Plumas County Flood Control and Water Conservation District

Plumas County, California

FEATHER RIVER WATERSHED MANAGEMENT STRATEGY

FOR IMPLEMENTING THE MONTEREY SETTLEMENT AGREEMENT

Issue Date: 03/17/04

This *Feather River Watershed Management Strategy* document was prepared to help decision making by the Plumas County Flood Control and Water Conservation District and the Plumas Watershed Forum under the Monterey Settlement Agreement of 2003 (the Agreement can be found at: http://www.montereyamendments.water.ca.gov/). The document sets out priorities for watershed management and restoration actions. The Watershed Management Strategy will allow the Technical Committee to advise the Watershed Forum on how to proceed with allotting funds for specific actions. The goals are to improve temporal retention of water to increase base flows, reduce sedimentation, protect streambanks, improve upland vegetation, and improve groundwater recharge.

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The Monterey Settlement

Goals

The Settlement Agreement[1] by and among the Planning and Conservation League, Plumas County Flood Control and Water Conservation District, Citizens Planning Association of Santa Barbara County, Inc., and the State of California Department of Water Resources, Central Coast Water Authority, Kern Water Bank Authority, and State Water Project Contractors authorizes the establishment of a Water Forum to implement watershed management and restoration activities in the Feather River watershed, with particular focus on the drainages of the three State Water Project (SWP) upper Feather River reservoirs, for the mutual benefit of Plumas County and the SWP. The Water Forum's specific goals include:

(1) Improve retention (storage) of water for augmented base flow in streams;
(2) Improve water quality (reduced sedimentation), and streambank protection;
(3) Improve upland vegetation management; and
(4) Improve groundwater retention/storage in major aquifers.

Funding

The funding for this watershed program will be in accordance with the terms and conditions of the Settlement Agreement. Briefly summarized, Plumas County will receive a total sum of $8,000,000. Initially, Plumas County will receive $1,000,000 annually for four years. After the Notice of Determination for the new EIR pursuant to the Settlement Agreement is filed, it will receive an additional $1,000,000 annually for four years. Plumas County received the first payment of $1,000,000 for FY 2002-03 and will receive $1,000,000 for FY 2003-04.

These funds will be used as "seed monies" to leverage against other funding sources such as CalFed, the Natural Resource Conservation Service, the EPA Watershed Initiative, U.S. Army Corps of Engineers, etc. Proposed projects will seek additional sources of funding in order to stretch the annual settlement award to implement as many restoration actions as possible.

Approach

A Technical Advisory Committee will assist the Watershed Forum by identifying objectives that will attain the goals; that is scientific and technical input from the Technical Committee will identify those actions and projects that will provide the greatest benefits for the monies available to restore and manage the watershed.

The first step in setting objectives is a Watershed Management Strategy that provides an overview of watershed conditions, identifies and prioritizes key problems, and prioritizes solutions to the problems. The Watershed Management Strategy will allow the Technical Committee to advise the Watershed Forum on how to proceed with allocating funds for specific actions. The Watershed Management Strategy prioritizes watershed management and restoration actions on a tiered basis. The tiering process is to be consistent with the funding schedule. The primary tier consists of the highest priority problems where investment of funds will pay the biggest beneficial dividends. The secondary tier will include those actions on a smaller scale that compliment and enhance the primary actions. Secondary tier actions will be modified from the original plan based on the success or failure and/or progress of primary tier actions (i.e., adaptive management).

Notes:
1. Planning and Conservation League, Plumas County Flood Control and Water Conservation District, Citizens Planning Association of Santa Barbara County, Inc., and The State of California Department of Water Resources, Central Coast Water Authority, Kern Water Bank Authority, and those State Water Project Contractors identified herein. May 5,2003. *Settlement Agreement*. - www.montereyamendments.water.ca.gov

The goals to improve temporal retention of water to increase base flows, reduce sedimentation, protection of streambanks, improve upland vegetation, and improve groundwater recharge for the mutual benefit of Plumas and the SWP are not only synergistic (the success of one goal is needed to ensure the success of another), but all point to a focus on water management (streamflow) and land management (grazing, logging, mining, development, and recreation). Currently, there are continuing efforts to improve the watershed. Ideally, the first-tier projects can build upon previous and on-going restoration actions.

Adaptive Management

Improving the watershed will depend upon actions that intervene to prevent further degradation and reset trends toward improving riparian and upland vegetation. However, watershed restoration is an iterative process requiring constant feedback to improve interventions. Thus, watershed management strategies will change over time as more is learned.

An underlying principle of successful watershed management is adaptive management. Adaptive management is a careful but flexible approach to the timing and quality of interventions used to restore health and functioning to an ecosystem. Adaptive management demands that as we implement restorative actions, we must simultaneously monitor the effects closely, attend to how nature and its processes respond to our actions, and adjust management interventions as necessary to achieve restoration goals.

The experimental nature of adaptive management requires that managers and politicians redefine success so that learning from what is not working effectively is allowed to become an acceptable part of the restoration process. In addition, information and data must be collected and analyzed over time frames that often exceed the typical tenure of political and managerial decision-makers. Adaptive management must also be predicated, however, upon clearly established goals and decision criteria that require accountability if we are to effectively evaluate how well goals and objectives are being met. Restoration goals and objectives must be compatible with natural processes, existing and achievable technology, and social norms.

Restoration goals established by the Water Forum

The Feather River, located in California's northern Sierra Nevada, is unique amongst Sierran streams. The river's uniqueness lies in the geology of its watershed. Most Sierran streams originate near the crest of the range and flow in a west or southwest direction. Although the Feather River flows in a similar direction west of the Sierra crest, as it cascades toward the Central Valley, its headwaters do not originate near the crest. Rather, the Feather River's two main branches, the north and middle forks, originate east of range and are the only Sierran streams to breach the crest[1]. The two main forks originate east of the Sierran crest in an area known as the Diamond Mountains. This geologic division gives the Feather River watershed a distinct geologic and hydrologic east and west side.

The Diamond Mountains comprise the east side of the Feather River Watershed and include the country north of Sierra Valley as far as State Highway 36, west to near Quincy, CA, and east to near Honey Lake (See p.6, Map of Feather Watershed). The mountains, akin to the ranges of the Great Basin, are formed by a series of northwesterly to north-northwesterly tilted fault blocks[2]. These