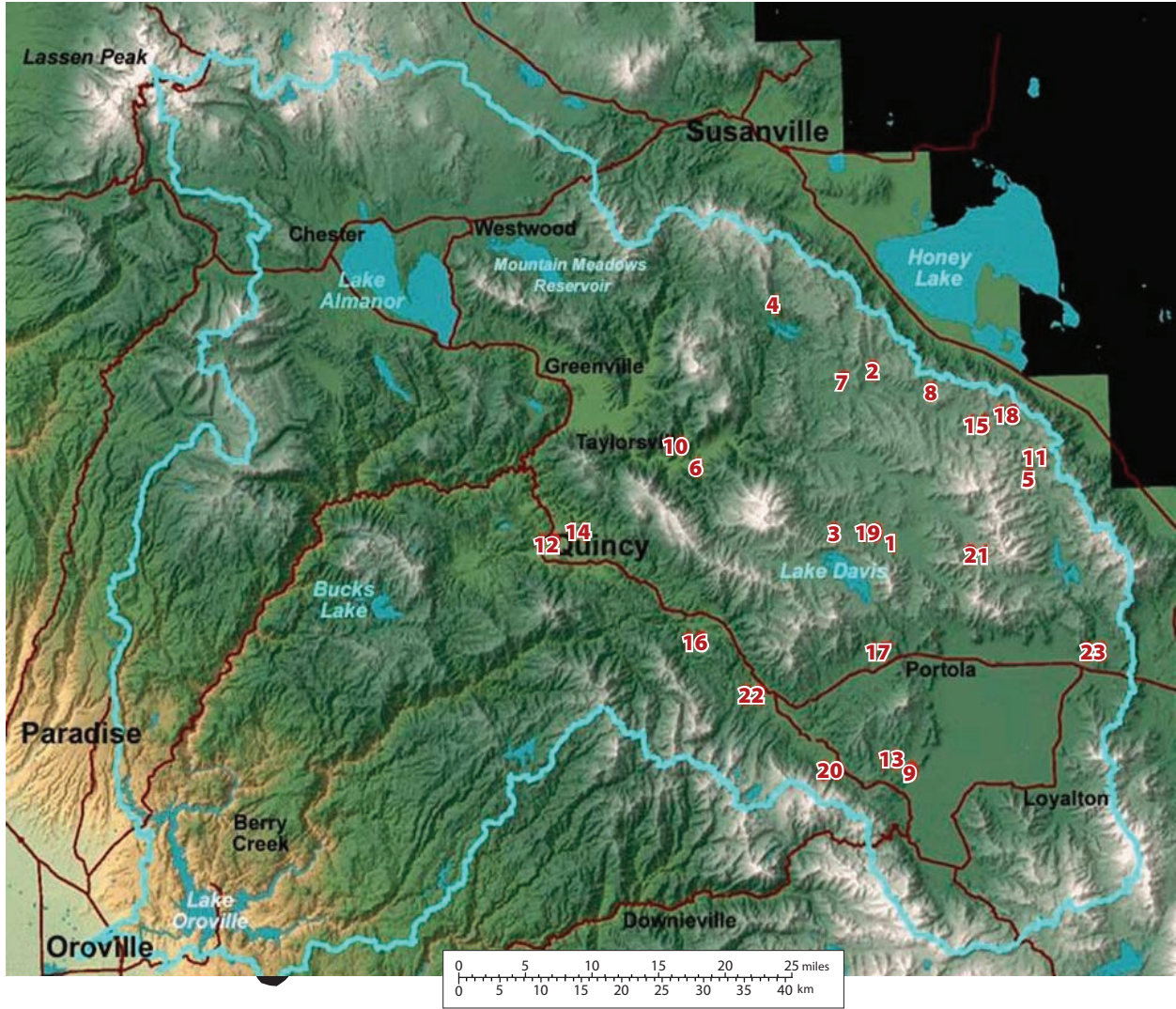
- In computing present new value, a 7% discount rate may be too high for such a long-term, intergenerational resource restoration project.
- The assumed average depth of incision may be too great or too small, or, equivalently, the estimated dewatered basin volume is too great or too small.
- The feasible extent of restoration may be too great or too small.
- The average specific yield of the alluvial basins may be lower than assumed.
- The ratio of base flow augmentation to new storage volume may be overestimated.
- Because of way in which areas of effect were estimated by the Feather River CRM, the computed cost per acre-foot of water-table restoration achieved may be too high.
- The imminent value of an acre-foot of water may be higher than assumed.

Table 5-2, Model Sensitivity, shows the outputs and economic efficiency (present net value) of the suite of potentially reasonable scenarios. As the table shows:

- **Other discount rates.** As would be expected, the BCR, based on present values, would be less than 1.00 if the higher discount rate of 9% were used. However, as discussed under Determining Economic Efficiency, above, lower discount rates may have more justification. Using a discount rate of 5%, for example, indicates a BCR of 1.21 during the restoration period (first 50 years) and 1.54 over the entire first 100-year period.
- **Other estimates of alluvial volume dewatered by incision.** As Table 5-2 indicates, the cost efficiency of the evaluated restoration program would not be different if the alluvial volume dewatered by incision were over- or underestimated. Annual program costs would change, however, if a 50-year restoration period were maintained. A 25% over- or underestimate in alluvial volume would decrease or increase annual costs by about \$1 million.
- **Other estimates of feasibly restorable volume.** Similarly, as Table 5-2 shows, the cost efficiency of the restoration program would not be different if the estimate of feasibly restorable lands were over- or underestimated. Annual program costs would change, however. Rather than 70%, if only 50% of the lands were restorable, annual program costs for 50 years would diminish to \$3.2 million; if 85% of the lands were actually restorable, annual costs would rise to \$5.4 million.
- **Lower average specific yield of shallow alluvium.** Table 5-2 indicates that cost efficiency is very sensitive to the average specific yield of the near-surface alluvial materials in the groundwater basins, and as discussed previously, the appropriate value to use for specific yield is difficult to determine. The results shown in the table indicate that if specific yield were only 20%–25%, the BCR would be less than 1. However, additional calculations show that even in this case, a BCR of 1 would materialize over the 100-year project horizon if lower but potentially acceptable discount rates

were assumed. These lower rates (6.0% if specific yield were 25% rather than 33%, and 4.6% if specific yield were only 20%) are potentially acceptable for an intra-generational project.

- **Lower ratio of base flow augmentation to new storage volume.** As previously discussed, Kavvas (2005) found that in one basin the characteristics of the near-surface aquifer are such that new storage volume translates to an equivalent volume of new base flow augmentation. If the average ratio were not 1.00, however, but, for example, 0.75, the BCR would be less than 1.00. As with specific yield, however, Table 5-2 shows that a BCR of 1 would materialize over the 100-year project horizon if a lower discount rate of 5.9% were assumed. This rate is potentially acceptable for an intra-generational project.
- **Lower cost per acre-foot of new storage.** For this study, a shape factor of 0.50 was applied to estimates of affected acreage by the Feather River CRM for its meadow restoration projects. This shape factor may be too low, however, since the acreage estimates probably reflect the area where the rise in groundwater would be evident and would not include the greater extent where the new groundwater wedge tapers eventually to zero thickness. A shape factor of 1.00, on the other hand, would suggest that the CRM estimates are based on the area where only the maximum rise in groundwater occurred. Accordingly an intermediate shape factor of 0.67 may be a reasonable alternative assumption. Such an assumption would be equivalent to a 25% reduction in unit cost, relative to the \$550 per AF of alluvium used in the calculations above. As Table 5-2 indicates, this alternative assumption would increase the BCR over the first 50 years from 1.00 to 1.36.
- **Higher value of newly produced streamflow.** If the assumed value of \$150 per AF of augmented base flow is too low, the BCR would increase. For example (as shown in Table 5-2), if a value \$200 per AF were assumed, the BCR in the first 50 years would increase from 1.00 to 1.35. This higher average value of new water could easily materialize over the next few years; indeed, much higher prices are currently paid in some locations for additional water supplies, and water demand in California continues to rise faster than supply increases.



Source: Feather River CRM, March 2008

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**Table 5-2. Model Sensitivity – Outputs and Economic Efficiency for Potentially Reasonable Scenarios**

Scenario	Alluvial Volume Dewatered by Incision (TAF)	Restorable Alluvial Volume (TAF)	Usable Water Volume/ Augmented Base Flow	Cost per Year for 50 Years (M\$)	Benefit-Cost Ratio (using present values)	
					First 50 Years	First 100 Years
Most Likely <sup>1</sup>	576	403	110	4.43	1.01	1.14
<b>Other Discount Rates</b>						
9%	“	“	“	“	0.85	0.90
5%	“	“	“	“	1.21	1.54
3%	“	“	“	“	1.46	2.31
<b>Extent of Action</b>						
Alluvial volume overestimated (25% less)	432	302	83	3.33	same as most likely	
Alluvial volume underestimated (25% more)	720	504	138	5.54	same as most likely	
Restorable land overestimated (50% restorable)	576	288	79	3.17	same as most likely	
Restorable land underestimated (85% restorable)	576	489	134	5.38	same as most likely	
<b>Specific Yield</b>						
25%	576	403	84	4.43	0.77	0.86
25% with discount rate of 6%	576	403	84	4.43	0.84	1.00
20%	576	403	67	4.43	0.61	0.69
20% with discount rate of 4.6%	576	403	67	4.43	0.76	1.00
<b>Ratio of base flow augmentation to new storage volume</b>						
Ratio overestimated; ratio is 0.75	576	403	83	4.43	0.76	0.85
Ratio overestimated; ratio is 0.75 with discount rate of 5.9%	576	403	83	4.43	0.84	1.00
<b>Unit Costs</b>						
Production volume underestimated (unit cost 75% of estimated)	576	403	110	3.30	1.36	1.53
Higher water value (\$200/AF)	576	403	110	4.43	1.35	1.52

<sup>1</sup> *Most likely scenario is:*  
 Discount rate of 7%.  
 Incision-dewatered volume estimated basin by basin, and volume restorable = 70%.  
 Specific yield = 33%.  
 Ratio of base flow augmentation to new storage volume = 1.0.  
 Cost to produce new storage = \$550/AF.  
 Value of augmented dry-season streamflow = \$150/AF.

## Water-Supply Benefits Achieved to Date

Aided significantly by Forum funding, to date nearly 10,000 AF of shallow alluvial aquifer storage have been restored by the Feather River CRM, at an estimated cost of \$550 per acre-foot of alluvial storage medium (Table 5-1, Figure 5-1). Applying the factors from Appendix D for specific yield, ET, and the ratio of new stored water to augmented base flow, as described in *Potential Water-Supply Benefits* section above, the unit cost of augmented base flow is equivalent to \$2,008 per AF. The cost is one time, but the benefit recurs annually in perpetuity. Assuming a value of \$150 per AF, in 13.4 years the benefits exceed the costs, and the net will grow larger by \$150 every year. After 25 years, for example, the one-time cost of \$2,008 per AF will have created \$3,750 of water value, and in 50 years it will have created \$7,500 of water value. Clearly, the CRM program, although not focused solely on water yield, has been cost effective in producing new water volume. Monitoring and research projects, also partly funded by the Forum, are demonstrating the effectiveness of meadow restoration in terms of reduced floodflow, augmented base flow, and reduced dry-season water temperatures (reflecting the presence of temporary storage and late-season release).

The Forum has also funded programs to treat upland vegetation. A study conducted for the U.S. Forest Service, as part of implementation of the Herger-Feinstein Quincy Library Group Forest Recovery Act, has estimated that flows will be augmented in the dry season by 17–26 TAF per year because of canopy reduction, depending upon the level at which the act is actually implemented (Troendle et al. 2007)<sup>2</sup>. Additional augmentation is coming from aspen restoration projects involving removal of encroaching conifers that otherwise increase ET. Some of this augmentation has already occurred but most is still to be achieved. In addition to the 110 TAF per year for the most likely scenario for raising stream and groundwater elevations, the overall watershed restoration program would result in an estimated 127–136 TAF per year (or more<sup>3</sup>) of augmented base flow during the dry season.

## Summary and Conclusions Regarding Water-Supply Benefits

A reasonable estimate is that streamflow delivered to Oroville Reservoir in the dry season can be enhanced an estimated 110 TAF per year by stream-elevation restoration actions to reverse 70% of the stream entrenchment in the upper Feather River watershed, and an additional 17–26 TAF per year may be enhanced through continuation of canopy density control for reducing wildland fire hazards, with an unknown additional amount through aspen restoration.

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<sup>2</sup> Quincy Library Group members point out that this estimate may be much too low, because implementation of canopy thinning is likely to be much more extensive than assumed by Troendle et al (2007). It should be noted, however, that canopy reduction is temporary, as forests will tend to re-attain natural canopy closure through time unless subsequent actions are taken.

<sup>3</sup> ditto

An estimated 3 TAF per year of augmented base flow has already been generated by meadow restoration actions taken by the Feather River CRM to date, and an unestimated augmentation has already occurred due to activities of the Quincy Library Group project and the Plumas County Fire Safe Council. To accomplish the feasible extent of stream restoration, the current stream restoration program would need to be funded at about \$4.5 million per year for approximately 50 years.

Economic analyses suggest that a favorable economic return in terms of new usable water volume could be realized as a result of the stream restoration program. Uncertainty analysis, involving changing each of the input variables within a reasonable range, shows that the conclusion is robust and that a positive benefit-to-cost ratio would likely result from the program of reversing watershed incision in the Feather River watershed.

In addition to statewide benefits from eventually producing 127–136 TAF of usable water per year, the restoration program creates local community benefits in terms of jobs and income and results in highly desirable fish and wildlife habitat improvements as well as reduced sediment yield to streams and downstream power and water-supply reservoirs. Although these other potential benefits have not been quantified and monetized, as have the water-supply benefits, they are clearly considerable. Given the estimated BCRs greater than 1.00, based on the water-supply benefits of stream restoration alone, total restoration-program benefits appear to justify a long-term public works program and investing in California's water resources.

Forum funding, particularly of direct intervention projects, including pond-and-plug projects, has contributed significantly to achieving these water supply benefits. Future funding, if it increases attention on water-supply parameters in watershed restoration, can be used to expand and make more cost effective the restoration of usable water resources.

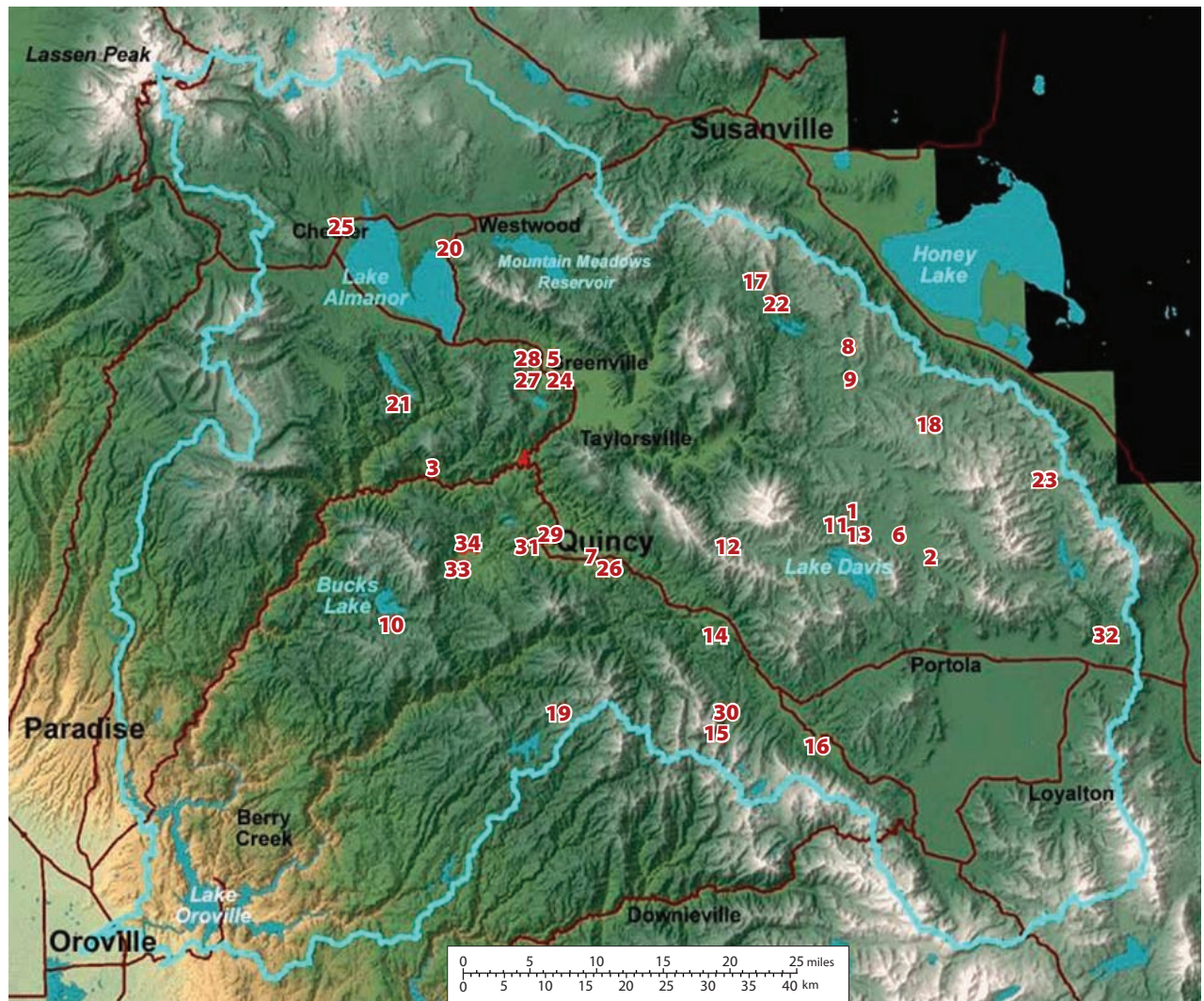
## Water Quality Benefits

The second goal of the Agreement is that water quality be improved through reduced sedimentation and that streambank protection be improved.

Water quality benefits of the Feather River restoration program are of two types: reduced sediment from stream channel erosion and reduced sediment from uplands due to the reduced extent and intensity of wildland fire.

### Streambank Protection and Reduced Sediment Yield

As previously noted, the benefits of upper Feather River watershed restoration on sediment yield to date, as well as ultimate benefits once the restoration program is substantially complete, are considered by most investigators to be substantial. Monitoring programs are not in place to document the reduction in sediment



Source: Feather River CRM, March 2008

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**Table 5-3.** Channel Stabilization Projects of the Feather River CRM (other than meadow-restoration projects)

Map Number	Project Name	Year(s)	Channel Length (mi)	Acre Rest.	Cost	Ownership	Project Type
1	Poco Creek	1986-89	0.23	20	\$128,000	Public	Rock dams/bank stab/fencing
2	Dotta Canyon	1988-90	0.5	50	\$30,200	Private	Rock dams
3	Rush Creek (fish ladder)	1989-91	NA	NA	\$25,300	Private	Fish ladder
4	Soda Creek (fish ladder)	1989-91	NA	NA	included in #3	Private	Fish ladder
5	Wolf Creek I, II, III	1989-93	2.5	29	\$850,000	Private	Inset channel reconstruction
6	Noble-Red Clover	1990	0.28	25	\$14,000	Private	Rock dams
7	Greenhorn Creek	1991	0.75	17.6	\$406,000	Private	Inset channel reconstruction
8	Dunn Pasture (biotechnical)	1992	0.1	NA	\$12,000	Public	Biotechnical (vegetative stabilization)
9	Clarks Creek	1992-94	0.38	NA	\$24,000	Public	Bank stabilization/inset channel reconstruction
10	Haskins Creek	1993	0.15	5	\$40,000	Private	Headcut treatment
11	Bagley Creek	1993	0.34	20	\$48,000	Public	Rock weirs/bank stabilization
12	Walker Mine	1994-96	0.75	100	\$430,000	Public	Tailings stabilization
13	Red Clover II	1994-95	0.5	NA	\$39,000	Public	Inset bank stabilization
14	Poplar Creek	1994-95	0.15	15	\$35,000	Private	Inset step pools
15	Jamison Creek	1995	0.38	20	\$180,000	Public	Inset channel reconstruction
16	Whitehawk Golf Course	1995	0.11	1	\$10,000	Private	Inset bank stabilization
17	Willow Creek	1996	0.25	11	\$106,153	Public	Step pool headcut treatment
18	Little Stony Creek	1996	0.15	2	\$24,000	Public	Step pool headcut treatment
19	Black Rock Creek	1996	1	10	\$14,000	Public	Inset channel structure
20	Hamilton Branch Spill Channel	1997	0.3	NA	\$25,000	Private	Inset channel structure
21	Benner Creek	1997	0.3	5.4	\$50,000	Private	Inset channel reconstruction

**Table 5-3.** Continued

Map Number	Project Name	Year(s)	Channel Length (mi)	Acre Rest.	Cost	Ownership	Project Type
22	Boulder Creek	1997	0.75	20	\$25,000	Public	Sediment traps
23	Rowland Creek	1997	2	50	\$5,000	Public	Channel structure
24	Wolf Creek-Dunham Bank	1999	0.04	NA	\$19,500	Private	Bank stabilization and vanes
25	Chester Park Bank Stabilization	2001	0.08	NA	\$25,000	Public	Rock vanes
26	Greenhorn Creek Maintenance	2001	0.04	NA	\$5,000	Private	Rock vanes
27	North Canyon Creek	2002	0.03	NA	\$10,000	Private	Rock vanes
28	Wolf Creek-Anson	2002	0.04	NA	\$10,000	Private	Rock vanes
29	Elizabethtown Crk @ Etown	2003	0.26	2	\$36,000	Pvt/Pub	Vanes and weirs
30	Jamison Creek Step Pools	2005	0.08	NA	\$39,000	Public	Step pools
31	Dyrr Bank Stabilization	2006	0.11	NA	\$20,000	Private	Boulder vanes
32	Little Last Chance (Guidici)	2008	1	NA	\$153,000	Private	Boulder vanes
33	Meadow Valley-Silver Crk	2008	0.32	NA	\$52,000	Private	Woody debris jams
34	Meadow Valley-Spanish @ Kellett	2008	0.44	NA	\$295,000	Private	Boulder vanes
	TOTAL		14.31	403	\$3,185,153		

yield due to watershed restoration projects completed to date. Sediment movement is exceedingly complex and difficult to measure, especially given the attendant high streamflow conditions. To possibly obtain meaningful results that could lead to economic justification of the restoration program, an inordinate monitoring funding level would need to be maintained.

As a direct consequence of sediment yield from the upper watershed, the rate of sedimentation (deposition of sediments) in PG&E power reservoirs on the North Fork and at the State Water Project at Oroville Reservoir on the Middle Fork could be considered. The authors are not aware of monitoring that has addressed possible changes in sediment inflow since the initiation of watershed restoration in 1985. With only a small portion of restoration completed to date, changes in rates of reservoir filling are unlikely to be substantial.

Monitoring of sediment yield is best accomplished through monitoring of stream geometry and vegetation cover of banks at and adjacent to restoration sites. Forum funding has contributed significantly to such monitoring, especially through the Feather River CRM. To date, almost all Feather River CRM projects are functioning as intended and preventing channel widening or degradation and the resultant sediment yield from project stream reaches.

The extent of this restoration is shown in Table 5-1 (previously referenced) and Table 5-3. The meadow restoration projects previously described as well as other projects, designed primarily for channel stabilization, have reduced sediment yield. In total, 63 projects conducted by the Feather River CRM from 1985 to the present have stabilized 44 miles of stream channel.

An inventory or estimate of the total extent of active channel degradation or widening in the upper Feather River watershed is not available. However, a review of Figure 5-2 suggests that 44 miles of channel encompasses a significant albeit still small part of the combined area of the alluvial basins. The accomplished reduction in sediment yield is therefore likely significant, and the watershed restoration program is therefore contributing well to attaining the second goal of the Agreement. The economic value of such reduction is unknown.

## Reduced Extent and Intensity of Wildfire

The watersheds surrounding the inter-montane alluvial basins are forested. The climate is Mediterranean, with dry summers. Occasional summer lightning storms often ignite multiple forest fires that spread to forest canopies and coalesce, causing major incidents that are highly destructive of watershed infiltration/runoff characteristics of soils. In the past 2 years, large stand-destroying fires have resulted in intensively burned soils in the upper Feather River watershed (near Antelope Reservoir).

Unfortunately, the forested lands in the watershed are dominated by overly dense stands due to past harvesting practices, presenting fuel ladders from the ground to

the canopies and horizontally continuous canopies. Ground fire is thereby allowed to reach canopies readily and then spread rapidly through the canopy. Ground forces are unable to work to control fires during these conditions and rely mostly on aerial attacks.

Several projects funded by the Forum have been intended to improve the condition of upland vegetation in the watershed and thereby achieve the third goal of the Agreement: “improve upland vegetation management.” Rather than simply focus on continuous vegetation cover as prescribed by the Feather River Watershed Management Strategy, the program has focused on reducing ladder fuels and canopy continuity while maintaining continuous vegetation cover in this fire-prone watershed. Project sponsors have included the Plumas Corporation, acting on behalf of the Quincy Library Group; the Plumas County Fire Safe Council; and the Feather River Resource Conservation District. The latter two organizations provide planning, permitting, and funding for fuel-reduction treatments. The Quincy Library Group achieves these results indirectly since it acts to support and encourage efforts of the U.S. Forest Service focused on fuel reduction and provision of fuel environments that allow ground crews to gain control of wildland fires. A study commenced during the large fires in the watershed in 2007 (Fites et al. 2007) and other studies in the northern Sierra Nevada in the past several years indicate that the fuel-reduction techniques, principally the creation of Defensible Fuel Profile Zones, are effective in bringing fire to the ground surface and reducing flame lengths so that fire containment can be achieved. These fuel activities are beginning to provide significant benefits to the watershed in terms of a reduction in the severity and extent of hot fires that destroy watershed function, even as catastrophic fires continue to occur.

## Benefits of Improved Watershed Awareness/Ethics

The Agreement does not include a specific goal of improved watershed awareness and improved watershed ethics. However, the Feather River Watershed Management Strategy adopted this goal in the form of a strategy for achieving the Agreement’s goals:

The watershed forum will encourage the development of educational projects that convey the strategy and restoration effort into schools. Field trips, field exercises, and educational projects that familiarize young people with the watershed and the science and engineering that are part of the restoration will be encouraged.

And the Forum adopted the following bylaw:

Bylaw 6 – Project Selection. The Forum shall be guided in its selection of projects by the following principles: ... probability of increasing public education and awareness.

Although the focus of the strategy is on the community’s students, the bylaw makes it clear that education and awareness extend to the public at large.



Watershed-wide watershed restoration would likely flounder if public understanding and support for the restoration program were not strong. Fortunately, watershed restoration generally poses a “win-win” situation for the local community and the larger statewide and federal interests. Restoration involves augmented streamflows in summer, reduced flood peaks in winter, more vigorous and extensive riparian ecosystems, improved stream health and fisheries, and increase forage for livestock producers. Costs are relatively modest, and both the intervention and intervention-support work represent jobs, local construction contracts, and salaries for local residents who are skilled in the required construction and administrative activities.

An important portion of Forum funding was directed at improved watershed awareness, watershed ethics, and outreach to landowners whose cooperation is needed for the program to succeed. Approximately 14% of Forum funding was expended for this purpose:

- 9.8% for landowner education, awareness, and outreach (projects B1, B5, B6);
- 2.7% for general public education and awareness (projects A2, B8); and
- 1.5 % watershed education in local schools (project B2).

Much of this funding was leveraged by project sponsors to obtain additional funding, and the capacity-building nature of most of this funding was universally effective in helping sponsors develop and initiate enduring programs for watershed education/ethics and outreach. The program initiated in the Plumas Unified Schools with Forum funding has been perpetuated through additional funding sources and fully integrated into the school system’s curricula. The capacity building of the two RCDs has been successful in allowing these organizations to secure additional sources of funding to facilitate and fund district/landowner restoration actions and reach out to landowners and obtain their approvals for large-scale restoration actions staged by the Feather River CRM.

The largest portion of these funds, 5.5% of total funding, was used to support the Plumas Corporation’s administration of the Plumas County Fire Safe Council and the Quincy Library Group. As discussed in the Water Quality Benefits, Reduced Extent and Intensity of Wildfire, Water-Supply Benefits, and the Water-Supply Benefits Achieved to Date sections above, this activity has been successful in educating and supporting landowners in undertaking actions that augment base flow, reduce sediment yield, and improve upland vegetation management—contributing considerably to meeting three of the goals of the Agreement.

## Consultant's Recommendations

Based on the discussions in this section, the following recommendations to the Forum should be considered:

- **Recognize Cost Effectiveness.** Recognize that the upper Feather River watershed restoration program—in the aggregate, including intervention and intervention-support efforts of several organizations—is likely cost effective in augmenting base flow and improving water quality and watershed condition, even considering only some market values (i.e., power generation benefits of augmented baseflow were not assessed in this analysis).
- **Increase Intervention Funding.** Increase funding of direct intervention to accelerate the restoration of basin storage capacity and augmentation of base flow but maintain other funding levels as needed to ensure that education/outreach and fuel-reduction activities in the watershed are maintained.
- **Seek Long-Term Restoration Funding for the Upper Feather River Watershed.** Use initial new Forum funding to develop a long-term funding arrangement involving water users and state and federal agencies such that a multi-decade restoration effort can be sustained.
- **Assume Mitigation Credits and Benefits.** Recognize that ancillary benefits of watershed restoration, especially benefits to biological resources, are significant, and seek to use these benefits to offset impacts of other DWR water-supply and flood-control enhancement actions in the state.
- **Empower CRM Leadership.** Empower the Feather River CRM to lead the watershed restoration program locally, and ensure that Forum funds are sufficient to maintain the organization's functions. The CRM is ideally suited to develop projects involving multiple ownerships and track restoration progress in meeting the goals of the Agreement through watershed-wide monitoring. It is also ideally suited as a funding recipient, being composed of a number of federal, state, and local agencies.
- **Develop Research Plan.** Develop a Forum-sponsored research plan to improve understanding of actual benefits of a long-term restoration program. The plan should focus attention on water-supply parameters in watershed restoration to expand and make more cost effective the restoration of usable water resources. The plan, developed by an expanded TAC of the Forum, would specify important technical/scientific issues/questions that warrant research. Future research funding by the Forum would be in response to proposals addressing those specified issues. The expanded TAC would comprise in-watershed technical experts, agency and water user technical experts, and water-supply, watershed restoration, and water-resource experts from academia and the consulting community.
- **Develop Monitoring Plan.** Develop a monitoring plan focused upon parameters of interest to water user's and the DWR's/ State Water Resources Control Board's needs regarding the watershed intervention program, coordinated with the current monitoring program of the Feather River CRM and delegated to the CRM for implementation via a new funding agreement.

- **Increase School Program Funding.** Increase funding of schools' watershed awareness programs to increase support for regional watershed restoration.
- **Maintain Landowner Outreach Capacity.** Fund additional landowner outreach activities as needed to ensure landowner education/outreach/cooperation with projects of the various sponsors.
- **Continue Advancing Upland Vegetation Management Goal.** Continue funding upland vegetation management actions focused on reduced ladder and canopy fuels at a level similar to the initial funding period.
- **Examine Water Rights Implications.** Commission an examination of the relationship between base flow augmentation resulting from the watershed restoration program and existing and future water rights.
- **Amend the FRWMS.** Amend the Feather River Watershed Management Strategy to improve the focus of Forum expenditures, as described in Section 2.
- **Improve Project Results/Success Tracking.** Improve the tracking of project success in meeting the goals of the Agreement and the strategies of the Forum, as also described in Section 2.

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Appendix A

**Plumas Watershed Forum Goals, Strategies,  
and Bylaws Affecting Project Selection**

# Plumas Watershed Forum Goals, Strategies, and Bylaws Affecting Project Selection

## Introduction

This appendix sets forth the key policies of the Plumas Watershed Forum (Forum) that bear on the selection of projects for funding. These policies have been incorporated into the Project Evaluation Matrix (Appendix B) developed for review of the 30 funded projects. These policies include the Monterey Settlement Agreement (Agreement) goals, priorities established in the Feather River Watershed Management Strategy (WMS), project selection processes also established in the WMS, and Forum bylaws specifically related to individual project. These policy excerpts provide the basis for completing the matrices for each project and evaluating the results described in Section 2 of this report.

## Monterey Settlement Agreement Goals

The specific focus of the Forum's activities is to implement programs designed to achieve the following benefits:

- (Goal 1) Improved retention (storage) of water for augmented base flow in streams;
- (Goal 2) Improved water quality (specifically, reduced sedimentation) and stream bank protection;
- (Goal 3) Improved upland vegetative management; and
- (Goal 4) Improved groundwater retention/storage in major aquifers.



# Priorities of Feather River Watershed Management Strategy

## Eastside Location

The Feather River watershed is divided by the Sierra Crest such that there are geologically distinct east and west sides. The east side exhibits less steep terrain, with broad valley floors, and is more degraded by the loss of riparian and upland vegetation. Headcutting is common throughout the upper east side of the watershed and the source of a majority of sediments exported from the watershed. The streams in the upper east-side watershed are characteristically gullied, with little riparian vegetation. Deep channel incision has lowered the water tables beneath surrounding landforms, and desert vegetation has replaced meadow and wetland vegetation types. The east side is more sensitive to human activities and more degraded as a consequence of those activities; thus, the east side of the watershed should be given priority for the limited resources.

## Non-Road-Decommissioning Focus

Rill and sheet erosion from roads (Plumas County, state highways, railroads, and U.S. Forest Service roads) constitutes the second-most important sediment source throughout the watershed. Reducing sediment problems associated with roads remains the key U.S. Forest Service restoration activity. Expecting the U.S. Forest Service to continue restoration with a focus on roads will free up Agreement funds for other watershed problems. Restoring roads should be a lower priority than other restoration interventions.

## Involves High-Sediment-Transport Watersheds

Subwatersheds contributing the greatest amount of sediments should be given the highest priority for restoration actions. The priority subwatersheds are:

- *Last Chance Subwatershed*
  - Main Stem
  - Clarks Creek, upstream
- *Red Clover Subwatershed*
  - Dixie Creek
  - Main Stem

- *Spanish Creek Subwatershed*
  - Main Stem
  - Upper Spanish Creek
  - Meadow Valley Creek
  - Greenhorn Creek
  - Thompson Creek
- *Lower Indian Creek Subwatershed*
  - Hosselkus Creek
  - Indian Creek, Taylorsville Reach
  - Main Stem
- *Upper Indian Creek Subwatershed*
  - Main Stem
- *Lake Davis-Long Valley Subwatershed*
  - Sulphur Creek
  - Jamison Creek
  - Poplar Creek
  - Smith Creek
- *Sierra Valley Subwatershed*
  - all

## **Addresses Sierra Valley Groundwater Overdraft**

Some areas of the watershed are experiencing dry-year depletions of deep groundwater systems as a result of continued extraction and reduced recharge during those periods. It is these areas of the watershed that need to be managed as a separate priority. Sierra Valley is an example of a high desert groundwater basin developed for agriculture; it experiences periodic drought depletions that recover only during wet periods. Safe yields in these areas have not been established. These areas should be targeted for the installation of cluster monitoring wells, and water producing zones should be identified by cross-section study. Highest priority should be placed on the Sierra Valley groundwater basin.

## **Restores Water Storage and Stability of Meadow Landforms**

Restoring stream conditions in meadow landforms to reduce erosion, increase aquifer storage, retain water to augment summer base flows, and improve riparian and upland vegetation for streambank protection will achieve the Agreement goals to a significant degree.

## **Restores Lost/Degraded Riparian Systems**

Because riparian vegetation is essential for streambank protection to prevent erosion and sediment transport, priority should be given to those streams where riparian vegetation has been lost and where conditions are favorable to restore riparian systems as part of active intervention.

## **Increases Upland Vegetation Cover through a Combination of Intervention and Management**

Uplands need to be well vegetated, especially with hydrophilic vegetation community types like grasses, forbes, and emergent, wet meadow, and wetland plants. Well-vegetated uplands provide benefits by retaining water, recharging water tables, increasing base flow, reducing erosion and sedimentation, and producing high-quality forage for livestock. Restoration involves active intervention and grazing management. Priority should be given to those upper watershed areas where land use management can work synergistically with the intervention technique to maximize benefits.

## **Achieves More than One Resource Benefit**

Highest priority should be placed on those watershed areas and projects where restoration will result in multiple resource benefits. Individual restoration projects should focus on interventions that:

- improve retention of water to increase base flows,
- reduce sedimentation,
- protect streambanks,
- improve upland vegetation, and
- improve groundwater recharge.

Projects with singular or limited objectives should be a lower priority.

## **Leverages Forum Funding with Other Funding, and Leverages Forum Funding with Landowner Contributions**

An underlying assumption of the Agreement is that monies will be leveraged for other sources of funding. Contributing funds from the Agreement can be matched with other sources to the extent that large, complicated restoration projects become feasible.

The California Regional Water Quality Control Board, Central Valley Region (which includes the upper Feather River watershed), now requires farmers and ranchers to meet the requirements of the Conditional Waiver of Waste Discharge from Irrigated Lands for discharge of irrigation and stormwater from irrigated agricultural lands (i.e., the Ag Waiver program). Requirements include use of best management practices (BMPs) to minimize pollutant discharge, including sediment, and will involve riparian buffers, channel stabilization, creation of wetlands and marshes, improved irrigation efficiency, and other results consistent with the Forum's goals and strategies.

Priority should be given to projects that work toward meeting the requirements of the Ag Waiver program, fit within the priorities of the WMS, and include economic incentives for (and contributions from) the landowner.

## **Involves Landowner Participation, and Project Documents Available to Public**

Highest priority should be given to those projects that include landowner participation and transparency, i.e., the project final report is open to public examination and review.

## **Involves or Supports Intervention**

The intent of the Agreement is to show on-the-ground results, not to underwrite research on different restoration actions or to fund studies other than those necessary to support and plan the intervention project.

## **Tier and Type**

Potential actions are grouped into two tiers, with four types in Tier 1 and three types in Tier 2. *Tier 1 actions have greater priority than Tier 2 actions.*

## Tier 1 Projects

- *Type 1, Tier 1 Projects – Headcutting in priority streams of the upper watershed. Multiple benefits that emphasize the main goals.* Type 1 projects must focus on headcutting in the upper watersheds of the priority streams. Type 1 projects must result in multiple benefits, emphasizing the goals of improving retention of water to increase base flows, reducing sedimentation, protecting streambanks, improving upland vegetation, and improving groundwater recharge. One type of first-tier project focuses on meadow landforms using geomorphologic restoration techniques in the priority streams. These projects must also incorporate written land management plans, particularly grazing strategies that ensure the sustainability of the intervention.
- *Type 2, Tier 1 Projects – Groundwater and aquifer recharge in subwatersheds through grazing management.* Type 2 projects will focus on groundwater recharge in subwatershed aquifers. These projects will focus on grazing management, with strategies to improve ground cover (upland vegetation) and stubble height through livestock utilization limits, pasture timing, and limitations on annual animal unit months (AUMs) . Other Type 2 projects include design and implementation of more water-efficient irrigation methods and irrigation management.
- *Type 3, Tier 1 Projects – BMP projects that include main goals and conditional waivers for discharge from irrigated lands and priority streams.* Type 3 projects are BMP projects that correlate the goals of the Agreement with requirements for waivers for discharge from irrigated lands to priority streams and create opportunities of mutual advantage. Landowners seeking permit for discharge and runoff that controls erosion, improves water retention, protects streambanks, and, especially, restores riparian and upland vegetation need to present a detailed plan for BMPs that include matching funds or in-kind contributions.
- *Type 4, Tier 1 Projects – Preventative projects, planning efforts, zoning and ordinances for environmental protection.* Type 4 first-tier projects can be viewed as preventative rather than restorative. Expansion of urban areas and rural developments that encroach on floodplains, fans, and near-stream areas that are geomorphologically dynamic causes new degradation that, in some cases, can negate efforts to restore the watershed. Concurrent with active restoration, comprehensive planning at both the county and municipal level is needed to enact ordinances and zoning regulations to protect critical stream areas from additional degradation. Comprehensive plans need to address development in both urban and rural areas, with a focus on setbacks, green stripping, and riparian buffers. Stormwater discharge from urban areas is also a critical issue, which affects both stream water quality and channel stability.

## Tier 2 Projects

- *Type 1, Tier 2 Projects – Enhancement and improvement of first-tier projects that promote sustainability.* Type 1 second-tier projects should be restoration actions that enhance or improve the sustainability of first-tier projects. These types of projects may include additional downslope or downstream interventions that extend the benefits of a Type 1 first-tier project and could include geomorphic techniques or better land and water management strategies.
- *Type 2, Tier2 Projects – Major valley streams within priority subwatersheds as indicated by monitoring and evaluation.* Type 2 projects should focus on major valley streams within the priority subwatersheds. These projects will be considered when monitoring and evaluation indicate that the Type 1 first-tier projects in the upper subwatershed (above the major valley stream) are successful, having achieved the original goals of the intervention. The focus of Type 2 second-tier projects will be on developing inset channels that prevent additional streambank erosion and incision.
- *Type 3, Tier 2 Projects – Improvement of county roads that cause substantial erosion.* While the premise of this strategy is to rely upon the U.S. Forest Service to address road restoration, there are county-owned roads that cause substantial erosion and are sources of sediment. Because road restoration generally provides only singular benefits (erosion control), and the early program effort is focused on multiple benefits, road projects will be a lower priority. However, as the program progresses, and if it becomes apparent that a particular road is an important and significant problem, the Technical Advisory Committee (TAC), under adaptive management, should move ahead with a project to address the issue.

## Includes Monitoring Focused on Project Success/Failure

As the program progresses, monitoring and evaluation will dictate whether projects need to continue to be focused on the priority areas (categories in each tier are weighted equally).

Monitoring measures project performance and provides data to evaluate success or failure. Project monitoring should not be a major cost item when the intent is to invest most of the available resources into the restoration action, nor is project monitoring intended to be solely research; rather, it is intended to simply generate sufficient data and information for project evaluation. Consequently, monitoring of projects should be efficient, with a focus on only those measurements that provide the desired information.

## Entails Educational Component

The Forum will encourage the development of educational projects that convey the strategy and restoration effort into schools. Field trips, field exercises, and educational projects that familiarize young people with the watershed and the science and engineering that are part of the restoration will be encouraged.

## Involves Innovative Intervention or Monitoring

The TAC will encourage projects that are innovative. While there are known restoration techniques that work, not all techniques are suitable for all site conditions. Consequently, the TAC will be open to new, perhaps untried, techniques (including approaches to monitoring techniques). Such projects, however, will need to be clearly and logically described with credible scientific and engineering arguments as well as research and exploration and may include large-scale monitoring projects.

## Processes of the Feather River Watershed Management Strategy

### Proposals Evaluated by Criteria Specified in the Feather River Watershed Management Strategy

The TAC will review proposals objectively using criteria that reflect the goals of the Agreement as well as the priorities of the WMS.

### Evaluation Score

The proposal will be numerically scored using the weighting and point values associated with each criterion. An example scoring sheet is shown below.

<b>Selection Criteria</b>	<b>Weighting</b>	<b>Points</b>	<b>Score</b>
First-Tier Projects	5	0–10	
Second-Tier Projects	4	0–10	
Applicant Capability	5	0–5	
Land/Water Management Plan	4	0–5	
Sustainability	5	0–5	
Establishes Baseline Conditions	3	0–5	
Monitoring Plans	5	0–5	
Matching Funds	4	0–5	
Detailed Work Plan	3	0–5	

Selection Criteria	Weighting	Points	Score
Budget	2	0-5	
Addresses Permitting	3	0-5	
Collaboration/Partners	2	0-5	
Innovation	2	0-5	
Educational	2	0-5	
<b>Total</b>			

## Forum Bylaws

### Bylaw 6 – Project Selection

The Forum shall be guided in its selection of projects by the following principles:

- funding criteria emphasizing matching or supplemental funding,
- selection criteria linked to a strategic plan,
- project criteria emphasizing certain landscapes and types of work,
- probability of meeting performance criteria, and
- probability of increasing public education and awareness.

### Bylaw 7 – Settlement Principles

The Forum shall be guided by the settlement text entitled “Watershed Forum and Programs” (pp. 18–20), to which reference shall be made in the event of an inability to reach consensus on any particular issue. In particular, Section 2c states:

- **Emphasis on Feather River Watershed.** The Forum specifically promotes and encourages restoration of the Feather River watershed, with particular focus on the drainages of the three State Water Project upper Feather River reservoirs. The Forum seeks to obtain funding and investments in the Feather River watershed to facilitate programs that will generate significant local environmental and water supply benefits.

### Bylaw 8 – Planning

The Forum shall focus on both short-range and long-range planning to optimize expected benefits to the Plumas watershed.



Appendix B  
**Project Evaluation Matrices**

See separate **pdf** file.

Plumas Watershed Forum – 2007 Program Review Project Evaluation Matrix						
<b>Project:</b>	Sulphur Creek Data Collection		<b>Sponsor:</b>	University of California, Davis, Cooperative Extension	<b>Program Review Number:</b>	A-1
<b>Funded Amount:</b>	\$3,000		<b>Fund:</b>	A	<b>Funding Date:</b>	14may04
<b>Description:</b>	<i>Potential intervention support:</i> Biologist's travel costs for field studies monitoring fish (trout) behavior and habitat condition within Sulphur Creek, as part of UC Extension's region-wide study of California rangeland streams. Purpose was to understand reasons for fish presence in stream where summer temperatures exceed the threshold considered to be lethal to fish, and to test means of fish capture and tracking of fish movement. No project file or funding agreement exists. (This was the first project approved by the Plumas Watershed Forum.)					
Forum Goal, Bylaw, or Strategy		Evaluation Rating	Rationale and/or Comments			
Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, <u>or</u> 0 – no contribution or consistency.						
Consistency of Proposed Project with Settlement Agreement Goals						
Goal 1 - Augmented baseflow	1	Result of this study (e.g. fish presence) could conceivably affect the design of a restoration project for Sulphur Creek to increase groundwater storage and augment baseflow, but the absence of a project report addressing the characteristics of the Sulphur Creek fishery makes this unlikely.				
Goal 2 - Reduced sedimentation and improved bank protection	1	Result of this study (e.g. fish presence) could conceivably affect the design of a restoration project for Sulphur Creek to reduce bank erosion, but the absence of a project report addressing the characteristics of the Sulphur Creek fishery makes this unlikely.				
Goal 3 - Improved upland vegetation management	0	Study results would not affect upland vegetation management in the watershed.				
Goal 4 - Increased groundwater retention/storage in major aquifers	1	See Goal 1.				
Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)						
Eastside location	3	Project site is in the Mohawk Valley alluvial groundwater basin (DWR-defined), in the basin and range province east of the Sierra Nevada crest.				
Not road-decommissioning focus	3	No road decommissioning element.				
Involves designated high priority (high sediment flux) watersheds	0	The watershed of Mohawk Valley is not a designated high priority watershed, although Sulphur Creek discharges considerable sediment to the Middle Fork of the Feather River.				
Addresses Sierra Valley groundwater overdraft	0	--				

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

Project:	Sulphur Creek Data Collection		Sponsor:	University of California, Davis, Cooperative Extension	Program Review Number:	A-1
Restores water storage and stability of meadow landforms	1	Conceivable contribution; see <i>Goal 1</i> above.				
Restores lost/degraded riparian systems	1	Conceivable contribution; see <i>Goal 1</i> above.				
Increases upland vegetation cover through combination of intervention and management	0	Study results would not affect upland vegetation management in the watershed.				
Achieves more than one resource benefit	1	Fishery benefit and conceivable contribution to riparian habitat and a successful groundwater storage and baseflow enhancement project; see <i>Goal 1</i> above.				
Leverages Forum funding with other funding	3	Most of the costs of the study of California rangeland streams were met by UC Davis Extension.				
Leverages Forum funding with landowner contributions	0	No landowner contributions were involved.				
Involves landowner participation	3	Some unspecified landowner participation was apparently involved, according to UC Davis Extension staff.				
Project documents available to the public	3	Although no project funding agreement exists, the UC Davis Extension report of California’s rangeland streams is available to the public. The report includes fishery data collected from Sulphur Creek.				
Involves or supports intervention	1	Project result may conceivably be used to support watershed intervention; see <i>Goal 1</i> above.				
Tier and Type	--	Study may conceivably be used to support a Tier 1, Type 1 watershed restoration project on Sulphur Creek.				
Includes monitoring focused on project success/failure to meet intervention goals	0	No monitoring of project performance was established.				
Entails educational component	3	Project was intended to reveal information about fisheries in Sulphur Creek.				
Involves innovative intervention or monitoring	3	A major project purpose was to evaluate fish capture and tracking techniques in a forest stream.				
<b>Consistency of Proposed Project with Forum Bylaws</b>						
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:						
a. requested funding would be supplemented	3	See <i>Leverages Forum funding with other funding</i> above.				
b. action linked to the strategic plan	3	See <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.				

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Sulphur Creek Data Collection</b>		<b>Sponsor:</b>	University of California, Davis, Cooperative Extension	<b>Program Review Number:</b>	A-1
c. involves meadow landscapes and groundwater retention actions	1	Project results could conceivably support groundwater retention actions in a meadow landscape.				
d. likely to attain performance criteria	2	No performance criteria for the project were formally established, however, the proposed monitoring was likely to be successfully performed and was successfully performed.				
e. likely to increase education/awareness	3	The project was intended to increase awareness of fishery issues in California’s rangeland streams.				
<i>Bylaw 7</i> – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman)	0	Project not located in these watersheds.				
<i>Bylaw 8</i> – Consistent with long-range planning (i.e. FRWMS)	3	See <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.				
<b>Project Results</b>						
Implementation documented	N	No record exists of successful project implementation.				
Success monitoring documented	Y	A report on the status of California’s rangeland streams was produced, of which Sulphur Creek was one of the study sites.				
Lessons for future funding/implementation	Research project proposals should establish clear link to Forum’s goals and strategies (see project A-2) which should be established before project funding considerations.					

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Feather River Watershed Management Strategy</b>	<b>Sponsor:</b>	Plumas Watershed Forum	<b>Review Number:</b>	A-2
<b>Funded Amount:</b>	\$27,780	<b>Fund:</b>	A	<b>Funding Date:</b>	May04

**Description:** *Watershed intervention support: development of the Forum's watershed management strategy by a consultant.*

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1 - Augmented baseflow</i>	2	Project established strategies to achieve this goal.
<i>Goal 2 - Reduced sedimentation and improved bank protection</i>	2	Project established strategies to achieve this goal.
<i>Goal 3 - Improved upland vegetation management</i>	2	Project established strategies to achieve this goal.
<i>Goal 4 - Increased groundwater retention/storage in major aquifers</i>	2	Project established strategies to achieve this goal.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	2	Project established this strategy as a criteria for evaluating projects proposed for funding.
Not road-decommissioning focus	2	Project established this strategy as a criteria for evaluating projects proposed for funding.
Involves designated high priority (high sediment flux) watersheds	2	Project established this strategy as a criteria for evaluating projects proposed for funding.
Addresses Sierra Valley groundwater overdraft	2	Project established this strategy as a criteria for evaluating projects proposed for funding.
Restores water storage and stability of meadow landforms	2	Project established this strategy as a criteria for evaluating projects proposed for funding.
Restores lost/degraded riparian systems	2	Project established this strategy as a criteria for evaluating projects proposed for funding.
Increases upland vegetation cover through combination of intervention and management	2	Project established this strategy as a criteria for evaluating projects proposed for funding.

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Feather River Watershed Management Strategy</b>	<b>Sponsor:</b>	Plumas Watershed Forum	<b>Review Number:</b>	A-2
Achieves more than one resource benefit	2	Project established this strategy as a criteria for evaluating projects proposed for funding.			
Leverages Forum funding with other funding	3	Project established this strategy as a criteria for evaluating projects proposed for funding. Project was supported by in-kind contributions of staff time from the Forum’s Technical Advisory Committee in the development and draft review of the strategy document. The strategy document is the most important pre-existing plan incorporated in the Upper Feather Integrated Regional Water Management Plan, which is being implemented with \$7 million in Proposition 50 grant funds awarded to date.			
Leverages Forum funding with landowner contributions	2	Project established this strategy as a criteria for evaluating projects proposed for funding.			
Involves landowner participation	2	Project established this strategy as a criteria for evaluating projects proposed for funding.			
Project documents available to the public	3	Project established this strategy as a criteria for evaluating projects proposed for funding. All Forum project documents are available to the public. The strategy is accessible on websites hosted by DWR, Plumas County, and the Feather River Coordinated Resource Management Group.			
Involves or supports intervention	2	Project established this strategy as a criteria for evaluating projects proposed for funding.			
Tier and Type	--	Project established this strategy as a criteria for evaluating projects proposed for funding.			
Includes monitoring focused on project success/failure to meet intervention goals	2	Project established this strategy as a criteria for evaluating projects proposed for funding.			
Entails educational component	2	Project established this strategy as a criteria for evaluating projects proposed for funding.			
Involves innovative intervention or monitoring	2	Project established this strategy as a criteria for evaluating projects proposed for funding.			
<b>Consistency of Proposed Project with Forum Bylaws</b>					
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:					
a. requested funding would be supplemented	2	Project established a strategy conforming to this selection principle.			
b. action linked to the strategic plan	2	Project established the strategic plan.			
c. involves meadow landscapes and groundwater retention actions	2	Project established a strategy closely conforming to this selection principle.			
d. likely to attain performance criteria	2	No formal performance criteria were established, but the product of this project met the purpose of establishing strategies for meeting the Forum’s goals.			
e. likely to increase education/awareness	2	Project established a strategy conforming to this selection principle.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Feather River Watershed Management Strategy</b>	<b>Sponsor:</b>	Plumas Watershed Forum	<b>Review Number:</b>	A-2
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	0	The project product rejected this policy embodied in the Forum’s bylaws as inappropriate, since all subwatersheds of the upper Feather River watershed are important for achieving the Forum’s goals. Opportunities exist for reducing sediment yield from these three watersheds and thereby reducing sedimentation of the reservoirs ( <i>Goal 2</i> ) and for improving upland vegetation conditions ( <i>Goal 3</i> ). Opportunities for enhancing groundwater storage and baseflow augmentation ( <i>Goals 1 and 4</i> ) have probably been reduced in these three watersheds, because of the presence of impounded waters in areas that undoubtedly had entrenched stream channels and rapid runoff prior to dam construction and because of induced rise of the water table surrounding the impoundments.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	2	Project established the strategic plan.			
<b>Project Results</b>					
Implementation documented	Y	Strategy document submitted to the Forum.			
Success monitoring documented	Y	Strategy document adopted by the Forum.			
Lessons for future funding/implementation	Strategy plans are needed to guide funding deliberations. The program review reveals that several amendments of the adopted strategy are needed to sharpen the program focus and ensure that funds are focused on intervention and essential support described in Settlement Agreement Goals (see report Section 2).				

Plumas Watershed Forum – 2008 Program Review Project Evaluation Matrix						
<b>Project:</b>	SVGMD Monitoring Wells		<b>Sponsor:</b>	Sierra Valley Groundwater Management District	<b>Review Number:</b>	A-3
<b>Funded Amount:</b>	\$120,984 (actual expenditure; \$151,700 originally approved by Forum and reflected in funding agreement)		<b>Fund:</b>	A	<b>Funding Date:</b>	31aug04
<b>Description:</b>	<i>Watershed Intervention Support:</i> development of nested monitoring wells at two locations in Sierra Valley (Chilcoot and Beckwourth areas) and subsurface hydrogeology inferences from the drilling logs, in order to determine the safe yield of the Sierra Valley groundwater basin for agricultural irrigation and thereby facilitate SVGMD's adaptive management of the groundwater basin. (Proposal from SVGMD constitutes contractual scope of work in the Forum's funding agreement.)					
Forum Goal, Bylaw, or Strategy		Evaluation Rating	Rationale and/or Comments			
Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, <u>or</u> 0 – no contribution or consistency.						
Consistency of Proposed Project with Settlement Agreement Goals						
Goal 1 - Augmented baseflow		1	See Goal 4 below. If periods of groundwater overdraft are avoided by SVGMD in the future based on monitoring of groundwater depths as facilitated by this project, baseflow in the Middle Fork of the Feather River will likely be augmented during these periods.			
Goal 2 - Reduced sedimentation and improved bank protection		0	Project does not address this goal.			
Goal 3 - Improved upland vegetation management		0	Project does not address this goal.			
Goal 4 - Increased groundwater retention/storage in major aquifers		1	The project facilitated a determination of the groundwater basin's safe yield and the degree to which agricultural withdrawals in dry periods exceed the safe yield. This information is needed to support groundwater management. If regulatory or educational action is taken by SVGMD in the future to limit withdrawals during dry periods, this project will have contributed to increase groundwater retention/storage in a major aquifer of the upper Feather River watershed.			
Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)						
Eastside location		3	Project is located in the Sierra Valley alluvial groundwater basin (DWR-defined), in the basin and range province east of the Sierra Nevada crest.			
Not road-decommissioning focus		3	--			
Involves designated high priority (high sediment flux) watersheds		3	Project is located in the priority Sierra Valley Subwatershed (although the project does not address sediment yield).			
Addresses Sierra Valley groundwater overdraft		3	The project is intended to provide an information base for prevention of overdraft in the Sierra Valley groundwater basin.			



**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>SVGMD Monitoring Wells</b>	<b>Sponsor:</b>	<b>Sierra Valley Groundwater Management District</b>	<b>Review Number:</b>	<b>A-3</b>
Restores water storage and stability of meadow landforms	1	By providing the basis for preventing large declines in water table elevation during drought periods, this project could prevent the loss or degradation of meadow vegetation in some locations. This potential is not addressed in the Forum’s files.			
Restores lost/degraded riparian systems	1	By providing the basis for preventing large declines in water table elevation during drought periods, this project could prevent the loss or degradation of riparian system in some locations. This potential is not addressed in the Forum’s files.			
Increases upland vegetation cover through combination of intervention and management	0	Project does not address upland vegetation.			
Achieves more than one resource benefit	1	The project is directed at preventing excessive loss of groundwater storage; consequently it may enhance base flow, meadow and riparian vegetation, and dependent wildlife.			
Leverages Forum funding with other funding	2	The SVGMD has assumed the responsibility of monitoring water levels in the installed wells and managing groundwater withdrawals when required. However, the project itself (well development and hydrogeologic inference) was funded entirely by the Forum.			
Leverages Forum funding with landowner contributions	0	The wells are on private lands, but landowners did not contribute funding.			
Involves landowner participation	3	The wells are on private lands, and landowners allowed access for their installation and monitoring.			
Project documents available to the public	3	All Forum documents are available to the public.			
Involves or supports intervention	3	Supports SVGMD’s potential intervention in groundwater withdrawal.			
Tier and Type	Tier1 Type4 Tier2 Type1	Preventative project, potentially involving governmental regulatory action. Actions to enhance sustainability of Tier 1, Type 1 projects to restore near-surface water tables.			
Includes monitoring focused on project success/failure to meet intervention goals	0	No formal monitoring of project implementation or project effects was proposed.			
Entails educational component	3	Project refined the prior estimate of safe yield of the Sierra Valley groundwater basin.			
Involves innovative intervention or monitoring	1	The immediate project—monitoring well development and hydrogeologic inference to determine safe yield—involves well established methodologies and therefore would not be considered innovative. Future groundwater management actions of SVGMD based on this information would be considered innovative, however, since this is one of the few groundwater management districts in the state, all of which developing management approaches unique to their groundwater conditions.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	SVGMD Monitoring Wells		<b>Sponsor:</b>	Sierra Valley Groundwater Management District	<b>Review Number:</b>	A-3
<b>Consistency of Proposed Project with Forum Bylaws</b>						
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:						
a. requested funding would be supplemented	2	See <i>Leverages Forum funding with other funding</i> above.				
b. action linked to the strategic plan	3	Project implements a specific strategy of the FRWMS.				
c. involves meadow landscapes and groundwater retention actions	3	The project provides a basis for retaining groundwater during drought periods (see <i>Goal 4</i> ) and involves a meadow landscape.				
d. likely to attain performance criteria	2	Although no formal performance criteria were established, the project purpose of filling two gaps in basin groundwater data could clearly be achieved and was achieved.				
e. likely to increase education/awareness	3	Filling the gaps in groundwater data in Sierra Valley has increased irrigators and DWR’s awareness of the relationship of groundwater withdrawals to safe yield of the basin.				
<i>Bylaw 7</i> – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) ( <i>Note: subsequently rejected as a priority in FRWMS</i> )	0	Project is not located in these watersheds.				
<i>Bylaw 8</i> – Consistent with long-range planning (i.e. FRWMS)	3	See <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.				
<b>Project Results</b>						
Implementation documented	Y	Report <i>Sierra Valley Hydrogeologic Studies</i> documents installation of the monitoring wells and presents the hydrogeologic inferences.				
Success monitoring documented	N	No monitoring of project implementation or use of project data was proposed.				
Lessons for future funding/implementation		Future funding should be directed at assisting the District in using the hydrogeologic information to effectively implement groundwater conservation during drought periods.				

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Charles Creek Reach of Last Chance Creek Restoration</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group (CRM)	<b>Review Number:</b>	A-4
<b>Funded Amount:</b>	\$35,000	<b>Fund:</b>	A	<b>Funding Date:</b>	31aug04
<b>Description:</b>	<i>Watershed intervention:</i> Raised stream and ground water surface elevations in alluvial body using pond-and-plug technology.				

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1</i> - Augmented baseflow	3	Increasing shallow aquifer groundwater storage will result in augmented baseflow; See <i>Goal 4</i> .
<i>Goal 2</i> - Reduced sedimentation and improved bank protection	3	Streamflow removed from entrenched channel and restored to remnant channel on meadow surface, eliminating widening of incised channel and resulting sediment yield, and facilitating growth of stabilizing bank vegetation.
<i>Goal 3</i> - Improved upland vegetation management	0	Project will not affect upland vegetation.
<i>Goal 4</i> - Increased groundwater retention/storage in major aquifers	3	Prevents further channel degradation and raises stream and water table elevations of creek in eastside alluvial basin. Causes water table to rise an average of 2 feet over an affected area of about 80 acres.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	In Last Chance Creek Valley alluvial groundwater basin (DWR-defined), in the basin and range province east of the Sierra Nevada crest.
Not road-decommissioning focus	3	--
Involves designated high priority (high sediment flux) watersheds	3	Last Chance Subwatershed, Main Stem.
Addresses Sierra Valley groundwater overdraft	0	--
Restores water storage and stability of meadow landforms	3	See <i>Goals 2 and 4</i> .
Restores lost/degraded riparian systems	3	Restored flow to meadow surface; riparian vegetation was planted and will tend to persist/increase with stabilized meadow landform.

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

Plumas Watershed Forum – 2007 Program Review Project Evaluation Matrix					
Project:	Charles Creek Reach of Last Chance Creek Restoration		Sponsor:	Feather River Coordinated Resource Management Group (CRM)	
Review Number:	A-4				
Increases upland vegetation cover through combination of intervention and management	0	Project will not affect upland vegetation.			
Achieves more than one resource benefit	3	Goundwater/baseflow augmentation, improved clarity of streamflow, riparian habitat.			
Leverages Forum funding with other funding	3	CALFED funding for design, permitting, and partial implementation.			
Leverages Forum funding with landowner contributions	0	Landowner contribution not evident in project record.			
Involves landowner participation	3	Landowner agreement to protect project from grazing until vegetation has recovered.			
Project documents available to the public	3	All Forum profile files are available to the public.			
Involves or supports intervention	3	Direct watershed intervention.			
Tier and Type	Tier1 Type1	--			
Includes monitoring focused on project success/failure to meet intervention goals (defined by Tier & Type policy)	3	Monitoring indicators included: groundwater depths, vegetation along transects, and photodocumentation of morphologic/riparian change.			
Entails educational component	1	No specific component, but project may be used for water resource restoration tours.			
Involves innovative intervention or monitoring	3	The pond and plug design is an innovative and apparently successful method of restoring shallow groundwater.			
Consistency of Proposed Project with Forum Bylaws					
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:					
a. requested funding would be supplemented	3	CALFED funding for design, permitting, and partial implementation.			
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.			
c. involves meadow landscapes and groundwater retention actions	3	See <i>Goal 4</i> above.			
d. likely to attain performance criteria	3	<i>Performance criterion</i> established is increased groundwater levels later into the dry season, which was likely to be attained.			

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Charles Creek Reach of Last Chance Creek Restoration</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group (CRM)	<b>Review Number:</b>	A-4
e. likely to increase education/awareness	1	No specific component, but project may be used for water resource restoration tours.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently repudiated as a priority by FRWMS)</i>	0	Not located in these watersheds.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	FRWMS consistency evaluated above.			
<b>Project Results</b>					
Implementation documented	Y	Via quarterly report/invoices.			
Success monitoring documented	Y	Groundwater-depth and vegetation monitoring not in project record. Monitored groundwater-depth and vegetation data not in project record. Because monitoring is conducted with funds from several sources, monitoring data is stored in the CRM's centralized monitoring files and on the website, <a href="http://www.feather-river-crm.org/monitoring">www.feather-river-crm.org/monitoring</a> , and summarized yearly in a annual Watershed Monitoring Program report. The Forum is one of the monitoring program funders. Monitoring data indicate that pond-and-plug projects, including this project, successfully raise groundwater levels in treated areas, result in increased riparian vegetation and may be augmenting dry-season streamflow in recharged streams, reducing peak floodflows, and lowering dry season temperatures.			
Lessons for future funding/implementation	Pond-and-plug projects provide a very direct and effective means of meeting the goals of the Settlement Agreement.				

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Hosselkus Creek Restoration</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group (CRM)	<b>Review Number:</b>	A-5
<b>Funded Amount:</b>	\$80,000	<b>Fund:</b>	A	<b>Funding Date:</b>	26oct04

**Description:** *Watershed intervention:* Raised stream and water table elevations in alluvial aquifer using pond-and-plug technology.

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1</i> - Augmented baseflow	3	Increasing shallow groundwater storage in alluvial aquifers will result in augmented baseflow; See <i>Goal 4</i> .
<i>Goal 2</i> - Reduced sedimentation and improved bank protection	3	Streamflow removed from entrenched channel and restored to remnant channel on meadow surface, eliminating widening of incised channel and resulting sediment yield, and facilitating growth of stabilizing bank vegetation.
<i>Goal 3</i> - Improved upland vegetation management	0	Project will not affect upland vegetation.
<i>Goal 4</i> - Increased groundwater retention/storage in major aquifers	3	Prevents further channel degradation and raises stream and water table elevations of creek in eastside alluvial basin. Causes water table to rise an average of 4 feet over an affected area of about 25 acres.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	Tributary of Indian Creek in the Indian Valley alluvial groundwater basin (DWR-defined), in the basin and range province east of the Sierra Nevada crest.
Not road-decommissioning focus	3	--
Involves designated high priority (high sediment flux) watersheds	3	Lower Indian Creek Subwatershed, Indian Creek-Taylorville Reach or Main Stem.
Addresses Sierra Valley groundwater overdraft	0	--
Restores water storage and stability of meadow landforms	3	See <i>Goals 2 and 4</i> .
Restores lost/degraded riparian systems	3	Restored flow to meadow surface; riparian vegetation was planted and will tend to persist/increase with stabilized meadow landform.

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Hosselkus Creek Restoration</b>		<b>Sponsor:</b>	Feather River Coordinated Resource Management Group (CRM)	<b>Review Number:</b>	A-5
Increases upland vegetation cover through combination of intervention and management	0	Project will not affect upland vegetation.				
Achieves more than one resource benefit	3	Groundwater/baseflow augmentation, improved clarity of streamflow, riparian habitat.				
Leverages Forum funding with other funding	3	CALFED funding for design, permitting, and partial implementation.				
Leverages Forum funding with landowner contributions	0	Landowner contribution not evident in project record.				
Involves landowner participation	3	Landowner agreement to protect project from grazing until vegetation has recovered.				
Project documents available to the public	3	All Forum documents are available to the public.				
Involves or supports intervention	3	Direct watershed intervention.				
Tier and Type	Tier1 Type1	--				
Includes monitoring focused on project success/failure to meet intervention goals	3	Monitoring includes groundwater depths, vegetation along transects, and photodocumentation of morphologic/riparian change.				
Entails educational component	1	No specific component, but project may be used for water-resource restoration tours.				
Involves innovative intervention or monitoring	3	The pond and plug design is an innovative and apparently successful method of restoring water table elevations.				
<b>Consistency of Proposed Project with Forum Bylaws</b>						
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:						
a. requested funding would be supplemented	3	CALFED funding for design, permitting, and partial implementation.				
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.				
c. involves meadow landscapes and groundwater retention actions	3	See <i>Goal 4</i> above.				
d. likely to attain performance criteria	3	<i>Performance criterion</i> established is increased groundwater levels later into the dry season, which were likely to be attained.				

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Hosselkus Creek Restoration</b>		<b>Sponsor:</b>	Feather River Coordinated Resource Management Group (CRM)	<b>Review Number:</b>	A-5
e. likely to increase education/awareness	1	No specific component, but project may be used for water-resource restoration tours.				
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently repudiated as a priority by FRWMS)</i>	0	Not located in these watersheds.				
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	FRWMS consistency evaluated above.				
<b>Project Results</b>						
Implementation documented	Y	Via quarterly report/invoices.				
Success monitoring documented	Y	<p>Monitored groundwater-depth and vegetation data not in project record. Because monitoring is conducted with funds from several sources, monitoring data is stored in the CRM’s centralized monitoring files and on the website, <a href="http://www.feather-river-crm.org/monitoring">www.feather-river-crm.org/monitoring</a>, and summarized yearly in a annual Watershed Monitoring Program report. The Forum is one of the monitoring program funders.</p> <p>Monitoring data indicate that pond-and-plug projects, including this project, successfully raise groundwater levels in treated areas, result in increased riparian vegetation and may be augmenting dry-season streamflow in recharged streams, reducing peak floodflows, and lowering dry season temperatures.</p>				
Lessons for future funding/implementation		Pond-and-plug projects provide a very effective and direct means of meeting the goals of the Settlement Agreement.				



Plumas Watershed Forum – 2007 Program Review Project Evaluation Matrix						
<b>Project:</b>	Last Chance Creek Low Water Crossing / Channel Grade Control		<b>Sponsor:</b>	Plumas National Forest (in cooperation with Feather River CRM)	<b>Review Number:</b>	A-6
<b>Funded Amount:</b>	\$35,000		<b>Fund:</b>	A	<b>Funding Date:</b>	31aug04
<b>Description:</b>	Watershed intervention: Raised channel invert (bottom) of low-water crossing stream crossing up to meadow elevation to stabilize channel, while restoring fish passage.					
Forum Goal, Bylaw, or Strategy		Evaluation Rating	Rationale and/or Comments			
Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, <u>or</u> 0 – no contribution or consistency.						
<b>Consistency of Proposed Project with Settlement Agreement Goals</b>						
Goal 1 - Augmented baseflow		3	Baseflow below the crossing likely increased because of the enhanced upstream storage; see Goal 4 below.			
Goal 2 - Reduced sedimentation and improved bank protection		3	Restored grade control minimizes upstream channel degradation and widening, reducing sediment yield and facilitating growth of bank vegetation.			
Goal 3 - Improved upland vegetation management		0	Project will not affect upland vegetation.			
Goal 4 - Increased groundwater retention/storage in major aquifers		3	Prevents further channel degradation and raises stream and water table elevations of creek in eastside alluvial basin. Causes water table to rise an average of 2 feet at the crossing and upstream.			
<b>Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)</b>						
Eastside location		3	In Last Chance Creek Valley alluvial groundwater basin (DWR-defined), in the basin and range province east of the Sierra Nevada crest.			
Not road-decommissioning focus		3	--			
Involves designated high priority (high sediment flux) watersheds		3	Last Chance Subwatershed, Main Stem.			
Addresses Sierra Valley groundwater overdraft		0	--			
Restores water storage and stability of meadow landforms		3	See Goal 4.			
Restores lost/degraded riparian systems		2	Riparian vegetation will tend to increase upstream of restored grade control and induced raised water table. No plantings.			

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>		<b>Last Chance Creek Low Water Crossing / Channel Grade Control</b>		<b>Sponsor:</b>	Plumas National Forest (in cooperation with Feather River CRM)	<b>Review Number:</b>	A-6
Increases upland vegetation cover through combination of intervention and management	0	Project will not affect upland vegetation.					
Achieves more than one resource benefit	3	Groundwater/baseflow augmentation, fish migration, possible riparian habitat.					
Leverages Forum funding with other funding	3	Integrated with USFS-funded project to relocate roads away from riparian zones. USFS also contributed design and construction oversight costs.					
Leverages Forum funding with landowner contributions	3	USFS is landowner; see preceding item.					
Involves landowner participation	3	Project design jointly developed by FR CRM and USFS, the latter also overseeing construction.					
Project documents available to the public	3	All Forum documents are available to the public.					
Involves or supports intervention	3	Direct watershed intervention.					
Tier and Type	Tier1 Type1						
Includes monitoring focused on project success/failure to meet intervention goals	3	Monitoring indicators include groundwater depths, vegetation along transects, and photodocumentation of morphologic/riparian change.					
Entails educational component	1	No specific component. Project may be used for water-resource restoration field trips.					
Involves innovative intervention or monitoring	0	Grade control is a well-established technique; monitoring uses established approaches.					
<b>Consistency of Proposed Project with Forum Bylaws</b>							
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:							
a. requested funding would be supplemented	3	See <i>Leverages Forum funding with landowner contributions</i> above.					
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.					
c. involves meadow landscapes and groundwater retention actions	3	See <i>Goal 4</i> above.					
d. likely to attain performance criteria	3	Performance criterion established is increased groundwater levels later into the dry season.					

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Last Chance Creek Low Water Crossing / Channel Grade Control</b>		<b>Sponsor:</b>	Plumas National Forest (in cooperation with Feather River CRM)	<b>Review Number:</b>	A-6
e. likely to increase education/awareness	1	No specific component. Project may be used for water-resource restoration field trips.				
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently repudiated as a priority by FRWMS)</i>	0	Not focused in these watersheds.				
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	FRWMS consistency evaluated above.				
<b>Project Results</b>						
Implementation documented	Y	Via quarterly report/invoices.				
Success monitoring documented	N	Monitored groundwater-depth and vegetation data not in Forum’s record.				
Lessons for future funding/implementation	Grade control projects such as this are also very effective means of meeting the goals of the Settlement Agreement.					

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Rodgers Creek and Last Chance Creeks Roads Relocations</b>	<b>Sponsor:</b>	Plumas National Forest	<b>Review Number:</b>	A-7
<b>Funded Amount:</b>	\$59,466	<b>Fund:</b>	A	<b>Funding Date:</b>	26oct04
<b>Description:</b>	<i>Watershed intervention:</i> relocation of 3.2 miles of native surface roads out of riparian corridors of Last Chance Creek and the Rodgers Creek tributary, replaced with upslope roads that improve upland vegetation management and protection from wildland fire.				

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1</i> - Augmented baseflow	2	See <i>Goal 4</i> .
<i>Goal 2</i> - Reduced sedimentation and improved bank protection	3	Removal of roads from the riparian zones eliminate important sources of sediment that cause sedimentation of Rodgers and Last Chance Creeks.
<i>Goal 3</i> - Improved upland vegetation management	2	Relocated road at Rodgers Creek will provide improved access to a new Defensible Fuel Profile Zone (DFPZ) nearby, which is part of an emerging network to reduce the potential severity and extent of wildland fire.
<i>Goal 4</i> - Increased groundwater retention/storage in major aquifers	2	Removal of compacted roadway surfaces from the surface of the groundwater basin alluvium is expected to incrementally increase infiltration of local runoff into the groundwater storage basin.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	Located in the Last Chance Creek Valley alluvial groundwater basin (DWR-defined) in the range and range province east of the Sierra Nevada crest.
Not road-decommissioning focus	0	The project involves road relocation, followed by decommissioning of existing roads.
Involves designated high priority (high sediment flux) watersheds	3	Little Last Chance Subwatershed, Main Stem.
Addresses Sierra Valley groundwater overdraft	0	--
Restores water storage and stability of meadow landforms	2	Incremental increase in groundwater storage; significant improvement of stability of meadow landforms.
Restores lost/degraded riparian systems	3	Riparian vegetation will reoccupy the sites vacated by road removal.

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Rodgers Creek and Last Chance Creeks Roads Relocations</b>		<b>Sponsor:</b>	Plumas National Forest	<b>Review Number:</b>	A-7
Increases upland vegetation cover through combination of intervention and management	2	Results in improved management of upland vegetation by providing improved access to a DFPZ; intervention facilitated during a wildland fire incident.				
Achieves more than one resource benefit	3	Results in benefits to riparian systems, water quality, fish, and wildlife. May benefit water quantity.				
Leverages Forum funding with other funding	3	The Plumas National Forest (PNF), the Plumas County Resource Advisory Committee (RAC), and the California Off-Highway Vehicle Commission contributed major funding.				
Leverages Forum funding with landowner contributions	3	Landowner is PNF; see above.				
Involves landowner participation	3	PNF designed the projects and engaged and managed a construction contractor.				
Project documents available to the public	3	All Forum projects are available to the public.				
Involves or supports intervention	3	Project is direct intervention in watershed condition.				
Tier and Type	Tier1 Type4	Improving DFPZ access is preventative action undertaken by the land management agency to preserve watershed function. Sponsor considers project to also be a Tier 2, Type 3 project, but that category is for improvement of county roads, not USFS roads, that cause substantial erosion.				
Includes monitoring focused on project success/failure to meet intervention goals	0	A monitoring element is listed in the approved project budget, but the project proposal did not describe a monitoring plan. Monitoring is not planned, but could be requested by the Forum.				
Entails educational component	0	No educational component.				
Involves innovative intervention or monitoring	0	Road removal from riparian zones is a emerging priority of land-management agencies, but would no longer be considered innovative. Project monitoring is not proposed.				
<b>Consistency of Proposed Project with Forum Bylaws</b>						
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:						
a. requested funding would be supplemented	3	See <i>Leverages Forum funding with other funding</i> above				
b. action linked to the strategic plan	3	Consistency with FRWMS evaluated in preceding section.				
c. involves meadow landscapes and groundwater retention actions	2	Incremental increase in groundwater retention; significant improvement of meadow landscape.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Rodgers Creek and Last Chance Creeks Roads Relocations</b>	<b>Sponsor:</b>	Plumas National Forest	<b>Review Number:</b>	A-7
d. likely to attain performance criteria	2	Objectives established in the funding agreement include reducing sediment delivery to Rodgers Creek and Last Chance Creek, reducing disturbance to forest wildlife and fragmentation of wildlife habitat within the corridors of the two creeks, improving road drainage and drivability (including reducing surface rutting and washout), and reducing future maintenance needs. These objectives lead to performance criteria (none in Forum’s records) that would likely be attainable with the project.			
e. likely to increase education/awareness	0	No education/awareness component.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	0	The project is not located in these watersheds.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	<i>See Consistency of Proposed Project with Priorities of the FRWMS.</i>			
<b>Project Results</b>					
Implementation documented	na	No progress reports are in the Forum’s records. An invoice has been approved for the total funded amount. Sponsor notes that construction of the new roads was completed in fall 2005, and obliteration of old roads through the riparian areas will be conducted in summer 2008.			
Success monitoring documented	N	No monitoring indicators and standards (performance criteria) were established for this project.			
Lessons for future funding/implementation	Approval of this project may be counter to the Forum’s adopted strategy of relying upon the USFS to fund its road decommissioning program and using Forum funds for other types of interventions. In recent years, the USFS road decommissioning program has been funded primarily via California Off Highway Vehicle restoration grant funds. However, that grant source will not fund road relocation, only obliteration. The Forum and RAC funds were used for new road construction, which improved access to the nearby DFPZ and thereby improved upland vegetation management, consistent with <i>Goal 3</i> .				

Plumas Watershed Forum – 2008 Program Review Project Evaluation Matrix					
<b>Project:</b>	Feather River College Riparian Protection	<b>Sponsor:</b>	Feather River College	<b>Review Number:</b>	A-8
<b>Funded Amount:</b>	\$92,453	<b>Fund:</b>	A	<b>Funding Date:</b>	23may05
<b>Description:</b>	<i>Watershed intervention:</i> construction of fencing to prevent livestock access to streambanks and wetlands; installation of off-stream water sources for livestock; installation/enlargement of road culverts to enhance overland flow during flood; expansion of a corral and dry lot area for equine that are part of Feather River College's equine management program; revegetation of pastures, ditches, and surrounding areas; preparation of a grazing management plan; conduct of at least three grazing practices demonstrations/workshops; and monitoring vegetation responses and changes in water quality.				
Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments			
Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, <u>or</u> 0 – no contribution or consistency.					
Consistency of Proposed Project with Settlement Agreement Goals					
Goal 1 - Augmented baseflow	1	Installation of road culverts to allow overland flow over the floodplain and improved meadow vegetation, to the degree improvement occurs, may increase infiltration into floodplain sediments during flood and slightly increase baseflow during lower flow periods, however the project record contains no technical assessment of this possible benefit.			
Goal 2 - Reduced sedimentation and improved bank protection	3	Excluding livestock from streambanks via fencing, and direct revegetation actions will result in more a more vigorous riparian community, improving bank protection and reducing sediment yield. It is not clear if other project elements (e.g. expansion of corral and dry-lot area) will contribute to reduced sediment yield. The absence of project drawings in the project record makes evaluation of this aspect and other aspects of the project somewhat inconclusive.			
Goal 3 - Improved upland vegetation management	0	The project does not involve upland vegetation.			
Goal 4 - Increased groundwater retention/storage in major aquifers	1	See Goal 1 above.			
Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)					
Eastside location	3	The project site is within the American Valley alluvial groundwater basin (DWR-defined), in the basin and range province east of the Sierra Nevada crest.			
Not road-decommissioning focus	3	No road decommissioning is proposed.			
Involves designated high priority (high sediment flux) watersheds	3	Project site is within the Spanish Creek Subwatershed, Main Stem.			
Addresses Sierra Valley groundwater overdraft	0	--			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Feather River College Riparian Protection</b>	<b>Sponsor:</b>	<b>Feather River College</b>	<b>Review Number:</b>	<b>A-8</b>
Restores water storage and stability of meadow landforms	1	Riparian-zone fencing will enhance stability of streambanks in meadow reach but project is not likely to significantly restore water storage; see <i>Goal 1</i> above.			
Restores lost/degraded riparian systems	3	Riparian-zone fencing will allow recovery of degraded riparian system along Spanish Creek and local tributaries.			
Increases upland vegetation cover through combination of intervention and management	0	Project does not involve upland vegetation.			
Achieves more than one resource benefit	3	Improved riparian vegetation and stream water quality, with consequent improvement in fish and wildlife habitat in and along Spanish Creek.			
Leverages Forum funding with other funding	3	Additional funding provided by Natural Resources Conservation Service (NRCS) and the Feather River Resource Conservation District (RCD).			
Leverages Forum funding with landowner contributions	0	The landowner, Feather River College, is not contributing funds to this project.			
Involves landowner participation	1	Long-term monitoring of vegetation and fish and wildlife utilization may be provided by Feather River College via its natural resource curriculum, but this depends upon instructor and student interest.			
Project documents available to the public	3	All Forum project documents are available to the public.			
Involves or supports intervention	3	Riparian fencing constitutes intervention to improve water quality.			
Tier and Type	Tier1 Type2	--			
Includes monitoring focused on project success/failure to meet intervention goals	3	Proposed monitoring includes vegetation photodocumentation (6-7 points monitored 2-3 times per year) and water quality (5 parameters) at unspecified locations for 5 years. A reference to additional monitoring of plant abundance and diversity was made in the agreement, but was not specified. (Note that the post-construction budget balance raises questions about the college's ability to complete the required 5-year monitoring.)			
Entails educational component	1	Project agreement states that monitoring of project performance may be made part of the college's curriculum, subject to student and instructor interest.			
Involves innovative intervention or monitoring	0	Neither the proposed project nor the proposed monitoring entail innovative approaches.			
<b>Consistency of Proposed Project with Forum Bylaws</b>					
<i>Bylaw 6</i> – Project conformity to Forum's selection principles:					
a. requested funding would be supplemented	3	Yes; see <i>Leverages Forum funding with other funding</i> above.			



**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

Project:		Feather River College Riparian Protection		Sponsor:	Feather River College	Review Number:	A-8
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.					
c. involves meadow landscapes and groundwater retention actions	1	Riparian-zone fencing will enhance stability of streambanks in meadow reach, but project is not likely to significantly restore water storage; see <i>Goal 1</i> above.					
d. likely to attain performance criteria	3	The performance criterion established in the Forum agreement are that native shrubs and grasses along stream corridors will increase over time; this vegetative recovery is likely to occur.					
e. likely to increase education/awareness	1	If the college institutes a long-term monitoring program, this project will have increased public education/awareness.					
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	0	Project is not in any of these watersheds.					
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	FRWMS consistency evaluated above.					
Project Results							
Implementation documented	N	A final annual report states that all project elements have been completed. It states that the grazing management plan was prepared by NRCS (although the project agreement indicates that it would be prepared using Forum funds); a copy is not in the project record. Also, only two grazing practices demonstration/workshop (rather than three as per the Forum agreement) were conducted. Finally, project expenditures were apparently made for one item not in the funding agreement: construction of a sign acknowledging participants in the project. As noted under the <i>monitoring</i> strategy element above, funds used for this out-of-scope expense may be needed for long-term monitoring.					
Success monitoring documented	N	The final project progress report states that the proposed monitoring has been initiated, but the project record does not contain monitoring results, and neither the funding agreement nor the progress report indicates where monitoring was conducted.					
Lessons for future funding/implementation		The project sponsor probably should have contributed funding to the project, which benefitted the college’s instructional program. An appropriate cost-share would have been some or all of the costs for expansion of the corral and dry-lot area for the equine management program, depending upon the relative benefits to stream water quality and to the instructional program.					

Plumas Watershed Forum – 2008 Program Review Project Evaluation Matrix						
<b>Project:</b>	Sierra Valley Aquifer Testing		<b>Sponsor:</b>	Sierra Valley Groundwater Management District	<b>Review Number:</b>	A-9
<b>Funded Amount:</b>	\$30,000		<b>Fund:</b>	A	<b>Funding Date:</b>	23may05
<b>Description:</b>	<i>Watershed intervention support:</i> aquifer testing (pump testing of wells) at two (funding agreement main text) or three sites (funding agreement scope of work) (in the vicinities of Sattley, Beckwourth, and Loyalton) in two consecutive years, to determine aquifer characteristics (transmissivity and storage coefficient), in order to predict well interference of various levels of agricultural withdrawals and thereby facilitate SVGMD's adaptive management of the Sierra Valley groundwater basin. (Proposal from SVGMD constitutes contractual scope of work in the Forum's funding agreement.)					
Forum Goal, Bylaw, or Strategy		Evaluation Rating	Rationale and/or Comments			
Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, <u>or</u> 0 – no contribution or consistency.						
Consistency of Proposed Project with Settlement Agreement Goals						
Goal 1 - Augmented baseflow		1	If the transmissivity and storage-coefficient information derived from the well tests help provide a basis for the SVGMD to prevent periods of groundwater overdraft from the Sierra Valley groundwater basin during dry periods through regulatory or educational action, the project will likely have contributed to augmented baseflow in the Middle Fork of the Feather River.			
Goal 2 - Reduced sedimentation and improved bank protection		0	Project does not address this goal.			
Goal 3 - Improved upland vegetation management		0	Project does not address this goal.			
Goal 4 - Increased groundwater retention/storage in major aquifers		1	If the transmissivity and storage-coefficient information derived from the well tests help provide a basis for the SVGMD to prevent periods of groundwater overdraft from the Sierra Valley groundwater basin during dry periods through regulatory or educational action, the project will have contributed to increased groundwater retention/storage in a major aquifer of the upper Feather River watershed.			
Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)						
Eastside location		3	Project is located in the Sierra Valley alluvial groundwater basin (DWR-defined), in the basin and range province east of the Sierra Nevada crest.			
Not road-decommissioning focus		3	--			
Involves designated high priority (high sediment flux) watersheds		3	Project is located in the priority Sierra Valley Subwatershed (although the project does address sediment yield).			
Addresses Sierra Valley groundwater overdraft		1	The relationship of the project to the prevention of overdraft of the Sierra Valley groundwater basin is unclear; the project proposal or project report does not address this relationship. The scope of work in the funding agreement suggests that the project purpose is to prevent well interference among neighboring wells rather than basin overdraft.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Sierra Valley Aquifer Testing</b>		<b>Sponsor:</b>	Sierra Valley Groundwater Management District	<b>Review Number:</b>	A-9
Restores water storage and stability of meadow landforms	0	Stability of meadow landforms is not a foreseeable project outcome.				
Restores lost/degraded riparian systems	0	Protection or restoration of riparian systems is not a foreseeable project outcome.				
Increases upland vegetation cover through combination of intervention and management	0	Project does not address upland vegetation.				
Achieves more than one resource benefit	0	Project apparently supports the single benefit ensuring equitable use of groundwater supplies among agricultural users in Sierra Valley.				
Leverages Forum funding with other funding	0	The project was funded entirely by the Forum.				
Leverages Forum funding with landowner contributions	0	The tested wells are on private lands, but landowners did not contribute funding. Landowners were reimbursed for use of their electrical power.				
Involves landowner participation	0	The tested wells are on private lands, but landowners did not participate in their testing other than allowing the testing to be conducted .				
Project documents available to the public	3	All Forum documents are available to the public.				
Involves or supports intervention	1	May support SVGMD’s potential intervention in groundwater withdrawals, but this is unclear.				
Tier and Type	Tier1 Type4	Preventative project, potentially involving governmental regulatory action.				
Includes monitoring focused on project success/failure to meet intervention goals	0	No formal monitoring of project implementation or project effects was proposed.				
Entails educational component	2	Project revealed the potential for well interference among irrigators.				
Involves innovative intervention or monitoring	1	The immediate project—well testing and hydrogeologic inference—is well established and therefore would not be considered innovative. Future groundwater management actions of SVGMD based on this information would be considered innovative, however, since this is one of the few groundwater management districts in the state, all of which developing management approaches unique to their groundwater conditions.				
<b>Consistency of Proposed Project with Forum Bylaws</b>						
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:						
a. requested funding would be supplemented	0	The project was funded entirely by the Forum.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Sierra Valley Aquifer Testing</b>		<b>Sponsor:</b>	Sierra Valley Groundwater Management District	<b>Review Number:</b>	A-9
b. action linked to the strategic plan	1	Possibly; the project may help implementation of a specific strategy of the FRWMS. See <i>Addresses Sierra Valley groundwater overdraft</i> above.				
c. involves meadow landscapes and groundwater retention actions	1	Possibly; the project may provide a basis for retaining groundwater during drought periods (see <i>Goal 4</i> ) and involves a meadow landscape.				
d. likely to attain performance criteria	2	Although no formal performance criteria were established, the project purpose of determining aquifer characteristics was likely to be achieved and was achieved.				
e. likely to increase education/awareness	2	Determination of aquifer characteristics has increased groundwater users' awareness of potential well interference in a specific locale.				
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	0	Project is not located in these watersheds.				
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	1	Possibly; see <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.				
<b>Project Results</b>						
Implementation documented	N	The project technical report indicates that only two tests were completed and they were both in the vicinity of Beckwourth (Goodwin Ranch and Green Gulch Ranch); no testing was conducted in the vicinities of Sattley and Loyaltan as proposed. Also, a storage coefficient for the Green Gulch Ranch well was not determined.				
Success monitoring documented	N	No monitoring of project implementation or use of project data was proposed.				
Lessons for future funding/implementation	Future funding should be directed at assisting the District in using the hydrogeologic information to effectively implement groundwater conservation during drought periods.					

Plumas Watershed Forum – 2008 Program Review Project Evaluation Matrix					
<b>Project:</b>	Red Clover Creek Monitoring	<b>Sponsor:</b>	Plumas Geo-Hydrology	<b>Review Number:</b>	A-10
<b>Funded Amount:</b>	\$28,000	<b>Fund:</b>	A	<b>Funding Date:</b>	23may05; 23may06
<b>Description:</b>	<p><i>Watershed intervention support:</i> evaluation of pre- and post-project groundwater storage and enhanced baseflow from a pond-and-plug restoration project in an alluvial aquifer. Includes reviewing past streamflow and groundwater monitoring data collected by the Feather River CRM in the upper Feather River watershed, installing piezometers and monitoring groundwater levels in them, monitoring stream stage as a surrogate for flow where stage-discharge rating curves do not exist, and sampling environmental isotope tracers in stream and groundwater emanating as springs, as well as in snow and rain. The latter element is intended to determine the degree to which recharge of the floodplain aquifer is due to stream recharge or upland groundwater recharge. Post-project monitoring is limited to one year.</p>				
Forum Goal, Bylaw, or Strategy		Evaluation Rating	Rationale and/or Comments		
<p>Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, <u>or</u> 0 – no contribution or consistency.</p>					
Consistency of Proposed Project with Settlement Agreement Goals					
Goal 1 - Augmented baseflow	1	The study is intended to reveal the relationship of restored floodplain aquifer storage to baseflow augmentation for a specific project, and applicability to other groundwater basins in the upper Feather River watershed is unknown. However, by developing a methodology to measure baseflow augmentation from a meadow restoration project that raises groundwater levels, this project could conceivably influence restoration designs of other projects such that greater baseflow augmentation results from them in the future.			
Goal 2 - Reduced sedimentation and improved bank protection	1	See <i>Goal 1</i> above. This study and similar studies in other locations prior to watershed restoration design may conceivably influence design such that floodplain groundwater storage and baseflow is improved, which in turn could improve vigor and extent of bank vegetation and reduce bank erosion in subsequent projects.			
Goal 3 - Improved upland vegetation management	0	Information obtained through this study and similar studies in other locations would not be directed at improving upland vegetation management.			
Goal 4 - Increased groundwater retention/storage in major aquifers	1	See <i>Goal 1</i> above. This study and similar studies in other locations prior to watershed restoration design may conceivably influence design such that floodplain groundwater storage is improved in subsequent projects.			
Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)					
Eastside location	3	Project is located in the Clover Valley alluvial groundwater basin (DWR-defined) in the Basin and Range province east of the Sierra Nevada crest.			
Not road-decommissioning focus	3	Project is not directed at benefits of road decommissioning.			
Involves designated high priority (high sediment flux) watersheds	3	Located in the Red Clover Subwatershed, Main Stem.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

Project:	Red Clover Creek Monitoring		Sponsor:	Plumas Geo-Hydrology	Review Number:	A-10
Addresses Sierra Valley groundwater overdraft	1	Project methodology might be applied to projects in the Sierra Valley groundwater basin and conceivably improve groundwater recharge in the floodplain aquifer.				
Restores water storage and stability of meadow landforms	1	Information obtained through this study and similar studies in other locations, by affecting design of intervention actions, could conceivably increase groundwater storage and baseflow for subsequent projects, which could improve extent and vigor of bank vegetation and thereby improve stability of meadow landforms.				
Restores lost/degraded riparian systems	1	Riparian systems in other project areas could also indirectly benefit from results of this study and similar studies.				
Increases upland vegetation cover through combination of intervention and management	0	Information obtained through this study and similar studies is not directed at improving upland vegetation management.				
Achieves more than one resource benefit	1	This study and similar studies that affect intervention design of other projects could result in improved groundwater storage and baseflow, resulting in improved riparian habitat and bank stability, in turn benefitting fish and wildlife in those subsequent project areas.				
Leverages Forum funding with other funding	3	Study includes hydrologist’s review of monitoring of groundwater and stream-channel water surface elevations collected by the Feather River CRM using other funding sources.				
Leverages Forum funding with landowner contributions	0	Landowner is owner of the Goodwin Ranch. No contribution from the landowner is involved.				
Involves landowner participation	0	No participation by the landowner is proposed.				
Project documents available to the public	3	All Forum documents are available to the public.				
Involves or supports intervention	1	Information obtained through this and similar studies may conceivably be used to support future design of intervention projects.				
Tier and Type	0	Information obtained through this and similar studies may conceivably be used to improve Tier 1, Type 1 projects.				
Includes monitoring focused on project success/failure to meet intervention goals	0	No monitoring of project implementation or success was established ( <i>project implementation monitoring</i> ).				
Entails educational component	3	The purpose of the project is to increase understanding of floodplain aquifer recharge and discharge, to the benefit of designers of intervention projects.				
Involves innovative intervention or monitoring	3	Project involves innovative monitoring using environmental isotopes to study recharge and discharge of floodplain aquifers ( <i>environmental process monitoring</i> ).				
<b>Consistency of Proposed Project with Forum Bylaws</b>						
Bylaw 6 – Project conformity to Forum’s selection principles:						

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

Project:		Red Clover Creek Monitoring		Sponsor:	Plumas Geo-Hydrology	Review Number:	A-10
a. requested funding would be supplemented	3	See <i>Leverages Forum funding with other funding</i> above.					
b. action linked to the strategic plan	3	See <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.					
c. involves meadow landscapes and groundwater retention actions	3	The project location is a meadow landscapes; project goal is to develop methodologies for understanding the potential benefits of groundwater retention actions.					
d. likely to attain performance criteria	1	No specific performance criteria were formally established. Because of the complexity of issues regarding use of environmental tracers, it is not clear that the sources of waters recharging the meadow aquifer will be determined. However the source of recharge waters is of secondary importance to the generally independent issue of how newly-created storage augments dry-season baseflow.					
e. likely to increase education/awareness	3	Project is likely to increase awareness of patterns of floodplain aquifer recharge and discharge.					
Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) ( <i>Note: subsequently rejected as a priority in FRWMS</i> )	0	The project was not located in these watersheds.					
Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)	3	Yes; see <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.					
Project Results							
Implementation documented	na	The project continues to date, although the project report, according to an amendment to the original funding agreement, was due September 30, 2007. Beaver activity has delayed data collection to summer 2008.					
Success monitoring documented	na	Determination of project success awaits submittal of the final report.					
Lessons for future funding/implementation	In collaboration with watershed stakeholders and a panel of technical experts, the Forum should take an active role in formulating a research program by developing a research plan that identifies and prioritizes issues for which more information is needed to ensure that intervention project designs optimally achieve reversal of stream incision and otherwise meet the goals of the Monterey Settlement.						

Plumas Watershed Forum – 2008 Program Review Project Evaluation Matrix					
<b>Project:</b>	Clark's Creek Aspen Restoration	<b>Sponsor:</b>	Plumas National Forest (PNF)	<b>Review Number:</b>	A-11
<b>Funded Amount:</b>	\$84,500	<b>Fund:</b>	A	<b>Funding Date:</b>	23may05
<b>Description:</b>	Watershed intervention: Removal of conifers encroaching into aspen stands to increase water yield on about 324 acres along a tributary to Last Chance Creek.; Forum funding covers project design and permitting. (Proposal from PNF constitutes the scope of work in the Forum's funding agreement.)				
Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments			
Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, <u>or</u> 0 – no contribution or consistency.					
Consistency of Proposed Project with Settlement Agreement Goals					
Goal 1 - Augmented baseflow	3	Reduced evapotranspiration (including reduced canopy interception and subsequent evaporation) resulting from the vegetation type conversion will increase baseflows by an estimated 125 acre-feet per year.			
Goal 2 - Reduced sedimentation and improved bank protection	3	Increased plant litter following aspen restoration will provide better soil cover and promote more infiltration, relative to conditions under conifers.			
Goal 3 - Improved upland vegetation management	3	The aspen stand is distributed so as to constitute both streamside vegetation and upland vegetation.			
Goal 4 - Increased groundwater retention/storage in major aquifers	3	Reduced evapotranspiration will enhance flows in Clark's Creek and thereby promote increased groundwater storage in the Last Chance Creek Valley groundwater basin.			
Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)					
Eastside location	3	Last Chance Creek Valley alluvial groundwater basin, in the Basin and Range province east of the Sierra crest.			
Not road-decommissioning focus	3	No road decommissioning element.			
Involves designated high priority (high sediment flux) watersheds	3	Project is situated in Last Chance Subwatershed, Clark's Creek Upstream.			
Addresses Sierra Valley groundwater overdraft	0	--			
Restores water storage and stability of meadow landforms	3	Regarding water storage, see <i>Goals 1 and 4</i> above. By promoting more infiltration of runoff, peak streamflows in Last Chance Creek will diminish slightly, incrementally increasing the stability of streambanks and meadow landforms.			
Restores lost/degraded riparian systems	3	A portion of the aspen stands to be restored are considered riparian systems.			



**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Clark's Creek Aspen Restoration</b>		<b>Sponsor:</b>	Plumas National Forest (PNF)	<b>Review Number:</b>	A-11
Increases upland vegetation cover through combination of intervention and management	3	As noted, a portion of the aspen restoration involves uplands. In both upland and riparian zones, modification of grazing management will be implemented as needed to promote adequate aspen regeneration.				
Achieves more than one resource benefit	3	As described above, project would improve retention of water to increase base flows, reduce sedimentation, protect streambanks, improve upland vegetation, and improve groundwater recharge. It would also restore important elements of landscape-level plant species/wildlife habitat diversity.				
Leverages Forum funding with other funding	3	USFS will fund project implementation; the Forum funding is being used for project planning, design, and permitting.				
Leverages Forum funding with landowner contributions	3	USFS is landowner; see preceding strategy item.				
Involves landowner participation	3	USFS is landowner and will secure a contractor and oversee project implementation. USFS will also monitor results of project.				
Project documents available to the public	Y	All Forum documents are available to the public.				
Involves or supports intervention	3	Direct intervention to alter watershed cover.				
Tier and Type	Tier2 Type1	The project is a restoration action that enhances and improves the sustainability of the first tier projects previously undertaken along Last Chance Creek to increase groundwater storage in the Last Chance Creek Valley groundwater basin.				
Includes monitoring focused on project success/failure to meet intervention goals	3	A detailed monitoring plan from the sponsor in the Forum's records includes measuring aspen/conifer basal area, canopy cover ratios, aspen size class and condition, and browsing intensities along transects during the first decade after restoration. In addition, photodocumentation will be collected. Implementation of BMP to protect soils during conifer removal will also be monitored. Monitoring will be funded and conducted by the USFS, not through use of Forum funds.				
Entails educational component	0	None proposed.				
Involves innovative intervention or monitoring	3	Restoring aspen for purposes of reducing water loss in the Feather River watershed is still a relatively innovative intervention, although similar projects have already been undertaken in the watershed.				
<b>Consistency of Proposed Project with Forum Bylaws</b>						
<i>Bylaw 6</i> – Project conformity to Forum's selection principles:						
a. requested funding would be supplemented	3	USFS will fund project implementation; the Forum funding is being used for project planning, design, and permitting.				
b. action linked to the strategic plan	3	See foregoing section addressing <i>Consistency of Proposed Project with Priorities of the FRWMS</i> .				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Clark's Creek Aspen Restoration</b>	<b>Sponsor:</b>	Plumas National Forest (PNF)	<b>Review Number:</b>	A-11
c. involves meadow landscapes and groundwater retention actions	3	Regarding groundwater retention, see <i>Goals 1 and 4</i> above. By promoting more infiltration of runoff, peak streamflows in Last Chance Creek will diminish slightly, incrementally increasing the stability of meadow landscapes downstream.			
d. likely to attain performance criteria	2	Specific performance criteria relative to monitoring variables are not stated in project proposal. However, the intended type conversion and increased water yield are likely to be achieved, if proposed adaptive management of range livestock is conducted.			
e. likely to increase education/awareness	0	No education/awareness component.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	0	Project is not in these watersheds.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	Yes; see <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.			
<b>Project Results</b>					
Implementation documented	na	Implementation of proposed project design (element funded by the Forum) is documented via annual reports and invoices. Restoration actions are pending.			
Success monitoring documented	na	Results of baseline monitoring are not in the Forum's records; BMP implementation and post-implementation monitoring is pending restoration actions.			
Lessons for future funding/implementation	Aspen restoration should be a priority of the Forum, since it can meet all four goals of the Monterey Agreement, and can be highly consistent with the Forum's strategies.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>“Four Creeks” Monitoring (10 permanent stations)</b>	<b>Sponsor:</b>	Feather River CRM	<b>Review Number:</b>	A-12
<b>Funded Amount:</b>	\$25,000	<b>Fund:</b>	A	<b>Funding Date:</b>	23may05

**Description:** *Watershed intervention support:* basic watershed-wide monitoring program (monitoring, data reduction, and analysis) at 10 stations on 7 streams to assess program performance—effects of watershed restoration on baseflow, floodflow, and water temperature regimes. (Note: “Four Creeks” is a misnomer in referring to this monitoring project, which was contracted together with B-9, Four Creeks Concept Development).

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1</i> - Augmented baseflow	2	Project is monitoring component of pond and plug intervention projects that augment baseflow; results affect design of subsequent meadow restoration project.
<i>Goal 2</i> - Reduced sedimentation and improved bank protection	1	Adaptive management driven by monitoring results may also result in improvements to bank protection and reduced sediment yield from future project.
<i>Goal 3</i> - Improved upland vegetation management	0	Upland vegetation resources are not affected by monitoring variables.
<i>Goal 4</i> - Increased groundwater retention/storage in major aquifers	2	Project is monitoring component of pond and plug intervention projects that increase groundwater retention; results affect design of subsequent meadow restoration projects.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	Funded monitoring stations are located in the following DWR-defined groundwater basins: Last Chance Creek Valley, Clover Valley, Indian Valley, American Valley, and Mohawk Valley, all in the basin and range province east of the Sierra Nevada crest.
Not road-decommissioning focus	3	--
Involves designated high priority (high sediment flux) watersheds	3	Funded monitoring stations are located in the following high-priority watersheds: Last Chance Subwatershed, Main Stem; Red Clover Subwatershed, Main Stem; Lower Indian Creek Subwatershed, Main Stem and Indian Creek, Taylorsville Reach; Spanish Creek Subwatershed, Main Stem; and Lake Davis-Long Valley Subwatershed, Sulphur Creek.
Addresses Sierra Valley groundwater overdraft	0	No stations are located in the Sierra Valley groundwater basin.
Restores water storage and stability of meadow landforms	1	See <i>Goals 2 and 4</i> .

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>“Four Creeks” Monitoring (10 permanent stations)</b>	<b>Sponsor:</b>	Feather River CRM	<b>Review Number:</b>	A-12
Restores lost/degraded riparian systems	1	Adaptive management driven by monitoring results may result in restoration of riparian vegetation in future projects.			
Increases upland vegetation cover through combination of intervention and management	0	Upland vegetation resources are not affected by monitoring variables.			
Achieves more than one resource benefit	2	Adaptive management driven by monitoring results is likely to result in increased groundwater storage, baseflow, restoration of riparian systems, and reduced sediment yield in future projects.			
Leverages Forum funding with other funding	3	Project funds ongoing monitoring using equipment purchased and installed with Clean Water Act 319 funds and Proposition 204 funds. Some of the monitoring activities were to be conducted by volunteers, funded by DWR Watershed Management Program.			
Leverages Forum funding with landowner contributions	0	Landowners grant access for monitoring, but do not provide financial support.			
Involves landowner participation	3	Landowners grant access for monitoring.			
Project documents available to the public	3	All Forum documents are available to the public.			
Involves or supports intervention	3	Monitoring restoration effects supports additional pond and plug intervention projects.			
Tier and Type	Tier1 Type1	Tier 1, Type 4 is stated in proposal, however Type 4 applies to preventative, governmental planning, and regulatory actions. Project is final step in all Tier 1, Type 1 projects in the treated watersheds.			
Includes monitoring focused on project success/failure to meet intervention goals	3	Monitoring of implementation of this Forum-funded project entails noting whether a watershed monitoring report is produced, which includes data analysis and conclusions relevant to watershed stakeholders.			
Entails educational component	3	Monitoring results comprise key information to use in watershed education and outreach programs (e.g. projects B-2, B-5, B-6, and B-8).			
Involves innovative intervention or monitoring	1	The watershed restoration monitoring program is inherently innovative, as a result of non-traditional goals established by the Forum, but proposed monitoring actions generally are designed around established hydrologic techniques.			
<b>Consistency of Proposed Project with Forum Bylaws</b>					
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:					
a. requested funding would be supplemented	3	See <i>Leverages Forum funding with other funding</i> above.			
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>“Four Creeks” Monitoring (10 permanent stations)</b>	<b>Sponsor:</b>	Feather River CRM	<b>Review Number:</b>	A-12
c. involves meadow landscapes and groundwater retention actions	3	See <i>Goal 2</i> and <i>Eastside Location</i> above.			
d. likely to attain performance criteria	3	Performance criteria include completion of a watershed monitoring report, which includes data analysis and conclusions directed at watershed stakeholder; such a report was produced.			
e. likely to increase education/awareness	3	The type of monitoring results reported in the monitoring report will be vital information sources for watershed education/awareness.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	1	Two of the ten monitoring stations are downstream of Antelope reservoir.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	FRWMS consistency evaluated above			
<b>Project Results</b>					
Implementation documented	Y	Via quarterly report/invoices.			
Success monitoring documented	Y	Resulting monitoring report submitted.			
Lessons for future funding/implementation	This monitoring has verified benefits of pond and plug technology. For example, the Big Flat pond and plug project (not Forum-funded) has demonstrably attenuated peak flow and extended duration of baseflow. The projects in Last Chance Creek Valley groundwater basin are decreasing the number of days of high stream temperatures, indirectly indicating that baseflow has been enhanced.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Last Chance Creek – Jordan Creek Restoration</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-13
<b>Funded Amount:</b>	\$63,995	<b>Fund:</b>	A	<b>Funding Date:</b>	23may05
<b>Description:</b>	<i>Watershed intervention:</i> Raised stream and ground water surface elevation in alluvial body using pond-and-plug technology				

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1</i> - Augmented baseflow	3	Increasing shallow aquifer groundwater storage will result in augmented baseflow; See <i>Goal 4</i> .
<i>Goal 2</i> - Reduced sedimentation and improved bank protection	3	Streamflow removed from entrenched channel and restored to remnant channel on meadow surface, eliminating widening of incised channel and resulting sediment yield, and facilitating growth of stabilizing bank vegetation.
<i>Goal 3</i> - Improved upland vegetation management	0	Project will not affect upland vegetation.
<i>Goal 4</i> - Increased groundwater retention/storage in major aquifers	3	Prevents further channel degradation/widening and raises stream and groundwater surface elevations in eastside alluvial basin. Causes water table to rise an average of 7 feet over an affected area of about 50 acres.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	At Last Chance – Jordan Creeks confluence in Last Chance Creek Valley alluvial groundwater basin (DWR-defined), in the Basin and Range province east of the Sierra Nevada crest..
Not road-decommissioning focus	3	--
Involves designated high priority (high sediment flux) watersheds	3	Last Chance Subwatershed, Main Stem.
Addresses Sierra Valley groundwater overdraft	0	--
Restores water storage and stability of meadow landforms	3	See <i>Goals 2 and 4</i> .
Restores lost/degraded riparian systems	3	Restores flow to remnant channel on meadow surface. Riparian vegetation planted to stabilize plugs and will tend to persist/increase with stabilized meadow landform.

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Last Chance Creek – Jordan Creek Restoration</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-13
Increases upland vegetation cover through combination of intervention and management	0	Project will not affect upland vegetation.			
Achieves more than one resource benefit	3	Groundwater/baseflow augmentation, improved clarity of streamflow, increased and better managed riparian habitat and livestock forage.			
Leverages Forum funding with other funding	3	CALFED funding of similar projects on adjacent reaches of the two streams. USFS donated fencing materials.			
Leverages Forum funding with landowner contributions	3	Landowner is USFS, which contributed fencing and is managing livestock to ensure establishment and recovery of riparian vegetation.			
Involves landowner participation	3	Landowner agreement to protect project from grazing until vegetation has established/recovered.			
Project documents available to the public	3	All Forum documents are available to the public.			
Involves or supports intervention	3	Direct watershed intervention.			
Tier and Type	Type1 Tier1	--			
Includes monitoring focused on project success/failure to meet intervention goals	3	Monitoring includes continuous streamflow and water temperature in Last Chance Creek 0.5 mile downstream, and photodocumentation of morphologic/riparian change.			
Entails educational component	1	No specific component, but project may be used for water-resource restoration tours.			
Involves innovative intervention or monitoring	3	The pond and plug design is an innovative and apparently successful method of restoring water table elevations.			
<b>Consistency of Proposed Project with Forum Bylaws</b>					
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:					
a. requested funding would be supplemented	3	See <i>Leverages Forum funding with other funding</i> above			
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.			
c. involves meadow landscapes and groundwater retention actions	3	See <i>Goal 4</i> above.			
d. likely to attain performance criteria	3	<i>Performance criteria</i> established are higher summer baseflows, cooler summer water temperatures at downstream monitoring station, and visually improved riparian vegetation, which were likely to be attained.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Last Chance Creek – Jordan Creek Restoration</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-13
e. likely to increase education/awareness	1	No specific component, but project may be used for water-resource restoration tours.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	0	Not located in these watersheds.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	FRWMS consistency evaluated above.			
<b>Project Results</b>					
Implementation documented	Y	Via quarterly and annual reports and invoices.			
Success monitoring documented	Y	<p>Monitored streamflow/temperature in Last Chance Creek downstream, and photodocumentation of morphologic/riparian change, are not in project record. Monitored groundwater-depth and vegetation data not in project record.</p> <p>Because monitoring is conducted with funds from several sources, monitoring data is stored in the CRM's centralized monitoring files and on the website, <a href="http://www.feather-river-crm.org/monitoring">www.feather-river-crm.org/monitoring</a>, and summarized yearly in a annual Watershed Monitoring Program report. The Forum is one of the monitoring program funders.</p> <p>Monitoring data indicate that pond-and-plug projects, including this project, successfully raise groundwater levels in treated areas, result in increased riparian vegetation and may be augmenting dry-season streamflow in recharged streams, reducing peak floodflows, and lowering dry season temperatures.</p>			
Lessons for future funding/implementation	Pond-and-plug projects provide a very direct and effective means of meeting the goals of the Settlement Agreement.				



**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	Silver Creek in Meadow Valley (Burney's)	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-14
<b>Funded Amount:</b>	\$51,000	<b>Fund:</b>	A	<b>Funding Date:</b>	23may06
<b>Description:</b>	<i>Watershed intervention:</i> Stabilized water surface elevation in an alluvial aquifer, and reduced sediment yield, using a suite of channel/floodplain actions				

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

Goal 1 - Augmented baseflow	3	Prevents reduction, and augments slightly, as a result of maintained or increased groundwater storage; see Goal 4
Goal 2 - Reduced sedimentation and improved bank protection	3	Actions are designed to stabilize the channel from further degradation or widening, thereby acting as bank protection and reducing bank erosion
Goal 3 - Improved upland vegetation management	0	Project will not affect upland vegetation.
Goal 4 - Increased groundwater retention/storage in major aquifers	3	Prevents further channel degradation/widening and thereby prevents further reductions in water table elevations associated with a creeks in an alluvial basin, relative to no-action. Also results in incremental increase in bank storage.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	In the Meadow Valley alluvial groundwater basin (DWR-defined), in the Basin and Range province east of the Sierra Nevada crest.
Not road-decommissioning focus	3	--
Involves designated high priority (high sediment flux) watersheds	3	Spanish Creek Subwatershed, Main Stem or Upper Spanish Creek
Addresses Sierra Valley groundwater overdraft	0	--
Restores water storage and stability of meadow landforms	3	See Goals 2 and 4.
Restores lost/degraded riparian systems	3	Riparian vegetation coverage will increase, both via initial planting and through natural colonization of the stabilized site.

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Silver Creek in Meadow Valley (Burney's)</b>		<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-14
Increases upland vegetation cover through combination of intervention and management	0	Project will not affect upland vegetation.				
Achieves more than one resource benefit	3	Reduced sediment yield through channel stabilization, improved riparian habitat, prevent of further loss of groundwater storage and slightly increases it.				
Leverages Forum funding with other funding	0	None proposed.				
Leverages Forum funding with landowner contributions	3	Landowner reportedly contributed \$1,000 in undefined <i>in-kind services</i> , but no information regarding it is in the Forum's files.				
Involves landowner participation	1	Landowner has apparently formally agreed to protect the project area and manage it for continued recovery, with no time limit.; agreement is not in project record.				
Project documents available to the public	3	All Forum documents are available to the public.				
Involves or supports intervention	3	Direct watershed intervention				
Tier and Type	Tier1 Type1	Tier-type elements of retention of water to increase base flows and improvement of groundwater recharge are achieved primarily through prevention of reduced groundwater recharge and base flow, with only slight increases. Note: the project record does not indicate that a written land management plan for post-project recovery has been or will be prepared as required for this tier-type.				
Includes monitoring focused on project success/failure to meet intervention goals	3	Proposed monitoring includes photodocumentation of morphologic/riparian change.				
Entails educational component	1	No specific component, but project may be used for water resource restoration tours.				
Involves innovative intervention or monitoring	0	Intervention actions and monitoring techniques are well-established.				
<b>Consistency of Proposed Project with Forum Bylaws</b>						
<i>Bylaw 6</i> – Project conformity to Forum's selection principles:						
a. requested funding would be supplemented	0	None proposed.				
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Silver Creek in Meadow Valley (Burney's)</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-14
c. involves meadow landscapes and groundwater retention actions	3	See <i>Goal 4</i> and <i>Eastside Location</i> above.			
d. likely to attain performance criteria	3	<i>Performance criterion</i> established is continued integrity and stability of each project feature and the channel itself. The project features are likely to result in meeting these performance criteria.			
e. likely to increase education/awareness	1	No specific component, but project may be used for water resource restoration tours.			
<i>Bylaw 7</i> – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) ( <i>Note: subsequently rejected as a priority in FRWMS</i> )	0	No located in these watersheds.			
<i>Bylaw 8</i> – Consistent with long-range planning (i.e. FRWMS)	3	FRWMS consistency evaluated above.			
<b>Project Results</b>					
Implementation documented	na	Project construction pending.			
Success monitoring documented	na	Project construction pending.			
Lessons for future funding/implementation	Landowner contribution and participation should be better defined and documented.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	Spanish Creek in Meadow Valley (Kellet's)	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-15
<b>Funded Amount:</b>	\$147,000	<b>Fund:</b>	A	<b>Funding Date:</b>	23may06
<b>Description:</b>	<i>Watershed intervention:</i> Stabilized water surface elevation in an alluvial aquifer, and reduced sediment yield, using a suite of channel/floodplain actions				

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

Goal 1 - Augmented baseflow	3	Prevents reduction and augments slightly; see <i>Goal 4</i>
Goal 2 - Reduced sedimentation and improved bank protection	3	Actions are designed to stabilize the channel from further degradation or widening, thereby acting as bank protection and reducing bank erosion
Goal 3 - Improved upland vegetation management	0	Project will not affect upland vegetation.
Goal 4 - Increased groundwater retention/storage in major aquifers	3	Prevents further channel degradation/widening and thereby prevents further reductions in water table elevations associated with a creeks in an alluvial basin, relative to no-action. Also results in an incremental increase in bank storage.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	In the Meadow Valley alluvial groundwater basin (DWR-defined), in the Basin and Range province east of the Sierra Nevada crest.
Not road-decommissioning focus	3	--
Involves designated high priority (high sediment flux) watersheds	3	Spanish Creek Subwatershed, Main Stem or Upper Spanish Creek
Addresses Sierra Valley groundwater overdraft	0	--
Restores water storage and stability of meadow landforms	3	Yes; see <i>Goals 2 and 4</i> .
Restores lost/degraded riparian systems	3	Riparian vegetation coverage will increase, both via initial planting and through natural colonization of the stabilized site.

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Spanish Creek in Meadow Valley (Kellet's)</b>		<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-15
Increases upland vegetation cover through combination of intervention and management	0	Project will not affect upland vegetation.				
Achieves more than one resource benefit	3	Reduced sediment yield, improved riparian habitat, prevent of further loss of groundwater storage and slight increase.				
Leverages Forum funding with other funding	3	Plumas County, for culvert installation.				
Leverages Forum funding with landowner contributions	3	Landowner to contribute \$1,000 in undefined <i>in-kind services</i> .				
Involves landowner participation	1	Landowner has apparently formally agreed to protect the project area and manage it for continued recovery, with no time limit; agreement is not in project record.				
Project documents available to the public	3	All Forum documents are available to the public				
Involves or supports intervention	3	Direct watershed intervention.				
Tier and Type	Tier1 Type1	Tier-type elements of retention of water to increase base flows and improvement of groundwater recharge are achieved primarily through prevention of reduced groundwater recharge and base flow, with only slight increases. Note: the project record does not indicate that a written land management plan for post-project recovery has been or will be prepared as required for this tier-type.				
Includes monitoring focused on project success/failure to meet intervention goals (defined by Tier & Type policy)	3	Proposed monitoring includes photodocumentation of morphologic/riparian change.				
Entails educational component	1	No specific component, but project may be used for water-resource restoration tours.				
Involves innovative intervention or monitoring	0	Intervention actions and monitoring techniques are well-established.				
<b>Consistency of Proposed Project with Forum Bylaws</b>						
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:						
a. requested funding would be supplemented	3	By Plumas County.				
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Spanish Creek in Meadow Valley (Kellet's)</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-15
c. involves meadow landscapes and groundwater retention actions	3	Yes; see <i>Goal 4</i> and <i>Eastside Location</i> above.			
d. likely to attain performance criteria	3	<i>Performance criterion</i> established is continued integrity and stability of each project feature and the channel itself. The project features are likely to result in meeting these performance criteria.			
e. likely to increase education/awareness	1	No specific component, but project may be used for water-resource restoration tours.			
<i>Bylaw 7</i> – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) ( <i>Note: subsequently rejected as a priority in FRWMS</i> )	0	No located in these watersheds.			
<i>Bylaw 8</i> – Consistent with long-range planning (i.e. FRWMS)	3	FRWMS consistency evaluated above.			
<b>Project Results</b>					
Implementation documented	na	Project construction pending.			
Success monitoring documented	na	Project construction pending.			
Lessons for future funding/implementation	Landowner contribution and participation should be better defined and documented.				

Plumas Watershed Forum – 2008 Program Review Project Evaluation Matrix					
<b>Project:</b>	Ramelli Ditch Replacement	<b>Sponsor:</b>	Plumas National Forest	<b>Review Number:</b>	A-16
<b>Funded Amount:</b>	\$85,000	<b>Fund:</b>	A	<b>Funding Date:</b>	23may06
<b>Description:</b>	<i>Watershed intervention:</i> place pipeline in a 1.5 mile-long ranch irrigation ditch to avoid sediment yield from impending ditch failure. (Note: project proposal served as contractual scope of work for the funding agreement.)				
Forum Goal, Bylaw, or Strategy		Evaluation Rating	Rationale and/or Comments		
Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, <u>or</u> 0 – no contribution or consistency.					
Consistency of Proposed Project with Settlement Agreement Goals					
Goal 1 - Augmented baseflow	0	The historic ditch is subject to seepage, which probably incrementally increased baseflow downstream in Grizzly Creek and/or the Middle Fork of the Feather River. Piping the ditch flow terminates this seepage, with the result that less water will be drawn through the ditch for pasture irrigation, resulting in incrementally larger groundwater recharge from the Grizzly Ice Pond (source for ditch flow) or from incrementally increased flow in Grizzly Creek, or, if more water is retained in Lake Davis, possible reduced groundwater recharge. The net result of the ditch piping project on baseflow in the MFFR may be neutral or negative, but the Forum’s records contain no assessment of probably changes in groundwater recharge or baseflow.			
Goal 2 - Reduced sedimentation and improved bank protection	3	The primary purpose of the project is to prevent the ditch from failing and discharging water and eroding soils into Grizzly Creek.			
Goal 3 - Improved upland vegetation management	1	The project sponsor states that if the ditch were to fail in the absence of the project, downstream pasture irrigation would cease and the pasture would be converted to a “dry dust bowl of weeds and bare ground, which would exacerbate sediment discharge from the uplands”. No analysis by the sponsor of this potential outcome in the absence of the project is in the Forum’s records. In the absence of pasture irrigation, the lands may revert to native dry meadow grassland or coniferous forest, which may provide similar soil cover as irrigated pasture grasses but with less evapotranspiration losses.			
Goal 4 - Increased groundwater retention/storage in major aquifers	0	See Goal 1 above.			
Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)					
Eastside location	3	Project is located in the Sierra Valley alluvial groundwater basin, in the Basin and Range province east of the Sierra Nevada crest.			
Not road-decommissioning focus	3	No road decommissioning is proposed.			
Involves designated high priority (high sediment flux) watersheds	3	Project is in the Sierra Valley Subwatershed.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Ramelli Ditch Replacement</b>	<b>Sponsor:</b>	<b>Plumas National Forest</b>	<b>Review Number:</b>	<b>A-16</b>
Addresses Sierra Valley groundwater overdraft	0	The project is located in Sierra Valley, but as described under <i>Goal 1</i> above, the project is likely neutral with respect to effects on groundwater recharge or withdrawal.			
Restores water storage and stability of meadow landforms	0	Regarding water storage, see <i>Goal 1</i> above. The project restores ditch stability and therefore bank and channel stability of Grizzly Creek. However, Grizzly Creek is not a meadow landform.			
Restores lost/degraded riparian systems	1	Project may prevent damage to existing riparian systems along Grizzly Creek, depending upon the nature of a ditch failure episode in absence of the ditch-piping project.			
Increases upland vegetation cover through combination of intervention and management	1	Regarding intervention, see <i>Goal 3</i> above.			
Achieves more than one resource benefit	3	Water quality protection (reduced sedimentation and possible streambank protection) and preservation of agricultural productivity.			
Leverages Forum funding with other funding	3	Major funding from the National Forest Foundation Centennial Year Challenge, and design and environmental documentation costs covered by sponsor (USFS).			
Leverages Forum funding with landowner contributions	3	Although the ditch/pipeline crosses several parcels in private ownership, the ditch easement and benefitting irrigated lands are now National Forest System Lands. The federal landowner contributed costs of project design and environmental clearance.			
Involves landowner participation	3	The USFS secured funding and project approvals, solicited a construction contractor, and oversaw the construction.			
Project documents available to the public	3	All Forum documents are available to the public. USFS has several processes for ensuring public notice of all of its projects (e.g. quarterly Schedule of Proposed Actions).			
Involves or supports intervention	3	Direct intervention to protect water quality.			
Tier and Type	Tier1 Type4	Preventative project (although this tier-type category primarily entails land-use regulatory actions).			
Includes monitoring focused on project success/failure to meet intervention goals	0	The project scope of work (proposal) does not specify or discuss any project monitoring.			
Entails educational component	0	No educational component.			
Involves innovative intervention or monitoring	0	Replacement of open ditch with piped flow has been undertaken extensively in recent years.			
<b>Consistency of Proposed Project with Forum Bylaws</b>					
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:					



**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Ramelli Ditch Replacement</b>	<b>Sponsor:</b>	Plumas National Forest	<b>Review Number:</b>	A-16
a. requested funding would be supplemented	3	See <i>Leverages Forum funding with other funding</i> above.			
b. action linked to the strategic plan	3	See <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.			
c. involves meadow landscapes and groundwater retention actions	0	No groundwater retention action. Does not involve meadow landscape. See <i>Restores water storage and stability of meadow landforms</i> section above.			
d. likely to attain performance criteria	3	Yes. Although performance criteria (or monitoring) were not formally established, it can be assumed that the performance criterion was to confine the energy of flowing water to a pipe rather than an erodible ditch. This outcome was accomplished.			
e. likely to increase education/awareness	0	No education/awareness component.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	0	Project is not in these watersheds.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	Yes; see <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.			
<b>Project Results</b>					
Implementation documented	Y	Final report states that the pipeline was successfully installed.			
Success monitoring documented	N	No monitoring and performance criteria was established, but the project is certain to have accomplished the project purpose. See <i>d. likely to attain performance criteria</i> above.			
Lessons for future funding/implementation	Project entailed pipeline construction crossing several private properties, and this required considerable landowner coordination which was not adequately scoped in the project proposal.				

Plumas Watershed Forum – 2007 Program Review Project Evaluation Matrix					
<b>Project:</b>	Little Last Chance Creek Channel Restoration	<b>Sponsor:</b>	Feather River CRM	<b>Review Number:</b>	A-17
<b>Amount:</b>	\$92,977	<b>Fund:</b>	A	<b>Funding Date:</b>	23may06
<b>Description:</b>	<i>Watershed intervention:</i> raised stream and groundwater surface elevation in an alluvial aquifer, and reduced sediment yield . Includes installation of rock riffles in entrenched channels of North and West Creeks, tributaries to Little Last Chance Creek in Sierra Valley – design and partial construction.				
Forum Goal, Bylaw, or Strategy		Evaluation Rating	Rationale and/or Comments		
Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, <u>or</u> 0 – no contribution or consistency.					
Consistency of Proposed Project with Settlement Agreement Goals					
Goal 1 - Augmented baseflow	3	Prevents reduction; see Goal 4			
Goal 2 - Reduced sedimentation and improved bank protection	3	Rock riffles are designed to stabilize the channel from further degradation or widening, thereby acting as bank protection and reducing bank erosion			
Goal 3 - Improved upland vegetation management	0	Project will not affect upland vegetation.			
Goal 4 - Increased groundwater retention/storage in major aquifers	3	Prevents further channel degradation/widening and raises stream and water table elevations of two creeks in an eastside alluvial basin. Causes water table to rise an average of 3 feet over an affected area of about 750 acres.			
Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)					
Eastside location	3	Along tributaries to Little Last Chance Creek, in the north end of Sierra Valley alluvial groundwater basin (DWR-defined) in the Basin and Range province east of the Sierra Nevada crest.			
Not road-decommissioning focus	3	--			
Involves designated high priority (high sediment flux) watersheds	3	Sierra Valley.			
Addresses Sierra Valley groundwater overdraft	3	Increase in total basin storage.			
Restores water storage and stability of meadow landforms	3	Yes; see Goals 2 and 4.			
Restores lost/degraded riparian systems	3	Riparian vegetation coverage will increase, both via initial planting and through colonization of the stabilized site. Modified grazing management through new fence construction by landowner will encourage riparian growth.			

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Little Last Chance Creek Channel Restoration</b>		<b>Sponsor:</b>	Feather River CRM		<b>Review Number:</b>	A-17
Increases upland vegetation cover through combination of intervention and management	0	Project will not affect upland vegetation.					
Achieves more than one resource benefit	3	Groundwater/baseflow augmentation, reduction in sediment yield, improved fish and riparian habitat, and increased forage production.					
Leverages Forum funding with other funding	3	Part of a larger project, the remainder of which involved State Prop. 40 funding. Project also includes contributions from USFS and the RAC.					
Leverages Forum funding with landowner contributions	3	Landowner contributed new fencing to protect restored streambanks, deferred grazing, and permitted survey and reporting work.					
Involves landowner participation	3	Restored stream system is part of ranch meadow irrigation system: landowner will serve as monitor and restoration steward and has incentive to do so. Specific requirements are not present in the project record.					
Project documents available to the public	3	All Forum documents available to the public.					
Involves or supports intervention	3	Direct watershed intervention					
Tier and Type	Tier1 Type1 Tier1 Type2	--					
Includes monitoring focused on project success/failure to meet intervention goals	3	Proposed monitoring includes changes in stream temperatures, soil moisture, fish habitat quality, fish populations; and photodocumentation of riparian vegetation. Water table elevations will not be monitored, since benefits have been previously demonstrated on similar projects.					
Entails educational component	1	No specific component, but project may be used in water-resource restoration tours.					
Involves innovative intervention or monitoring	0	Intervention actions and monitoring technology are well-established.					
<b>Consistency of Proposed Project with Forum Bylaws</b>							
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:							
a. requested funding would be supplemented	3	Landowner contributed new fencing to protect restored streambanks through deferral of grazing, and permits survey and reporting work.					
b. action linked to the strategic plan	3	FRWMS consistency evaluated above					
c. involves meadow landscapes and groundwater retention actions	3	See <i>Goal 4</i> above.					

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Little Last Chance Creek Channel Restoration</b>	<b>Sponsor:</b>	Feather River CRM	<b>Review Number:</b>	A-17
d. likely to attain performance criteria	0	Although monitoring variables were specified, performance criteria for success were not.			
e. likely to increase education/awareness	1	No specific component, but project may be used in water-resource restoration tours.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently repudiated as a priority by FRWMS)</i>	0	Not focused in these watersheds.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	FRWMS consistency evaluated above.			
<b>Project Results</b>					
Implementation documented	Y	Via quarterly report/invoices.			
Success monitoring documented	na	Project just constructed (fall 2007). Pre-project monitoring of proposed monitoring indicators is in Forum's record.			
Lessons for future funding/implementation	Monitoring of groundwater depths should be a part of all direct intervention projects, since it is the variable most highly related to the goals of the Monterey Agreement and is important to tracking benefits of the restoration program. Landowner contribution and participation should be better defined and documented.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Dixie Creek Restoration</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-18
<b>Funded Amount:</b>	\$56,704	<b>Fund:</b>	A	<b>Funding Date:</b>	23may06
<b>Description:</b>	<i>Watershed intervention:</i> Raised stream and water table elevations in alluvial aquifer and reduced sediment yield, using pond-and-plug technology				

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1</i> - Augmented baseflow	3	Increasing shallow groundwater storage in alluvial aquifers will result in augmented baseflow; See <i>Goal 4</i> .
<i>Goal 2</i> - Reduced sedimentation and improved bank protection	3	Streamflow removed from entrenched channel and restored to remnant channel on meadow surface, eliminating widening of incised channel and resulting sediment yield, and facilitating growth of stabilizing bank vegetation.
<i>Goal 3</i> - Improved upland vegetation management	0	Project will not affect upland vegetation.
<i>Goal 4</i> - Increased groundwater retention/storage in major aquifers	3	Prevents further channel degradation/widening and raises stream water surface elevations and groundwater surface elevations in eastside alluvial basin. Causes water table to rise an average of 6 feet over an affected area of about 12 acres.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	In Clover Valley alluvial groundwater basin (DWR-defined), in the Basin and Range province east of the Sierra Nevada crest.
Not road-decommissioning focus	3	--
Involves designated high priority (high sediment flux) watersheds	3	Red Clover Subwatershed, Dixie Creek unit.
Addresses Sierra Valley groundwater overdraft	0	--
Restores water storage and stability of meadow landforms	3	Yes, see <i>Goals 2 and 4</i> .
Restores lost/degraded riparian systems	3	Restores flow to remnant stream channel on meadow surface. Riparian vegetation planted to stabilize plugs and will tend to persist/increase with stabilized meadow landform.

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Dixie Creek Restoration</b>		<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-18
Increases upland vegetation cover through combination of intervention and management	0	Project will not affect upland vegetation.				
Achieves more than one resource benefit	3	Groundwater/baseflow augmentation, improved clarity of streamflow, riparian habitat.				
Leverages Forum funding with other funding	3	CALFED funding for first phase of this project. USFS for rock materials for this phase.				
Leverages Forum funding with landowner contributions	0	Landowner contribution not evident in project record.				
Involves landowner participation	3	Landowner participated in meetings of the Technical Advisory Committee, conducted design review, and proposed post-project land management.				
Project documents available to the public	3	All Forum documents are available to the public.				
Involves or supports intervention	3	Direct watershed intervention.				
Tier and Type	Tier1 Type1	--				
Includes monitoring focused on project success/failure to meet intervention goals	3	Monitoring includes 1) photodocumentation of morphologic/riparian change pertaining to project goal of restoring meadow hydrology, and 2) stream temperature monitoring as surrogate for increased alluvial storage.				
Entails educational component	1	No specific component, but project may be used in water-resource restoration tours.				
Involves innovative intervention or monitoring	3	Yes; the pond and plug design is an innovative and apparently successful method of restoring stream and water table elevations.				
<b>Consistency of Proposed Project with Forum Bylaws</b>						
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:						
a. requested funding would be supplemented	3	CALFED funding for first phase of this project. USFS for rock materials for this phase.				
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.				
c. involves meadow landscapes and groundwater retention actions	3	See <i>Goal 4</i> above.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Dixie Creek Restoration</b>		<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-18
d. likely to attain performance criteria	3	<i>Performance criteria</i> established are higher summer baseflows, cooler summer water temperatures, attenuated floodflows, and visually improved riparian vegetation, but only stream temperature, and morphologic/riparian vegetation change will be monitored. All of these performance criteria are likely to be met by a pond and plug project design.				
e. likely to increase education/awareness	1	No specific component, but project may be used in water-resource restoration tours.				
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	0	Not located in these watersheds.				
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	FRWMS consistency evaluated above.				
<b>Project Results</b>						
Implementation documented	Y	Via quarterly and annual reports and invoices.				
Success monitoring documented	na	Project just constructed (Fall 2007). Monitoring has been initiated.				
Lessons for future funding/implementation	Pond-and-plug projects provide a very direct and effective means of meeting the goals of the Settlement Agreement.					

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Last Chance Creek at Ferris Fields Restoration</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-19
<b>Funded Amount:</b>	\$107,011	<b>Fund:</b>	A	<b>Funding Date:</b>	23may06

**Description:** *Watershed intervention:* Raised stream and water table surface elevations in alluvial aquifer and reduced sediment yield using pond-and-plug technology.

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1</i> - Augmented baseflow	3	Increasing shallow groundwater storage in alluvial aquifers will result in augmented baseflow; See <i>Goal 4</i> .
<i>Goal 2</i> - Reduced sedimentation and improved bank protection	3	Streamflow removed from entrenched channel and restored to remnant channel on meadow surface, eliminating widening of incised channel and resulting sediment yield, and facilitating growth of stabilizing bank vegetation.
<i>Goal 3</i> - Improved upland vegetation management	0	Project will not affect upland vegetation.
<i>Goal 4</i> - Increased groundwater retention/storage in major aquifers	3	Prevents further channel degradation/widening and raises stream and groundwater surface elevations in eastside alluvial basin. Causes water table to rise an average of 5 feet over an affected area of about 85 acres.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	At Last Chance – Ferris Creeks confluence in Last Chance Creek Valley alluvial groundwater basin (DWR-defined), in the Basin and Range province east of the Sierra Nevada crest.
Not road-decommissioning focus	3	--
Involves designated high priority (high sediment flux) watersheds	3	Last Chance Subwatershed, Main Stem.
Addresses Sierra Valley groundwater overdraft	0	--
Restores water storage and stability of meadow landforms	3	Yes, see <i>Goals 2 and 4</i> .
Restores lost/degraded riparian systems	3	Restores flow to remnant stream channel on meadow surface. Riparian vegetation planted to stabilize plugs and will tend to persist/increase with stabilized meadow landform.



**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Last Chance Creek at Ferris Fields Restoration</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-19
Increases upland vegetation cover through combination of intervention and management	0	Project will not affect upland vegetation.			
Achieves more than one resource benefit	3	Groundwater/baseflow augmentation, improved clarity of streamflow, riparian habitat.			
Leverages Forum funding with other funding	3	Restoration in the project area was undertaken in two phases. CALFED funded for first phase. The Forum funded most of the second phase, with USFS contributing fencing materials.			
Leverages Forum funding with landowner contributions	3	Landowner is USFS, which contributed fencing and is managing livestock to ensure establishment and recovery of riparian vegetation.			
Involves landowner participation	3	Landowner agreement to protect project from grazing until vegetation has established/recovered.			
Project documents available to the public	3	All Forum documents are available to the public.			
Involves or supports intervention	3	Direct watershed intervention.			
Tier and Type	Tier1 Type1	--			
Includes monitoring focused on project success/failure to meet intervention goals	3	Monitoring includes continuous streamflow and water temperature in Last Chance Creek 0.5 mile upstream and 9 miles downstream, to document increased alluvial storage. At project site, stream temperature measurements and photodocumentation of morphologic/riparian change, including beaver activity.			
Entails educational component	1	No specific component, but project may be used in water-resource restoration tours.			
Involves innovative intervention or monitoring	3	Yes; the pond and plug design is an innovative and apparently successful method of restoring stream and water table elevations.			
<b>Consistency of Proposed Project with Forum Bylaws</b>					
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:					
a. requested funding would be supplemented	3	Restoration in the project area was undertaken in two phases. CALFED funded for first phase. The Forum funded most of the second phase, with USFS contributing fencing materials.			
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.			
c. involves meadow landscapes and groundwater retention actions	3	See Goal 4 above.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Last Chance Creek at Ferris Fields Restoration</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	A-19
d. likely to attain performance criteria	3	See monitoring item above. <i>Performance criteria</i> established are higher summer baseflows, cooler summer water temperatures, attenuated floodflows, and visually improved riparian vegetation. all of which were proposed to be monitored. All of these performance criteria are likely to be met by a pond and plug project design.			
e. likely to increase education/awareness	1	No specific component, but project may be used in water-resource restoration tours.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	0	No located in these watersheds.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	FRWMS consistency evaluated above.			
<b>Project Results</b>					
Implementation documented	Y	Via quarterly and annual reports and invoices.			
Success monitoring documented	na	<p>Project recently constructed ( August 2007), and monitoring initiated.</p> <p>Because monitoring is conducted with funds from several sources, monitoring data is stored in the CRM’s centralized monitoring files and on the website, <a href="http://www.feather-river-crm.org/monitoring">www.feather-river-crm.org/monitoring</a>, and summarized yearly in a annual Watershed Monitoring Program report. The Forum is one of the monitoring program funders.</p> <p>Monitoring data indicate that pond-and-plug projects, including this project, successfully raise groundwater levels in treated areas, result in increased riparian and meadow vegetation and may be augmenting dry-season streamflow in recharged streams, reducing peak floodflows, and lowering dry season temperatures.</p>			
Lessons for future funding/implementation	Pond-and-plug projects provide a very direct and effective means of meeting the goals of the Settlement Agreement.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Lake Davis Water Treatment Plant</b>	<b>Sponsor:</b>	Plumas County Flood Control and Water Quality District	<b>Review Number:</b>	A-20
<b>Funded Amount:</b>	\$588,260 (Including \$100,000 loan against future B funds.)	<b>Fund:</b>	A	<b>Funding Date:</b>	May05; Oct07
<b>Description:</b>	Supplement to local funding for construction of a replacement water treatment plant for domestic use of water from Lake Davis (a reservoir of the State Water Project) for the City of Portola, an incorporated city in eastern Plumas County. No project file or funding agreement exists.				

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1</i> - Augmented baseflow	1	To the degree that the City of Portola does not need to increase its use or may decrease its use of groundwater in the Humbug Valley groundwater basin, the basin will provide increased retention/storage of precipitation and runoff there, but potentially augmented baseflow in the Middle Fork of the Feather River below Humbug Valley would likely be offset by reduced baseflow from Grizzly Creek recharge of the lower Sierra Valley groundwater basin.
<i>Goal 2</i> - Reduced sedimentation and improved bank protection	0	None. Construction erosion control BMPs will be used to prevent increased sediment yield.
<i>Goal 3</i> - Improved upland vegetation management	0	No upland vegetation element.
<i>Goal 4</i> - Increased groundwater retention/storage in major aquifers	1	To the degree that the City of Portola does not need to increase its use or may decrease its use of groundwater in the Humbug Valley groundwater basin and avoids use of Sierra Valley groundwater (an alternative to the proposed project), the basins will provide increased retention/storage of precipitation and runoff.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	Humbug Valley alluvial groundwater basin, in the Basin and Range province east of the Sierra Nevada crest.
Not road-decommissioning focus	3	--
Involves designated high priority (high sediment flux) watersheds	2	Humbug Valley is not in a high priority watershed. Adjoining Sierra Valley (location of avoided groundwater withdrawal) is a high priority watershed.
Addresses Sierra Valley groundwater overdraft	2	Sierra Valley groundwater was considered as an alternative source of water for the City of Portola. By avoiding that alternative, the project avoids increased drafting of Sierra Valley groundwater.
Restores water storage and stability of meadow landforms	1	See <i>Goal 4</i> . Also, avoidance of dewatering the Humbug Valley groundwater basin will tend to avoid induced instability of streambanks in meadows of Humbug Valley.

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

Project:	Lake Davis Water Treatment Plant		Sponsor:	Plumas County Flood Control and Water Quality District	Review Number:	A-20
Restores lost/degraded riparian systems	1	Prevents decreased water table elevation, which may have been sufficient to further degrade riparian systems.				
Increases upland vegetation cover through combination of intervention and management	0	No upland vegetation element.				
Achieves more than one resource benefit	3	Benefits are avoidance of groundwater withdrawals from Humbug Valley or Sierra Valley, improved municipal water supply, and, indirectly, reduced likelihood of adverse effects on fish resources and operation of the State Water Project at Oroville Reservoir.				
Leverages Forum funding with other funding	3	Funding is shared by the U.S. Army Corps of Engineers as the federal sponsor; Plumas County FCD, the County of Plumas, the City of Portola, and Grizzly Lake Resort Improvement District as the local sponsors; and the Department of Public Health Drinking Water State Revolving Fund.				
Leverages Forum funding with landowner contributions	3	Current owner (Plumas County Flood Control District) and future owner (City of Portola) are providing approximately \$2.4 million in funding (not including Watershed Forum funding).				
Involves landowner participation	3	Plumas County and City of Portola (landowners) are thoroughly involved in the project as the local sponsors. The City of Portola will become the owner and operator of the finished facility.				
Project documents available to the public	3	All Forum documents are available to the public. CEQA and NEPA review was completed with public process. Army Corps of Engineers conducted environmental impact review according to CEQA and NEPA, which included public review of a draft environmental document. All project documentation not subject to federal procurement confidentiality rules is and will be available to the public.				
Involves or supports intervention	1	See <i>Goals 1 and 4</i> above.				
Tier and Type	--	Project does not conform to any tier-type categories.				
Includes monitoring focused on project success/failure to meet intervention goals	3	Monitoring will include tracking of water quality constituents in the treated water and formal certification to meet State health standards. Construction site impact monitoring was specified in NEPA-CEQA review.				
Entails educational component	0	--				
Involves innovative intervention or monitoring	0	--				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Lake Davis Water Treatment Plant</b>	<b>Sponsor:</b>	Plumas County Flood Control and Water Quality District	<b>Review Number:</b>	A-20
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**Consistency of Proposed Project with Forum Bylaws**

<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:		
a. requested funding would be supplemented	3	See <i>Leverages Forum funding with landowner contributions</i> above.
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.
c. involves meadow landscapes and groundwater retention actions	3	See <i>Goal 4</i> . Avoidance of groundwater withdrawals from the the Humbug Valley and Sierra Valley groundwater basins will tend to avoid induced instability of streambanks in meadows of Humbug and Sierra Valley.
d. likely to attain performance criteria	3	Performance criteria include meeting State health standards for treated water to obtain certification by the Department of Public Health and precluding significant environmental impacts from construction. It is likely that these criteria can be met.
e. likely to increase education/awareness	0	No educational awareness component.
<i>Bylaw 7</i> – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) ( <i>Note: subsequently rejected as a priority in FRWMS</i> )	3	WTP and Lake Davis reservoir are in the Lake Davis watershed.
<i>Bylaw 8</i> – Consistent with long-range planning (i.e. FRWMS)	3	FRWMS consistency evaluated above.

**Project Results**

Implementation documented	Y	The project has been bid, a construction contract has been awarded, and a notice to proceed has been issued by U.S. Army Corps of Engineers, for which the Forum funds will be used.
Success monitoring documented	na	Construction is scheduled to begin in the spring of 2008.
Lessons for future funding/implementation	The Forum should make written findings documenting how each proposed project is expected to further the goals of the Agreement and is consistent with the Forum’s strategies and other policies. The Forum should establish a project record and funding agreement for all projects, even for projects sponsored by one of its members.	

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Upland Vegetation Management</b>	<b>Sponsor:</b>	Plumas Corporation	<b>Review Number:</b>	A-21 & B-1
<b>Funded Amount:</b>	\$102,755	<b>Fund:</b>	A – \$22,012 and B – \$80,743	<b>Funding Date:</b>	13aug03 or 27jan04, 26oct04, 23may05,

**Description:** *Watershed intervention support:* funds used to seek funding from other sources and continue the fuels reduction activities of the Plumas County Fire Safe Council (FSC) (primarily on private lands), and funds used to support administration of the Quincy Library Group (QLG) in its advocacy of healthy forests (thinning and improved silviculture) and creation of defensible fuel profile zones primarily on public lands. (The Forum's files do not include a scope of work attached to the first funding agreement.)  
Other activities for which initial funding was used include database development for a bibliography of the influence of forest structure on wildfire behavior and severity; coordination with the Feather River CRM on inclusion of water yield from upland vegetation in its water modeling program; and analyzing potential private land use of lands within the Plumas National Forest that the USFS identified as "available for exchange". (The Forum's files do not include a scope of work prescribing these other activities.)

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1 - Augmented baseflow</i>	FSC 3 QLG 2	Upland vegetation thinning diminishes evapotranspiration and if carried out extensively would augment baseflow in some watersheds (the effect, although estimable, may be difficult to perceive due to natural streamflow variability). The magnitude of this effect at one site has recently been studied in the watershed through a Forum-funded project (see project B-7) and through a watershed-wide study of the effects of the QLG program by a consultant to the HFQLG Forest Service team (Troendle and Nankervis 2007).
<i>Goal 2 - Reduced sedimentation and improved bank protection</i>	FSC 3 QLG 2	Both the FSC and QLG are focused on reducing the extent and severity of wildland fire. To the degree that their efforts succeed, as recent fire incidents indicate they will (e.g. Fites et al 2007), sediment yield and peak rates of runoff to the Feather River and its tributaries will be appreciably reduced by an estimable amount.
<i>Goal 3 - Improved upland vegetation management</i>	FSC 3 QLG 2	Both organizations are focused upon creating healthy, fire-resistant forests with continuous vegetative cover. FSC does so directly, QLG indirectly through discussions with the USFS.
<i>Goal 4 - Increased groundwater retention/storage in major aquifers</i>	1	To the degree that baseflow is augmented, some alluvial aquifers may capture more stream runoff, but during baseflow meadows are generally discharging; see <i>Goal 1</i> .

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Upland Vegetation Management</b>	<b>Sponsor:</b>	Plumas Corporation	<b>Review Number:</b>	A-21 & B-1
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**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	Most of the lands addressed by the FSC and the QLG are east of the Sierra Nevada crest.
Not road-decommissioning focus	FSC 3 QLG 2	Road-decommissioning is not a focus of the FSC but is one of QLG. Every QLG project includes a road decommissioning component. However, the use of the Forum funding by QLG is not focused on advocating road decommissioning but on reducing fuel hazards of upland vegetation.
Involves designated high priority (high sediment flux) watersheds	3	High priority watersheds, as well as lower priority watersheds, would likely benefit from the effects of the FSC and QLG.
Addresses Sierra Valley groundwater overdraft	0	Not a focus of FSC and QLG programs.
Restores water storage and stability of meadow landforms	1	See goal consistency section above.
Restores lost/degraded riparian systems	1	Forest thinning projects under both programs may benefit riparian ecosystems within the upland vegetation matrix, if harvest prescriptions allow, and they could have positive effects on valley riparian systems.
Increases upland vegetation cover through combination of intervention and management	1	These two organizations are focused on reducing tree density and canopy cover, which results in conditions suitable for increased ground cover. The net effect on vegetative cover is likely neutral.
Achieves more than one resource benefit	FSC 3 QLG 2	In addition to reducing fire extent and severity, the vegetation management programs of these organizations reduce sediment yield and improve water quality, improve riparian and fish habitat, and improve and protect upland habitats for many species.
Leverages Forum funding with other funding	FSC 3 QLG 1	The purpose of the Forum-funding of the FSC is to allow acquisition of project-level funding from other sources, such as Title II and III funds, USFS, BLM, Northern Sierra Air Quality Management District, and the Resource Advisory Council (RAC). Funds for QLG administration and advocacy of improved forest management may be used to obtain additional funding.
Leverages Forum funding with landowner contributions	FSC 3 QLG 0	Landowners cooperating with the FSC contribute the removed wood products to defray some of project costs.
Involves landowner participation	3	FSC projects involve landowner participation. QLG activities are aimed at influencing management of National Forest System lands.
Project documents available to the public	3	All Forum documents are available to the public.
Involves or supports intervention	3	The Forum funds were used to facilitate FSC intervention activities and to influence USFS intervention activities.
Tier and Type	--	The FSC and QLG projects do not fit into any of the Tier-Type categories.

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Upland Vegetation Management</b>	<b>Sponsor:</b>	Plumas Corporation	<b>Review Number:</b>	A-21 & B-1
Includes monitoring focused on project success/failure to meet intervention goals	0	No monitoring of use of Forum funds by the FSC and QLG were proposed, but the FSC has well-defined monitoring protocol for projects that it funds. The USFS also extensively monitors implementation of the Herger-Feinstein Quincy Library Group Forest Recovery Act.			
Entails educational component	3	Efforts of the QLG are directed at educating the public and public agencies implementing upland vegetation management. FSC projects have included several educational (non-intervention) projects.			
Involves innovative intervention or monitoring	FSC 0 QLG 3	A primary purpose of the QLG is to advocate innovative management of USFS lands to reduce fire extent and severity.			
<b>Consistency of Proposed Project with Forum Bylaws</b>					
<i>Bylaw 6 – Project conformity to Forum’s selection principles:</i>					
a. requested funding would be supplemented	FSC 3 QLG 1	See <i>Leverages Forum funding with other funding</i> above.			
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.			
c. involves meadow landscapes and groundwater retention actions	1	Groundwater storage and meadow stability may benefit from activities of the FSC and QLG; see <i>Goal 4</i> above.			
d. likely to attain performance criteria	3	Project performance criteria are continued expansion of FSC acreage and funding to include at least 250 acres per year, and broadened implementation of the USFS HFQLG program to 40,000 acres per year. The former is likely attainable; the latter depends primarily upon USFS funding as driven by federal law (QLG Forest Recovery Act), but the presence of QLG ensures continuing high-level USFS effort.			
e. likely to increase education/awareness	3	FSC and QLG have been effective at educating the public and public agencies regarding upland vegetation management.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	FSC 1 QLG 3	These subwatersheds are among those that would likely benefit from improved upland vegetation management advocated by QLG. FSC projects are not generally targeted at these subwatersheds.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	FRWMS consistency evaluated above.			



**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Upland Vegetation Management</b>	<b>Sponsor:</b>	Plumas Corporation	<b>Review Number:</b>	A-21 & B-1
<b>Project Results</b>					
Implementation documented	Y	Via quarterly reports/invoices.			
Success monitoring documented	N	An accounting of FSC and USFS activities meeting the two performance criteria above was part of the second project agreement, but has not been submitted for subsequent time periods. The increase in rate of implementation of the USFS HFQLG program during the funded project period is not in the Forum’s records. Reporting provided for this review from the project sponsor indicates that FSC acreage increased from 116 to 593 to 1239 acres per year and averaged 650 acres per year during the Forum funding period (in excess of the performance criteria of 250 acres/year).			
Lessons for future funding/implementation		<p>Project funding appropriately includes intervention and awareness efforts to benefit upland systems, with correlative benefits to riparian/aquatic systems, importantly contributing attainment of the goals of the Monterey Settlement Agreement.</p> <p>In future Forum funding, the two elements of the Plumas Corporation’s Upland Vegetation Management Program should be separated for accounting and program-effectiveness-review purposes. These two elements—FSC as direct intervention, and QLG as indirect intervention—contribute differently to degree of implementation of Forum goals and policies.</p>			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Water Education Program</b>	<b>Sponsor:</b>	Plumas Unified School District	<b>Review Number:</b>	B-2
<b>Funded Amount:</b>	\$34,000 (\$11,000 initially, \$23,000 subsequently)	<b>Fund:</b>	B	<b>Funding Date:</b>	aug04, dec04

**Description:** *Watershed management:* year-long 6<sup>th</sup> grade course in watershed education/awareness in Plumas County schools (as documented in a proposal for the subsequent funding; no information about the use of the initial \$11,000 grant [for Portola-area schools] is in the Forum's records). The course, initiated via the Forum's funding, has been continued with other funding and has become a successful component of county's instructional program. (No funding agreement is in the Forum's records.)

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

Goal 1 - Augmented baseflow	2	Heightened awareness of watershed issues among local watershed residents (in this case, the upper Feather River watershed) is a proven strategy for the protection and restoration of watershed functions.
Goal 2 - Reduced sedimentation and improved bank protection	2	See Goal 1 above.
Goal 3 - Improved upland vegetation management	2	See Goal 1 above.
Goal 4 - Increased groundwater retention/storage in major aquifers	2	See Goal 1 above.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	Course was given in schools in the American Valley, Indian Valley, Lake Almanor Valley, and Humbug Valley alluvial groundwater basins (DWR-defined), all of which are in the Basin and Range province east of the Sierra Nevada crest.
Not road-decommissioning focus	3	Project had wide focus but involved no direct intervention.
Involves designated high priority (high sediment flux) watersheds	3	The education/awareness program extended to the entire upper Feather River watershed.
Addresses Sierra Valley groundwater overdraft	3	This was one of the course study elements.
Restores water storage and stability of meadow landforms	2	Course study element.

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Water Education Program</b>		<b>Sponsor:</b>	Plumas Unified School District	<b>Review Number:</b>	B-2
Restores lost/degraded riparian systems	2	Course study element.				
Increases upland vegetation cover through combination of intervention and management	2	Course study element.				
Achieves more than one resource benefit	3	Increased local awareness increases protection of water quality, water quantity, riparian vegetation, upland vegetation, and fish and wildlife.				
Leverages Forum funding with other funding	3	Community fund-raisers, Rotary, and Plumas Unified School District during the specific years of Forum funding.				
Leverages Forum funding with landowner contributions	0	Major landowners in the watershed include the USFS, timber producers, ranchers, and PG&E. These entities did not contribute funding to the course.				
Involves landowner participation	3	Major landowners participated in the instruction, including USFS, PG&E, ranchers, timberland owners (e.g. Collins Pine) (as well as public agencies including the Quincy Community Services District and California Departments of Fish & Game and Water Resources).				
Project documents available to the public	3	All Forum documents are available to the public.				
Involves or supports intervention	3	Supports watershed intervention and management.				
Tier and Type	Tier1 Type4	Preventative project.				
Includes monitoring focused on project success/failure to meet intervention goals	0	No course-implementation monitoring was proposed.				
Entails educational component	3	Project is wholly educational; see <i>likely to increase education/awareness</i> below.				
Involves innovative intervention or monitoring	3	The innovative education program was designed by and specifically for residents of the upper Feather River watershed, and focused on the importance of the watershed to the State Water Project and other downstream users.				
<b>Consistency of Proposed Project with Forum Bylaws</b>						
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:						
a. requested funding would be supplemented	3	See <i>Leverages Forum funding with other funding</i> above.				
b. action linked to the strategic plan	3	See <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.				
c. involves meadow landscapes and groundwater retention actions	3	Course study element.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Water Education Program</b>	<b>Sponsor:</b>	Plumas Unified School District	<b>Review Number:</b>	B-2
d. likely to attain performance criteria	3	No performance criteria are in the Forum’s records. However, the ongoing program that grew out of the Forum-funded first program year now includes a robust assessment/evaluation process, which include knowledge gained by students and degree of success perceived by teachers and community partners.			
e. likely to increase education/awareness	3	The program is a well-conceived education in watershed and water resources for children at an optimum age. Improved stewardship of upper Feather River watershed will result for continued funding of this innovative and important program.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	3	Course study element.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	See <i>Consistency of Proposed Project with Priorities of the FRWMS</i> , above.			
<b>Project Results</b>					
Implementation documented	N	Invoices in the Forum’s record document partial completion of the project only. However, according to the program developer at the Plumas Unified School District, the project was completed.			
Success monitoring documented	N	No project monitoring program or performance criteria were established, and no information about the considerable project success are in the Forum’s records.			
Lessons for future funding/implementation	Progress toward meeting goals of the Monterey Agreement can be made indirectly by funding watershed awareness/education programs. Forum funding for proposed new outreach programs can provide major catalysts for establishment of ongoing successful programs.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Last Chance Creek Isotope Monitoring</b>	<b>Sponsor:</b>	Plumas Geo-Hydrology	<b>Review Number:</b>	B-3
<b>Funded Amount:</b>	\$23,000	<b>Fund:</b>	B	<b>Funding Date:</b>	26oct04

**Description:** *Watershed intervention support: examination of the sources and timing of recharge and discharge of floodplain aquifers at two locations in the Last Chance Creek watershed, using environmental isotopes and monitoring of groundwater and stream-channel water surface elevations.*

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1 - Augmented baseflow</i>	1	The study results reveal the relationship of floodplain aquifer storage to baseflow augmentation at two specific locations, but applicability to other groundwater basins in the upper Feather River watershed is unknown. Watershed restoration projects were completed in these locations prior to the study. If storage-baseflow relationships were determined by similar methods in other locations prior to watershed restoration design, they may conceivably influence restoration designs such that greater baseflow augmentation would result from the intervention projects.
<i>Goal 2 - Reduced sedimentation and improved bank protection</i>	1	See <i>Goal 1</i> above. Similar studies in other locations prior to watershed restoration design may conceivably influence design such that floodplain groundwater storage and baseflow is improved, which in turn could improve vigor and extent of bank vegetation and reduce bank erosion.
<i>Goal 3 - Improved upland vegetation management</i>	0	Information obtained through this and similar studies would not be directed at improving upland vegetation management.
<i>Goal 4 - Increased groundwater retention/storage in major aquifers</i>	1	See <i>Goal 1</i> above. Similar studies in other locations prior to watershed restoration design may conceivably influence design such that floodplain groundwater storage is improved.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	Project was located in the Last Chance Creek Valley alluvial groundwater basin (DWR-defined), in the Basin and Range province east of the Sierra Nevada crest.
Not road-decommissioning focus	3	Project was not directed at benefits of road decommissioning.
Involves designated high priority (high sediment flux) watersheds	3	Located in the Last Chance Subwatershed, Main Stem.
Addresses Sierra Valley groundwater overdraft	1	Project methodology might be applied to projects in the Sierra Valley groundwater basin and conceivably improve groundwater recharge in the alluvial aquifer.

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Last Chance Creek Isotope Monitoring</b>	<b>Sponsor:</b>	<b>Plumas Geo-Hydrology</b>	<b>Review Number:</b>	<b>B-3</b>
Restores water storage and stability of meadow landforms	1	Information obtained through similar studies, by affecting design of intervention actions, could conceivably increase groundwater storage and baseflow, which could improve extent and vigor of bank vegetation and thereby improve stability of meadow landforms.			
Restores lost/degraded riparian systems	1	Riparian systems could also indirectly benefit from result of similar studies.			
Increases upland vegetation cover through combination of intervention and management	0	Information obtained through similar studies is not directed at improving upland vegetation management.			
Achieves more than one resource benefit	1	Similar studies that affect intervention design could result in improved groundwater storage and baseflow, resulting in improved riparian habitat and bank stability, in turn benefitting fish and wildlife.			
Leverages Forum funding with other funding	3	Study incorporated monitoring of groundwater and stream-channel water surface elevations from permanent sites previously established by the Feather River CRM using other funding sources.			
Leverages Forum funding with landowner contributions	0	Landowners were USFS and the Nature Conservancy; neither contributed funding.			
Involves landowner participation	0	Neither landowner participated in the project.			
Project documents available to the public	3	All Forum documents are available to the public.			
Involves or supports intervention	1	Information obtained through similar studies may conceivably be used to support design of intervention projects.			
Tier and Type	--	Information obtained through similar studies may conceivably be used to improve Tier 1, Type 1 projects.			
Includes monitoring focused on project success/failure to meet intervention goals	0	No monitoring of project implementation or success was established ( <i>project implementation monitoring</i> ).			
Entails educational component	3	The purpose of the project was to increase understanding of floodplain aquifer recharge and discharge, to the benefit of designers of intervention projects.			
Involves innovative intervention or monitoring	3	Project involved innovative monitoring using environmental isotopes to study recharge and discharge of floodplain aquifers ( <i>environmental process monitoring</i> ).			
<b>Consistency of Proposed Project with Forum Bylaws</b>					
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:					
a. requested funding would be supplemented	3	See <i>Leverages Forum funding with other funding</i> above.			
b. action linked to the strategic plan	3	See <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Last Chance Creek Isotope Monitoring</b>	<b>Sponsor:</b>	Plumas Geo-Hydrology	<b>Review Number:</b>	B-3
c. involves meadow landscapes and groundwater retention actions	3	Project locations were meadow landscapes; project goal was to develop methodologies for understanding the potential benefits of groundwater retention actions.			
d. likely to attain performance criteria	2	No specific performance criteria were formally established, but the project report indicates that project purposes were generally met.			
e. likely to increase education/awareness	3	Project increases awareness of patterns of floodplain aquifer recharge and discharge.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	0	The project was not located in these watersheds.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	See <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.			
<b>Project Results</b>					
Implementation documented	Y	Final report submitted, dated 22sept07.			
Success monitoring documented	Y	Although no project implementation monitoring and performance criteria were formally established, the project report indicates that the goal of better understanding patterns of recharge and discharge of floodplain aquifers at two locations, and the goal of determining potential benefits of employing environmental isotopes for this purpose, were met.			
Lessons for future funding/implementation	In collaboration with watershed stakeholders and a panel of technical experts, the Forum should take an active role in formulating a research program by developing a research plan that identifies and prioritizes issues for which more information is needed to ensure that intervention project designs optimally achieve reversal of stream incision and otherwise meet the goals of the Monterey Settlement.				

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Stream Restoration Project Development (Coordination) and Monitoring</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	B-4
<b>Funded Amount:</b>	\$70,000	<b>Fund:</b>	B	<b>Funding Date:</b>	26Oct04
<b>Description:</b>	<i>Watershed intervention and intervention support: facilitates development of watershed restoration projects, and supports watershed-wide monitoring program to assess program performance</i>				

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1 - Augmented baseflow</i>	2	Watershed restoration techniques employed by the Feather River CRM tend to result in augmented baseflow from increased floodplain storage in inter-montane alluvial valleys.
<i>Goal 2 - Reduced sedimentation and improved bank protection</i>	2	Watershed restoration techniques employed by the Feather River CRM tend to result in revegetated streambanks in inter-montane alluvial valleys.
<i>Goal 3 - Improved upland vegetation management</i>	0	The Feather River CRM is not focused on upland vegetation management.
<i>Goal 4 - Increased groundwater retention/storage in major aquifers</i>	2	Watershed restoration techniques employed by the Feather River CRM tend to result in augmented baseflow from increased floodplain storage in inter-montane alluvial valleys.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	2	Focus of Feather River CRM.
Not road-decommissioning focus	3	--
Involves designated high priority (high sediment flux) watersheds	2	Focus of Feather River CRM.
Addresses Sierra Valley groundwater overdraft	2	Shallow alluvial aquifer storage is focus of Feather River CRM.
Restores water storage and stability of meadow landforms	2	See <i>Goals 2 and 4</i> .
Restores lost/degraded riparian systems	2	Focus of Feather River CRM.



**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

Project:	Stream Restoration Project Development (Coordination) and Monitoring		Sponsor:	Feather River Coordinated Resource Management Group	Review Number:	B-4
Increases upland vegetation cover through combination of intervention and management	0	Feather River CRM projects generally do not address upland vegetation.				
Achieves more than one resource benefit	2	Feather River CRM approach to projects is to maximize multiple resource benefits, such as groundwater/baseflow augmentation, improved clarity of streamflow, creation of riparian habitat, increase in range forage crop.				
Leverages Forum funding with other funding	2	Feather River CRM historically has developed funding partnerships.				
Leverages Forum funding with landowner contributions	1	Landowner contributions are part of many Feather River CRM projects.				
Involves landowner participation	1	Landowner participation is part of many Feather River CRM projects.				
Project documents available to the public	3	All Forum documents are available to the public.				
Involves or supports intervention	2	Feather River CRM projects involve or directly support watershed intervention.				
Tier and Type	Tier1 Type1	Feather River CRM projects may be of any type, but Tier 1 Type 1 currently predominates.				
Includes monitoring focused on project success/failure to meet intervention goals	0	No monitoring of implementation of the proposed watershed restoration project development and watershed-wide monitoring program were proposed.				
Entails educational component	2	Monitoring provides watershed stakeholders with improved understanding of watershed processes.				
Involves innovative intervention or monitoring	1	Feather River CRM projects may involve innovative intervention or monitoring.				
<b>Consistency of Proposed Project with Forum Bylaws</b>						
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:						
a. requested funding would be supplemented	2	Feather River CRM historically has developed funding partnerships.				
b. action linked to the strategic plan	2	FRWMS consistency evaluated above.				
c. involves meadow landscapes and groundwater retention actions	2	Feather River CRM projects focus on meadow landscape and groundwater retention actions.				
d. likely to attain performance criteria	3	Performance criteria not established, but it was likely that the projects could be successfully developed and monitoring could be successfully performed.				

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Stream Restoration Project Development (Coordination) and Monitoring</b>		<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	B-4
e. likely to increase education/awareness	2	Monitoring provides watershed stakeholders with improved understanding of watershed processes.				
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently repudiated as a priority by FRWMS)</i>	1	Feather River CRM focuses on all high priority (high sediment flux) watersheds.				
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	2	FRWMS consistency evaluated above.				
<b>Project Results</b>						
Implementation documented	Y	Via quarterly report/invoices.				
Success monitoring documented	N	No performance indicators or success criteria established.				
Lessons for future funding/implementation	Considerable effort must be made to develop projects and to assess their performance, so that Forum funding should not focus entirely on implementing projects. However, project development and project monitoring should be separately into distinct proposals. Also, performance indicators should be established for all funded projects.					

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	Sierra Valley RCD Capacity Building	<b>Sponsor:</b>	Sierra Valley Resource Conservation District	<b>Review Number:</b>	B-5
<b>Funded Amount:</b>	\$50,000	<b>Fund:</b>	B	<b>Funding Date:</b>	26oct04, 23may05
<b>Description:</b>	<i>Watershed intervention support and management support:</i> allowed the RCD to continue facilitating watershed improvement and management projects, by meeting annual operating costs of the RCD, a portion of the salary of the District Manager, and Board members' expenses for a period of two years (maximum of \$25,000 per year). No portion of the funding was used for direct intervention or monitoring.				

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1</i> - Augmented baseflow	2	No direct intervention occurred as part of RCD capacity building. Additional funding that the RCD leveraged with Forum startup funds was used to assist Sierra Valley landowners comply with the irrigated agricultural waiver program (Proposition 50 funds) and to manage noxious weeds invasive of waterways (RAC funding). The RCD's primary role is landowner outreach/coordination/facilitation, and in this regard the Forum funding allowed the RCD to work with landowners to achieve consent for Forum-funded project A-17 implemented by the Feather River CRM. That direct-intervention project is likely to have incrementally increased groundwater storage and baseflow in the Middle Fork Feather River.
<i>Goal 2</i> - Reduced sedimentation and improved bank protection	2	The leveraged work to comply with requirements promulgated under the Clean Water Act, and the noxious weed program are expected to reduce sediment yield and bank stability.
<i>Goal 3</i> - Improved upland vegetation management	1	Some projects facilitated by the RCD historically have involved improved management of upland vegetation.
<i>Goal 4</i> - Increased groundwater retention/storage in major aquifers	2	See <i>Goal 1</i> above.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	The RCD encompasses the Sierra Valley alluvial groundwater basin, in the Basin and Range province east of the Sierra Nevada crest.
Not road-decommissioning focus	3	Although private road decommissioning could be part of projects funded/conducted by the RCD.
Involves designated high priority (high sediment flux) watersheds	3	The RCD corresponds with the Sierra Valley Subwatershed.
Addresses Sierra Valley groundwater overdraft	2	See <i>Goal 4</i> .

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Sierra Valley RCD Capacity Building</b>	<b>Sponsor:</b>	Sierra Valley Resource Conservation District	<b>Review Number:</b>	B-5
Restores water storage and stability of meadow landforms	2	Regarding water storage, see <i>Goal 4</i> ; treatment of perennial peppergrass leveraged by Forum funding, when followed by reseeded, enhances stability of streambanks and meadow landforms.			
Restores lost/degraded riparian systems	2	See <i>Goal 4</i> ; riparian systems were restored as part of Forum-funded project A-17.			
Increases upland vegetation cover through combination of intervention and management	1	Some projects facilitated by the RCD historically have involved improved management of upland vegetation.			
Achieves more than one resource benefit	2	Support leveraged for the three program areas described under Goal 1 above contribute to improved groundwater storage and augmented baseflow, water quality, riparian vegetation, and fish and wildlife habitat.			
Leverages Forum funding with other funding	3	See Goal 1 above. The Forum’s startup funding allowed the RCD to leverage funding from Proposition 50 and Plumas County RAC funds.			
Leverages Forum funding with landowner contributions	1	SVRCD programs are focused on involving landowners in resource land management. SVRCD projects may involve monetary or in-lieu landowner contributions, primarily in terms of labor and equipment; see following item.			
Involves landowner participation	3	SVRCD programs are focused on involving landowners in resource land management. All RCD programs and projects involve landowner participation.			
Project documents available to the public	3	All Forum documents are available to the public.			
Involves or supports intervention	3	Leveraged projects conducted by the RCD comprised both supportive or direct management to improve watershed conditions.			
Tier and Type	--	RCD capacity building does not fit into any tier-type definition. Projects conducted with leveraged funding have involved Tier 1, Type 1 and 3 projects.			
Includes <i>monitoring</i> focused on project success/failure to meet intervention goals	3	Proposed <i>monitoring</i> includes (1) identifying RCD office status, (2) number of applications for watershed restoration grants to improve watershed conditions submitted annually, (3) implementation of recommendations in the Sierra Valley Watershed Assessment, (4) attendance of Board members and staff at educational seminars, and (5) RCD sponsorship of educational workshops focused on water quality/quantity.			
Entails educational component	3	RCD activities comprise landowner outreach/education/participation.			
Involves innovative intervention or monitoring	0	No direct intervention is proposed; none of the proposed monitoring is innovative.			
<b>Consistency of Proposed Project with Forum Bylaws</b>					
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:					
a. requested funding would be supplemented	3	See Goal 1 above. The Forum’s startup funding allowed the RCD to leverage funding from Proposition 50 and Plumas County RAC funds.			
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Sierra Valley RCD Capacity Building</b>	<b>Sponsor:</b>	Sierra Valley Resource Conservation District	<b>Review Number:</b>	B-5
c. involves meadow landscapes and groundwater retention actions	2	Regarding groundwater retention, see <i>Goal 4</i> above. Treatment of perennial peppergrass leveraged by Forum funding, when followed by reseeding, enhances stability of streambanks and meadow landforms.			
d. likely to attain performance criteria	3	Performance criteria are (1) establishment of an RCD office in Sierra Valley, (2) at least two applications for watershed restoration grants to improve watershed conditions are submitted annually (total of four), (3) at least three recommendations in the Sierra Valley Watershed Assessment (SVWA) are implemented, (4) Board members and staff attend at least three educational seminars annually (total of six), and (5) the RCD sponsors at least two educational workshops focused on water quality/quantity. These are reasonable performance criteria that are would be expected to be met.			
e. likely to increase education/awareness	3	Landowner education and awareness is a primary project purpose.			
<i>Bylaw 7</i> – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) ( <i>Note: subsequently rejected as a priority in FRWMS</i> )	0	None of these watersheds is within the RCD.			
<i>Bylaw 8</i> – Consistent with long-range planning (i.e. FRWMS)	3	FRWMS consistency evaluated above.			
<b>Project Results</b>					
Implementation documented	N	In the Forum’s record, quarterly invoices for the first year are summarized and indicate first-year project completion. Subsequent invoices are present but are not summarized to indicate second-year completion. Two annual progress reports indicates activities in both years, but do not include all of the information required in the supplemental funding agreement for the second year.			
Success monitoring documented	N	The Forum’s records include a “Semi-Annual Progress Report” during the first funding year (dated July 1, 2005) and a “Summary of 2006-2007 Annual Report”. It is not clear if these two reports describe all of the activities conducted under the two-year project agreement. The second report does not specifically addresses the performance criteria established in the Forum funding agreement, but some relevant information can be extracted. The reports indicated that the five performance criteria above were met as follows: (1) and (2) were accomplished; (3) at least two (three required) of the recommendations of the SVWA were implemented (conducting water quality workshop with UC Extension, and managing noxious weeds); (4) three educational seminars (of 6 required) were attended by RCD Board/staff and (5) one educational workshop (2 required) may be considered to have been conducted (a fair event that included a watershed restoration displayed provided by the Feather River CRM).			
Lessons for future funding/implementation		Forum funding for capacity building for this RCD was successful, in that the RCD programs and activities initiated/supported by the funding (seed money) have continued and expanded through acquisition of funding from other sources. Future Forum funding should be focused helping the RCD increase watershed-intervention expertise and on funding invention that directly addresses the goals of the Monterey Agreement. In this regard, a determination is needed about which types of RCD project objectives are consistent with the goals of the Monterey Agreement (e.g. under what circumstances should noxious weed control be fundable).			

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	Feather River RCD Watershed Outreach and Education/Program Assistance/Restoration Projects (RCD Capacity Building)	<b>Sponsor:</b>	Feather River Resource Conservation District	<b>Review Number:</b>	B-6
<b>Funded Amount:</b>	\$47,750	<b>Fund:</b>	B	<b>Funding Dates:</b>	26oct04, 23may05
<b>Description:</b>	<i>Watershed intervention, intervention support, and management:</i> assist and educate ranchers and forested landowners on installing and monitoring practices currently planned as part of watershed management programs that the FRRCD is working on with individuals and partners throughout the county. Direct Intervention and monitoring costs were 49% of total.				

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – possible contribution or consistency, or 0 – no apparent contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

Goal 1 - Augmented baseflow	1	Direct intervention funded under the FR RCD program via this project included riparian streambank fencing, fuels reduction, and exotic plant eradication. Some of these projects may result in incremental baseflow augmentation. Analyses of potential benefits is not in the Forum’s record. However, non-project capacity building may indirectly contribute to augmented baseflow, since RCD fund-leveraging ability and landowner collaboration are enhanced, and since RCD-sponsored or supported projects often counter stream entrenchment and loss of groundwater storage, with concurrent gains in forage and storage.
Goal 2 - Reduced sedimentation and improved bank protection	3	Some of the funded projects involved fencing of streambanks to protect riparian vegetation that stabilizes streambanks; these projects will tend to reduce sedimentation.
Goal 3 - Improved upland vegetation management	3	Some of the funded projects involved fuel reduction in upland vegetation, which lessens the potential extent and intensity of wildfire that may degrade watershed condition.
Goal 4 - Increased groundwater retention/storage in major aquifers	1	See Goal 1 above.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	The RCD encompasses all of the groundwater basins in the upper Feather River watershed (11) except Grizzly Valley and Sierra Valley, all of which are in the Basin and Range province east of the Sierra Nevada crest.
Not road-decommissioning focus	3	Although private road decommissioning could be part of projects funded/conducted by the RCD.
Involves designated high priority (high sediment flux) watersheds	3	Could include projects/actions in 6 of the 7 high priority watersheds.

**Plumas Watershed Forum – 2007 Program Review  
Project Evaluation Matrix**

Project:	Feather River RCD Watershed Outreach and Education/Program Assistance/Restoration Projects (RCD Capacity Building)	Sponsor:	Feather River Resource Conservation District	Review Number:	B-6
Addresses Sierra Valley groundwater overdraft	0	--			
Restores water storage and stability of meadow landforms	1	Some projects directly increased stability of streambanks bordering meadows. Possible resulting increase in water storage is not evident.			
Restores lost/degraded riparian systems	3	Some projects provided fencing to protect riparian streambank zones.			
Increases upland vegetation cover through combination of intervention and management	3	Some projects provide fuel reduction in upland vegetation which, by reducing fire intensity, increases upland vegetation over the long term. Participating landowners have already initiated long-term maintenance actions in treated areas (e.g. underburning).			
Achieves more than one resource benefit	3	Protection of riparian systems, wildlife habitat, reduced potential loss of vegetation and degraded watershed condition from wildfire.			
Leverages Forum funding with other funding	3	NRCS and FRRCD, and potentially the Plumas County Fire Safe Council, USFS, and FRCRM.			
Leverages Forum funding with landowner contributions	1	RCD programs are focused on involving landowners in resource land management. RCD projects may involve monetary or in-lieu landowner contributions, primarily in terms of labor and equipment; see following item.			
Involves landowner participation	3	The RCD's primary role is landowner outreach/coordination/facilitation. All RCD projects involve landowner participation.			
Project documents available to the public	3	All Forum documents available to the public.			
Involves or supports intervention	3	Involves a direct intervention element and general support to improved watershed management.			
Tier and Type	--	The funded projects (i.e. riparian fencing, fuels treatments, and noxious weed management), nor agency capacity-building, do not fit into the tier-type definitions.			
Includes <i>monitoring</i> focused on project success/failure to meet intervention goals	3	Proposed <i>monitoring</i> includes the number of landowner projects approved, project acreages, amount of stream restoration, changes in ecological conditions (photos), effectiveness of outreach program, and amount of other funding leveraged by project funding.			
Entails educational component	3	Strong focus on landowners' watershed education and awareness.			
Involves innovative intervention or monitoring	0	None of the funded intervention or monitoring is innovative.			

Plumas Watershed Forum – 2007 Program Review Project Evaluation Matrix				
<b>Project:</b>	Feather River RCD Watershed Outreach and Education/Program Assistance/Restoration Projects (RCD Capacity Building)	<b>Sponsor:</b>	Feather River Resource Conservation District	<b>Review Number:</b> B-6
Consistency of Proposed Project with Forum Bylaws				
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:				
a. requested funding would be supplemented	3	NRCS and FRRCD, and potentially the Fire Safe Council, USFS, and FRCRM.		
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.		
c. involves meadow landscapes and groundwater retention actions	1	Some projects directly increased stability of streambanks bordering meadows. Increases in water storage from funded projects, if any, are unlikely to have been significant.		
d. likely to attain performance criteria	0	Although monitoring variables were specified, performance criteria for success were not.		
e. likely to increase education/awareness	3	Landowner education and awareness is a primary project purpose. The RCD’s primary role is landowner outreach/coordination/facilitation		
<i>Bylaw 7</i> – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) ( <i>Note: subsequently repudiated as a priority by FRWMS</i> )	0	Not focused in these watersheds.		
<i>Bylaw 8</i> – Consistent with long-range planning (i.e. FRWMS)	3	FRWMS consistency evaluated above.		
Project Results				
Implementation documented	Y	Capacity building and intervention actions are documented via annual report/invoices. Direct intervention grants were valued at \$18,760 noted (39% of total Forum funding), which were supplemented with RCD-staff project monitoring, also enabled by the Forum-funding. Direct intervention grants included riparian fencing, fuels reduction, and exotic plant eradication.		
Success monitoring documented	N	With regard to the six proposed implementation-monitoring indicators (see above), the Forum’s record contains only the number of landowner projects approved.		
Lessons for future funding/implementation		If capacity of the RCD can continue to be maintained, future Forum’s funding should be directed at supporting RCD programs to outreach, design, and fund landowner-sponsored projects that focus on furthering the specific goals of the Monterey Agreement. To support any future proposals to the Forum, the RCD should assess potential demand by landowners for direct intervention projects that contribute to meeting the Forum’s goals.		



Plumas Watershed Forum – 2008 Program Review Project Evaluation Matrix					
<b>Project:</b>	Forest Canopy Interception Study	<b>Sponsor:</b>	Plumas Geo-Hydrology	<b>Review Number:</b>	B-7
<b>Funded Amount:</b>	\$20,997	<b>Fund:</b>	B	<b>Funding Date:</b>	23may05
<b>Description:</b>	<p><i>Watershed intervention support:</i> examination of the degree to which various densities of forest canopy intercept precipitation and diminish <i>throughfall</i> to the forest floor, and presumably therefore infiltration to groundwater, in an eastside pine forest in the upper Feather River watershed. Project also evaluated whether environmental isotopes can be used to determine effects of interception losses on downslope groundwater discharges and streamflow, by comparing isotope signatures in precipitation, soil moisture, springs, and stream water samples.</p>				
Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments			
<p>Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, <u>or</u> 0 – no contribution or consistency.</p>					
Consistency of Proposed Project with Settlement Agreement Goals					
Goal 1 - Augmented baseflow	1	Study confirmed known phenomenon that forest canopy intercepts precipitation causes increased evapotranspiration losses relative to an open meadow, and the magnitude of reduction in such loss with canopy thinning in one locale was theoretically estimated. If the study results were used to increase the extent of canopy thinning in the watershed now being performed for purposes of reducing the extent and severity of wildland fire, the project would have the effect of increase storage in upland soils and floodplain aquifers, thereby augmenting baseflow in portions of the upper Feather River watershed.			
Goal 2 - Reduced sedimentation and improved bank protection	1	See Goal 1 above. Any resulting increase in bank storage and baseflow could indirectly improve the extent and vigor of bank vegetation, which could improve bank stability.			
Goal 3 - Improved upland vegetation management	1	See Goal 1 above.			
Goal 4 - Increased groundwater retention/storage in major aquifers	1	See Goal 1 above.			
Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)					
Eastside location	3	Study site is in the Mohawk Valley groundwater basin (DWR), east of the Sierra Nevada crest.			
Not road-decommissioning focus	3	Study had no focus on road decommissioning.			
Involves designated high priority (high sediment flux) watersheds	0	Mohawk Valley is not part of a high priority watershed, although it has been incised, diminishing groundwater storage and baseflow.			
Addresses Sierra Valley groundwater overdraft	1	Project results might be used to influence design of forest canopy reduction projects in the Sierra Valley watershed, conceivably increasing groundwater storage.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Forest Canopy Interception Study</b>	<b>Sponsor:</b>	Plumas Geo-Hydrology	<b>Review Number:</b>	B-7
Restores water storage and stability of meadow landforms	1	Study results may conceivably be used to restore groundwater storage and, incrementally, the stability of meadow landforms.			
Restores lost/degraded riparian systems	1	Study results may conceivably be used to restore groundwater storage and, incrementally, riparian systems.			
Increases upland vegetation cover through combination of intervention and management	1	Study results could be used to <i>decrease</i> forest canopy cover of upland vegetation, thereby increasing ground cover through expanded canopy thinning projects and permanent canopy reduction management.			
Achieves more than one resource benefit	1	If used to affect treatment of upland vegetation, project results could benefit groundwater storage and baseflow, resulting in improved riparian habitat and bank stability, in turn benefitting fish and wildlife.			
Leverages Forum funding with other funding	0	No other funding involved.			
Leverages Forum funding with landowner contributions	0	Landowner was project sponsor, who received funds from the Forum (rather than contributing funds).			
Involves landowner participation	3	Landowner made his property available for the data gathering effort.			
Project documents available to the public	3	All Forum documents are available to the public.			
Involves or supports intervention	1	See <i>Goal 1</i> above. Study results could be used to justify increasing ongoing canopy reduction on upland watersheds to increase throughfall and infiltration of precipitation to groundwater.			
Tier and Type	--	Study results could be used to justify increasing ongoing canopy reduction actions in the upper Feather River watershed, which would be considered to be a Tier 2, Type 1 project where Tier 1, Type1 projects downslope would receive the benefit of increased infiltration to groundwater.			
Includes monitoring focused on project success/failure to meet intervention goals	0	No monitoring of project implementation or success was established ( <i>project implementation monitoring</i> ).			
Entails educational component	3	The purpose of the project was to increase understanding of effects of canopy reduction on precipitation infiltration, to the benefit of designers of canopy reduction projects.			
Involves innovative intervention or monitoring	3	Project involved innovative monitoring using environmental isotopes to study effects of canopy thinning on groundwater recharge ( <i>environmental process monitoring</i> ).			
<b>Consistency of Proposed Project with Forum Bylaws</b>					
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:					
a. requested funding would be supplemented	0	No other funding sources were involved.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Forest Canopy Interception Study</b>	<b>Sponsor:</b>	Plumas Geo-Hydrology	<b>Review Number:</b>	B-7
b. action linked to the strategic plan	3	See <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.			
c. involves meadow landscapes and groundwater retention actions	1	Study results may conceivably be used to increase groundwater inflow to meadow landscapes through expansion of forest canopy thinning activities.			
d. likely to attain performance criteria	3	No performance criteria were established, but the project report indicates that project purposes were generally met.			
e. likely to increase education/awareness	3	Project increases awareness of effects of coniferous forest canopy density on groundwater recharge.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	0	The project was not located in these watersheds.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	See <i>Consistency of Proposed Project with Priorities of the FRWMS</i> above.			
<b>Project Results</b>					
Implementation documented	Y	“Final draft” reported submitted, dated 27feb08. Report notes that laboratory analysis was made of samples taken after only four storms, compared to six storms described in the project funding agreement.			
Success monitoring documented	Y	Although no project implementation monitoring and performance criteria were formally established, the project report indicates that the project goals were generally met (increasing understanding of the degree to which forest canopy intercepts precipitation and diminishes infiltration to groundwater in an eastside pine forest in the upper Feather River watershed, and determining potential benefits of employing environmental isotopes for this purpose). However, conclusions regarding suitability of using isotopes for evaluating streamflow augmentation from canopy reduction are apparently not conclusive, and considerably more study is recommended before a firm conclusion can be drawn.			
Lessons for future funding/implementation		In collaboration with watershed stakeholders and a panel of technical experts, the Forum should take an active role in formulating a research program by developing a research plan that identifies and prioritizes issues for which more information is needed to ensure that intervention project designs optimally achieve reversal of stream incision and otherwise meet the goals of the Monterey Settlement.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Feather River Watershed Public Awareness Project</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	B-8
<b>Funded Amount:</b>	\$33,668	<b>Fund:</b>	B	<b>Funding Date:</b>	23May05
<b>Description:</b>	<i>Watershed management:</i> program to encourage watershed stewardship by the local public through development of a watershed awareness festival, three articles and three ads for newspaper publication promoting watershed awareness, a non-technical watershed map/brochure, a watershed restoration techniques booklet (or three brochures), and educational outreach materials (including general public brochure, bookmark, logo, tag line, and bumper sticker).				

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

Goal 1 - Augmented baseflow	1	The watershed awareness encouraged by this project could result in augmented baseflow from the Feather River watershed.
Goal 2 - Reduced sedimentation and improved bank protection	2	At least some of the project activities are likely to result in increased watershed stewardship, which would be expected to result in increased vegetation-cover management and fewer citizen activities that expose soils to erosive agents.
Goal 3 - Improved upland vegetation management	1	The awareness program may result in better upland vegetation management, but upland vegetation is not a focus of the awareness activities.
Goal 4 - Increased groundwater retention/storage in major aquifers	1	The watershed awareness encouraged by this project could result in increased groundwater retention/storage in the Feather River watershed.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	All of the awareness activities are focused on lands east of the Sierra Nevada crest.
Not road-decommissioning focus	3	The awareness program is not focused on road decommissioning.
Involves designated high priority (high sediment flux) watersheds	2	High priority watersheds, as well as lower priority watershed, would like benefit from the awareness program.
Addresses Sierra Valley groundwater overdraft	0	Not a focus of the awareness program.
Restores water storage and stability of meadow landforms	1	See <i>Goals 2 and 4</i> above.
Restores lost/degraded riparian systems	2	Increased watershed awareness would likely result in increased participation in riparian ecosystem restoration projects.

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Feather River Watershed Public Awareness Project</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	B-8
Increases upland vegetation cover through combination of intervention and management	1	The awareness program may result in better upland vegetation intervention and management, but upland vegetation is not a focus of the awareness activities.			
Achieves more than one resource benefit	3	Benefits include improved water quality, fish and wildlife habitat, and riparian vegetation.			
Leverages Forum funding with other funding	3	Forum agreement calls for specific contributions from NRCS and the DWR Watershed Management Program.			
Leverages Forum funding with landowner contributions	0	Project is not tied to specific lands.			
Involves landowner participation	3	Project is targeted at landowners (e.g. watershed restoration techniques booklet) as well as the general public, and landowners are participants some of the project activities.			
Project documents available to the public	3	All Forum documents are available to the public, and the project products are directed at the public.			
Involves or supports intervention	2	Increased watershed awareness will likely result in increased intervention actions within the watershed.			
Tier and Type	--	Tier 1 Type 4 is stated by sponsor; however, Type 4 projects are regulatory actions of governmental agencies to protect watershed values; public education/awareness is not a project type listed in the FRWMS.			
Includes monitoring focused on project success/failure to meet intervention goals	3	Proposed monitoring includes identifying when and if the various project elements are completed. Note that the project does not include direct intervention goals, or the monitoring does not assess the degree to which awareness is increased.			
Entails educational component	3	The project is an educational project.			
Involves innovative intervention or monitoring	0	None of the awareness activities conducted would be considered innovative; they have been successfully conducted in other areas.			
<b>Consistency of Proposed Project with Forum Bylaws</b>					
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:					
a. requested funding would be supplemented	3	See discussion above			
b. action linked to the strategic plan	3	FRWMS consistency evaluated above.			
c. involves meadow landscapes and groundwater retention actions	1	Meadow landscapes and groundwater retention may benefit.			
d. likely to attain performance criteria	3	The implied performance criteria are that all of the proposed project elements are completed.			

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Feather River Watershed Public Awareness Project</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	B-8
e. likely to increase education/awareness	3	Yes; this is the focus of the project.			
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	2	These watersheds are among those that would likely benefit from increased watershed awareness.			
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	FRWMS consistency evaluated above.			
<b>Project Results</b>					
Implementation documented	N	<p>Although quarterly reports are a part in the project record, they do not clearly document that all project elements were completed. This situation is partially due to the nature of the agreement with the Forum, in which the project budget was not tied to elements of the scope of work, but rather consists of expenditure by type (e.g. staff time, materials and supplies, etc.). Accordingly, expenditures are clearly documented by type, but the completion status of each project element is unclear.</p> <p>The contractual project completion date, earlier extended, has past. The project record indicates that the watershed awareness festival was conducted (for 2 rather than the 3 days proposed), the proposed number of articles and ads were published in a newspaper, the non-technical map/brochure was completed and distributed (for substantially less cost than approved by the Forum), an erosion-control brochure highlighting best management practices was prepared, while production of a watershed restoration techniques booklet is still pending. Educational outreach materials have not yet been prepared (a tagline was developed, but a logo is still under development) including a general public brochure, bumper sticker, and bookmark). Some project expenditures have been made for items not in the funding agreement, including storm-drain stenciling and a children’s faire about aquatic insects. These activities are consistent with the public awareness focus of the funded project, however.</p>			
Success monitoring documented	N	For this project, project success is completion of all proposed elements; see foregoing discussion.			
Lessons for future funding/implementation	Projects to increase public awareness of watershed protection and restoration issues are as important as direct intervention action in achieving the goals of the Monterey Agreement. The Forum should develop a method of allowing project sponsors flexibility to manage public awareness programs adaptively, within the overall constraint that activities must further attainment of goals of the Monterey Agreement.				

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Four Creeks – Concept Development</b>	<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	B-9
<b>Funded Amount:</b>	\$50,308	<b>Fund:</b>	B	<b>Funding Date:</b>	23may05
<b>Description:</b>	<i>Watershed intervention:</i> facilitates development of watershed restoration projects on Spanish, Last Chance, Long Valley, and Sulphur Creeks using pond-and-plug technology.				

Forum Goal, Bylaw, or Strategy	Evaluation Rating	Rationale and/or Comments
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Evaluation Codes: 3 – direct goal contribution or direct policy consistency, 2 – demonstrated indirect contribution or consistency, 1 – indeterminate contribution or consistency, or 0 – no contribution or consistency.

**Consistency of Proposed Project with Settlement Agreement Goals**

<i>Goal 1</i> - Augmented baseflow	2	Watershed restoration techniques employed by the Feather River CRM tend to result in augmented baseflow from increased bank storage in inter-montane alluvial valleys, such as the four emerging project locations.
<i>Goal 2</i> - Reduced sedimentation and improved bank protection	2	Watershed restoration techniques employed by the Feather River CRM tend to result in revegetated streambanks in inter-montane alluvial valleys.
<i>Goal 3</i> - Improved upland vegetation management	0	The Feather River CRM is not focused on upland vegetation management.
<i>Goal 4</i> - Increased groundwater retention/storage in major aquifers	2	Watershed restoration techniques employed by the Feather River CRM tend to result in augmented baseflow from increased bank storage in inter-montane alluvial valleys.

**Consistency of Proposed Project with Priorities of the Feather River Watershed Management Strategy (FRWMS)**

Eastside location	3	The four alluvial valleys include the following eastside groundwater basins: Meadow Valley, Last Chance Creek Valley, Middle Fork Feather River, and Mohawk Valley.
Not road-decommissioning focus	3	--
Involves designated high priority (high sediment flux) watersheds	3	The four project areas are in the Spanish Creek Subwatershed, Main Stem or Upper Spanish Creek; Last Chance Subwatershed, Main Stem; and Lake Davis-Long Valley Subwatershed, Long Valley and Sulphur Creek.
Addresses Sierra Valley groundwater overdraft	0	None of projects sites are in or on tributaries to Sierra Valley.
Restores water storage and stability of meadow landforms	2	See <i>Goals 2 and 4</i> .
Restores lost/degraded riparian systems	2	Focus of Feather River CRM

**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Four Creeks – Concept Development</b>		<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	B-9
Increases upland vegetation cover through combination of intervention and management	0	Proposed projects will likely not affect upland vegetation.				
Achieves more than one resource benefit	2	Feather River CRM approach to projects is to maximize multiple resource benefits, such as groundwater/baseflow augmentation, improved clarity of streamflow, creation/protection of riparian habitat, increase in range forage crop.				
Leverages Forum funding with other funding	1	No other funding for the planning stage; eventual project proposals may include multiple funding sources.				
Leverages Forum funding with landowner contributions	1	Landowners are not contributing funds to project planning, but eventual project proposals may include landowner contributions.				
Involves landowner participation	2	Landowners are involved in project development and may participate in project maintenance.				
Project documents available to the public	3	All Forum documents are available to the public.				
Involves or supports intervention	3	Project development directly supports intervention.				
Tier and Type	Tier1 Type1	Tier 1, Type 4 is stated in proposal, however Type 4 applies to governmental planning and regulatory actions. Project is initial step in a Tier 1, Type 1 project.				
Includes monitoring focused on project success/failure to meet intervention goals	3	Proposal states no monitoring of the project is needed/proposed, but also states that monitoring includes identifying whether projects are successfully developed, in the form of clear project concepts submitted for funding.				
Entails educational component	1	Not applicable to a project development, but eventual project may include an educational component via tours.				
Involves innovative intervention or monitoring	1	Not applicable to a project development project, but eventual project may include an innovative component.				
<b>Consistency of Proposed Project with Forum Bylaws</b>						
<i>Bylaw 6</i> – Project conformity to Forum’s selection principles:						
a. requested funding would be supplemented	1	Project planning grant would not be supplemented, but eventual project proposals may include multiple funding sources.				
b. action linked to the strategic plan	2	FRWMS consistency evaluated above.				
c. involves meadow landscapes and groundwater retention actions	2	See <i>Goal 2</i> and <i>Eastside Location</i> above.				



**Plumas Watershed Forum – 2008 Program Review  
Project Evaluation Matrix**

<b>Project:</b>	<b>Four Creeks – Concept Development</b>		<b>Sponsor:</b>	Feather River Coordinated Resource Management Group	<b>Review Number:</b>	B-9
d. likely to attain performance criteria	3	Performance criteria established include: completion of clear project concepts and proposals; these products did result from this project.				
e. likely to increase education/awareness	1	Possible; see <i>Entails educational component</i> above.				
<i>Bylaw 7 – Focused on watersheds of SWP Upper Watershed reservoirs (Antelope, Davis, Frenchman) (Note: subsequently rejected as a priority in FRWMS)</i>	0	Projects are not located in these watersheds.				
<i>Bylaw 8 – Consistent with long-range planning (i.e. FRWMS)</i>	3	FRWMS consistency evaluated above				
<b>Project Results</b>						
Implementation documented	Y	Yes, via quarterly report/invoices.				
Success monitoring documented	Y	Clear project concepts and proposals, as well as four funded intervention projects resulted from this effort. Funding leveraged by this project development funding was in excess of \$3,000,000 from Props 40 and 50, RAC, and Water Forum sources.				
Lessons for future funding/implementation	Considerable effort must be made to develop projects, so that Forum funding should not focus entirely on implementing projects.					

Appendix C  
**Consistency Summary**

See separate **Excel** file.

Appendix C. Continued

A-Fund Projects																
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16
<b>Funded Amount</b>	\$3,000	\$27,780	\$120,984	\$35,000	\$80,000	\$35,000	\$59,466	\$92,453	\$30,000	\$28,000	\$84,500	\$25,000	\$64,000	\$51,000	\$147,000	\$85,000
<b>Percent of Total Project Funding</b>	0.13%	1.24%	5.39%	1.56%	3.56%	1.56%	2.65%	4.12%	1.34%	1.25%	3.76%	1.11%	2.85%	2.27%	6.55%	3.79%
<b>Evaluation Codes</b>																
<i>Goal Consistency</i>																
Goal 1 - Augmented baseflow	1	2	1	3	3	3	2	1	1	1	3	2	3	3	3	0
Goal 2 - Sediment/bank protection	1	2	0	3	3	3	3	3	0	1	3	1	3	3	3	3
Goal 3 - Upland vegetation mgmt	0	2	0	0	0	0	2	0	0	0	3	0	0	0	0	1
Goal 4 - Groundwater storage	1	2	1	3	3	3	2	1	1	1	3	2	3	3	3	0
<i>Strategy and Bylaw Consistency</i>																
Eastside location	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Non-road decommissioning	3	2	3	3	3	3	0	3	3	3	3	3	3	3	3	3
In high-sediment priority watershed	0	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Addresses Sierra Valley overdraft	0	2	3	0	0	0	0	0	1	1	0	0	0	0	0	0
Restores meadow functions	1	2	1	3	3	3	2	1	0	1	3	1	3	3	3	0
Restores riparian potential	1	2	1	3	3	2	3	3	0	1	3	1	3	3	3	1
Increases upland vegetation	0	2	0	0	0	0	2	0	0	0	3	0	0	0	0	1
Multi-resource benefit	1	2	1	3	3	3	3	3	0	1	3	2	3	3	3	3
Leverages other funding	3	3	2	3	3	3	3	3	2	3	3	3	3	0	3	3
Landowner contribution	0	2	0	0	0	3	3	0	0	0	3	0	3	3	3	3
Landowner participation	3	2	3	3	3	3	3	1	0	0	3	3	3	1	1	3
Documents publically available	3	3	3	3	3	3	3	3	3	3	?	3	3	3	3	3
Involves/supports intervention	1	2	3	3	3	3	3	3	1	1	3	3	3	3	3	3
Monitoring of project success	0	2	0	3	3	3	0	3	0	0	3	3	3	3	3	0
Educational component	3	2	3	1	1	1	0	1	2	3	0	3	1	1	1	0
Innovative intervention/monitoring	3	2	1	3	3	0	0	0	1	3	3	1	3	0	0	0
Funding supplement	3	2	2	3	3	3	3	3	2	3	3	3	3	0	3	3
Linked to strategic plan	3	2	3	3	3	3	3	3	1	3	3	3	3	3	3	3
Grdwater retention in mdws	1	2	3	3	3	3	2	1	1	3	3	3	3	3	3	0
Likely to attain performance crit	2	2	2	3	3	3	2	3	2	1	2	3	3	3	3	3
Increase education/awareness	3	2	3	1	1	1	0	1	2	3	0	3	1	1	1	0
Upper Reservoir focus	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Consistent with long-range plan	3	2	3	3	3	3	3	3	1	3	3	3	3	3	3	3
<b>Project Results</b>																
Implementation documented	N	Y	Y	Y	Y	Y	na	N	N	na	na	Y	Y	na	na	Y
Success documented	Y	Y	N	Y	Y	N	N	N	N	na	na	Y	Y	na	na	N
<b>Evaluation Rating</b>																
Goal Consistency	0.8	2.0	0.5	2.3	2.3	2.3	2.3	1.3	0.5	0.8	3.0	1.3	2.3	2.3	2.3	1.0
Strategy and Bylaw Consistency	1.7	2.0	2.0	2.3	2.3	2.3	1.9	1.9	1.2	1.8	2.3	2.2	2.4	2.0	2.2	1.8
Aggregated Consistency	1.2	2.0	1.3	2.3	2.3	2.3	2.1	1.6	0.9	1.3	2.7	1.7	2.3	2.1	2.2	1.4

Appendix C. Continued

	A-Fund (cont.)					B-Fund Projects									Summary of Evaluation Code Frequencies			
	A17	A18	A19	A20	A21	B1	B2	B3	B4	B5	B6	B7	B8	B9	3	2	1	0
<b>Funded Amount</b>	\$92,977	\$56,704	\$107,011	\$588,260	\$22,012	\$80,743	\$34,000	\$23,000	\$70,000	\$50,000	\$47,750	\$20,997	\$33,668	\$50,308				
<b>Percent of Total Project Funding</b>	4.14%	2.53%	4.77%	26.20%	0.98%	3.60%	1.51%	1.02%	3.12%	2.23%	2.13%	0.94%	1.50%	2.24%				
<b>Evaluation Codes</b>															Directly Consistent	Indirectly Consistent	Possibly Consistent	Not Consistent
<i>Goal Consistency</i>																		
Goal 1 - Augmented baseflow	3	3	3	1	3	3	2	1	2	2	1	1	1	2	38%	14%	44%	4%
Goal 2 - Sediment/bank protection	3	3	3	0	3	3	2	1	2	2	3	1	2	2	51%	12%	4%	33%
Goal 3 - Upland vegetation mgmt	0	0	0	0	3	3	2	0	0	1	3	1	1	0	10%	5%	8%	76%
Goal 4 - Groundwater storage	3	3	3	1	1	1	2	1	2	2	1	1	1	2	34%	14%	49%	4%
<i>Strategy and Bylaw Consistency</i>																		
Eastside location	3	3	3	3	3	3	3	3	2	3	3	3	3	3	96%	4%	0%	0%
Non-road decommissioning	3	3	3	3	3	3	3	3	3	3	3	3	3	3	96%	1%	0%	3%
In high-sediment priority watershed	3	3	3	2	3	3	3	3	2	3	3	0	2	3	67%	32%	0%	1%
Addresses Sierra Valley overdraft	3	0	0	2	0	0	3	1	2	2	0	1	0	0	11%	33%	5%	52%
Restores meadow functions	3	3	3	1	1	1	2	1	2	2	1	1	1	2	34%	13%	48%	5%
Restores riparian potential	3	3	3	1	1	1	2	1	2	2	3	1	2	2	41%	13%	44%	1%
Increases upland vegetation	0	0	0	0	1	1	2	0	0	1	3	1	1	0	6%	5%	13%	76%
Multi-resource benefit	3	3	3	3	3	3	3	1	2	2	3	1	3	2	80%	10%	9%	1%
Leverages other funding	3	3	3	3	3	3	3	3	2	3	3	0	3	1	85%	10%	2%	3%
Landowner contribution	3	0	0	3	3	3	0	0	1	1	1	0	0	1	58%	1%	10%	31%
Landowner participation	3	3	0	3	3	3	3	0	1	3	3	3	3	2	72%	3%	16%	8%
Documents publically available	3	3	3	3	3	3	3	3	3	3	3	3	3	3	96%	0%	0%	0%
Involves/supports intervention	3	3	3	1	3	3	3	1	2	3	3	1	2	3	63%	6%	31%	0%
Monitoring of project success	3	3	3	3	0	0	0	0	0	3	3	0	3	3	73%	1%	0%	26%
Educational component	1	1	1	0	3	3	3	3	2	3	3	3	3	1	22%	6%	36%	36%
Innovative intervention/monitoring	0	3	3	0	3	3	3	3	1	0	0	3	0	1	28%	1%	13%	57%
Funding supplement	3	3	3	3	3	3	3	3	2	3	3	0	3	1	83%	11%	2%	3%
Linked to strategic plan	3	3	3	3	3	3	3	3	2	3	3	3	3	2	92%	7%	1%	0%
Grdwater retention in mdws	3	3	3	3	1	1	3	3	2	2	1	1	1	2	70%	11%	15%	4%
Likely to attain performance crit	0	3	3	3	3	3	3	2	3	3	0	3	3	3	77%	16%	1%	6%
Increase education/awareness	1	1	1	0	3	3	3	3	2	3	3	3	3	1	22%	6%	36%	36%
Upper Reservoir focus	0	0	0	3	3	3	3	0	1	0	0	0	2	0	32%	1%	4%	62%
Consistent with long-range plan	3	3	3	3	3	3	3	3	2	3	3	3	3	3	94%	4%	1%	0%
<b>Project Results</b>															Y	N	na (prjct incomplete)	
Implementation documented	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	N	Y	73%	11%	16%	
Success documented	na	na	na	na	N	N	N	Y	N	N	N	Y	N	Y	12%	34%	51%	
<b>Evaluation Rating</b>															Average			
Goal Consistency	2.3	2.3	2.3	0.5	2.5	2.5	2.0	0.8	1.5	1.8	2.0	1.0	1.3	1.5	1.8			
Strategy and Bylaw Consistency	2.3	2.3	2.2	2.1	2.4	2.4	2.6	1.9	1.8	2.3	2.2	1.6	2.2	1.8	2.2			
Aggregated Consistency	2.3	2.3	2.2	1.3	2.4	2.4	2.3	1.3	1.6	2.0	2.1	1.3	1.7	1.7	2.0			

Appendix D  
**UFRW Water Enhancement Model**

See separate **Excel** file.

Appendix D. Continued

Appendix D. Upper Feather River Watershed Water Enhancement Model

ICF J&S version: 26feb08

CA DWR Groundwater Basin		Area		Estimated Prevalent Maximum Incision		Dewatered Basin Volume		Notes:
Basin No.	Basin Name	Acreage	Percent	Feet	Note	Acre-Feet	Percent	
5-7	Lake Almanor	7,150	3%	0.0	reservoir	0	0%	Areas of groundwater basins from CA DWR Incision estimates from SCS 1989 and Feather River CRM
5-8	Mountain Meadows	8,150	3%	2.0	4 ft over 50% of area; resrv	8,150	1%	
5-9	Indian Valley	29,400	12%	10.0		147,000	26%	
5-10	American Valley	6,800	3%	10.0		34,000	6%	
5-11	Mohawk Valley	19,000	8%	8.0		76,000	13%	
5-12.01	Sierra Valley, primary	117,700	47%	2.0	resistant lake beds	117,700	20%	
5-12.02	Sierra Valley, Chilcoot	7,550	3%	5.0		18,875	3%	
5-56	Yellow Creek Valley (Humbug Valley)	2,310	1%	5.0		5,775	1%	
5-57	Last Chance Creek Valley	4,660	2%	7.0		16,310	3%	
5-58	Clover Valley	16,780	7%	10.0		83,900	15%	
5-59	Grizzly Valley	13,440	5%	0.0	reservoir	0	0%	
5-60	Humbug Valley (Porola)	9,980	4%	6.0		29,940	5%	
5-87	Middle Fork Feather River (Long Valley)	4,340	2%	7.0		15,190	3%	
5-95	Meadow Valley	5,730	2%	8.0		22,920	4%	
TOTAL		252,990		Total Area-Weighted Average: 4.6		Total Basins Volume: 575,760 (assumes shape factor of 0.5)		
						Restorable Gross Basin Volume:	403,032	Comparable to project accompli data, fr: invert rise X acres restord X shapefactor
Groundwater Volume:		If Specific Yield equals:		33%		190,001		fr. text discussion
Accessible Groundwater Volume:		If Feasible Restoration Extent equals:		70%		133,001		fr. Feather River CRM
Available Groundwater Volume After ET Loss:		If change in annual ET from fully degraded to restored is (ft):		1.7		110,390		fr. Loheide and Gorelick 2005 and SIMIS
Dry-Season Flow Enhancement:		If ratio of flow enhancement to new storage is:		1.00		110,390		fr. Kavvas et al 2005
Restoration Cost-Benefit Analyses		Assumed value of water (\$/AF)		150		Assumed		Marginal unit cost: use EWA cost Feather River CRM historical data
		Annual restoration cost (M\$)		4.43		Based on \$550 per AF of new gross basin storage volume		
		Assumed duration of restoration (yrs)		50		Assumed		
		Computed benefit increase per year (AF)		2,208				

Year	Annual Cost (M\$)	Annual Benefit (M\$)	Cumulative Cost (M\$)	Cumulative Benefit (M\$)	Present Value of Cost (M\$)	Present Value of Benefit (M\$)
1	4.433	0.331	4.433	0.331	4.143	0.310
2	4.433	0.662	8.867	0.994	3.872	0.579
3	4.433	0.994	13.300	1.987	3.619	0.811
4	4.433	1.325	17.733	3.312	3.382	1.011
5	4.433	1.656	22.167	4.968	3.161	1.181
6	4.433	1.987	26.600	6.955	2.954	1.324
7	4.433	2.318	31.033	9.273	2.761	1.444
8	4.433	2.649	35.467	11.922	2.580	1.542
9	4.433	2.981	39.900	14.903	2.411	1.621
10	4.433	3.312	44.334	18.214	2.254	1.684
11	4.433	3.643	48.767	21.857	2.106	1.731
12	4.433	3.974	53.200	25.831	1.968	1.765
13	4.433	4.305	57.634	30.137	1.840	1.787
14	4.433	4.636	62.067	34.773	1.719	1.798
15	4.433	4.968	66.500	39.741	1.607	1.800
16	4.433	5.299	70.934	45.039	1.502	1.795
17	4.433	5.630	75.367	50.669	1.403	1.782
18	4.433	5.961	79.800	56.630	1.312	1.764
19	4.433	6.292	84.234	62.923	1.226	1.740
20	4.433	6.623	88.667	69.546	1.146	1.712
21	4.433	6.955	93.100	76.501	1.071	1.680
22	4.433	7.286	97.534	83.786	1.001	1.644
23	4.433	7.617	101.967	91.403	0.935	1.607
24	4.433	7.948	106.400	99.351	0.874	1.567
25	4.433	8.279	110.834	107.631	0.817	1.525
26	4.433	8.610	115.267	116.241	0.763	1.483
27	4.433	8.942	119.701	125.183	0.713	1.439
28	4.433	9.273	124.134	134.456	0.667	1.395
29	4.433	9.604	128.567	144.060	0.623	1.350
30	4.433	9.935	133.001	153.995	0.582	1.305
31	4.433	10.266	137.434	164.261	0.544	1.260
32	4.433	10.597	141.867	174.858	0.509	1.216
33	4.433	10.929	146.301	185.787	0.475	1.172
34	4.433	11.260	150.734	197.047	0.444	1.128
35	4.433	11.591	155.167	208.638	0.415	1.086
36	4.433	11.922	159.601	220.560	0.388	1.044
37	4.433	12.253	164.034	232.813	0.363	1.002
38	4.433	12.585	168.467	245.398	0.339	0.962
39	4.433	12.916	172.901	258.314	0.317	0.923
40	4.433	13.247	177.334	271.561	0.296	0.885
41	4.433	13.578	181.767	285.139	0.277	0.847
42	4.433	13.909	186.201	299.048	0.259	0.811

Appendix D. Continued

50-Year Present Net Value (M\$)			
PV Costs:	PV Benefits:	Net PV :	Benefit-cost ratio
61.184	61.832	0.648	1.01

Year	Annual Cost (M\$)	Annual Benefit (M\$)	Cumulative Cost (M\$)	Cumulative Benefit (M\$)	Present Value of Cost (M\$)	Present Value of Benefit (M\$)
43	4.433	14.240	190.634	313.288	0.242	0.776
44	4.433	14.572	195.067	327.860	0.226	0.742
45	4.433	14.903	199.501	342.762	0.211	0.710
46	4.433	15.234	203.934	357.996	0.197	0.678
47	4.433	15.565	208.368	373.561	0.184	0.647
48	4.433	15.896	212.801	389.458	0.172	0.618
49	4.433	16.227	217.234	405.685	0.161	0.589
50	4.433	16.559	221.668	422.244	0.151	0.562
51	0.000	16.559	221.668	438.802	0.000	0.525
52	0.000	16.559	221.668	455.361	0.000	0.491
53	0.000	16.559	221.668	471.919	0.000	0.459
54	0.000	16.559	221.668	488.478	0.000	0.429
55	0.000	16.559	221.668	505.036	0.000	0.401
56	0.000	16.559	221.668	521.595	0.000	0.375
57	0.000	16.559	221.668	538.154	0.000	0.350
58	0.000	16.559	221.668	554.712	0.000	0.327
59	0.000	16.559	221.668	571.271	0.000	0.306
60	0.000	16.559	221.668	587.829	0.000	0.286
61	0.000	16.559	221.668	604.388	0.000	0.267
62	0.000	16.559	221.668	620.946	0.000	0.250
63	0.000	16.559	221.668	637.505	0.000	0.233
64	0.000	16.559	221.668	654.064	0.000	0.218
65	0.000	16.559	221.668	670.622	0.000	0.204
66	0.000	16.559	221.668	687.181	0.000	0.190
67	0.000	16.559	221.668	703.739	0.000	0.178
68	0.000	16.559	221.668	720.298	0.000	0.166
69	0.000	16.559	221.668	736.856	0.000	0.155
70	0.000	16.559	221.668	753.415	0.000	0.145
71	0.000	16.559	221.668	769.973	0.000	0.136
72	0.000	16.559	221.668	786.532	0.000	0.127
73	0.000	16.559	221.668	803.091	0.000	0.119
74	0.000	16.559	221.668	819.649	0.000	0.111
75	0.000	16.559	221.668	836.208	0.000	0.104
76	0.000	16.559	221.668	852.766	0.000	0.097
77	0.000	16.559	221.668	869.325	0.000	0.090
78	0.000	16.559	221.668	885.883	0.000	0.085
79	0.000	16.559	221.668	902.442	0.000	0.079
80	0.000	16.559	221.668	919.001	0.000	0.074
81	0.000	16.559	221.668	935.559	0.000	0.069
82	0.000	16.559	221.668	952.118	0.000	0.064
83	0.000	16.559	221.668	968.676	0.000	0.060
84	0.000	16.559	221.668	985.235	0.000	0.056
85	0.000	16.559	221.668	1001.793	0.000	0.053
86	0.000	16.559	221.668	1018.352	0.000	0.049
87	0.000	16.559	221.668	1034.911	0.000	0.046
88	0.000	16.559	221.668	1051.469	0.000	0.043
89	0.000	16.559	221.668	1068.028	0.000	0.040
90	0.000	16.559	221.668	1084.586	0.000	0.038
91	0.000	16.559	221.668	1101.145	0.000	0.035
92	0.000	16.559	221.668	1117.703	0.000	0.033
93	0.000	16.559	221.668	1134.262	0.000	0.031
94	0.000	16.559	221.668	1150.821	0.000	0.029
95	0.000	16.559	221.668	1167.379	0.000	0.027
96	0.000	16.559	221.668	1183.938	0.000	0.025
97	0.000	16.559	221.668	1200.496	0.000	0.023
98	0.000	16.559	221.668	1217.055	0.000	0.022
99	0.000	16.559	221.668	1233.613	0.000	0.020
100	0.000	16.559	221.668	1250.172	0.000	0.019

100-Year Present Net Value (M\$)			
Costs PV	Benefits PV	Net PV	Benefit-cost ratio
61.184	69.589	8.406	1.14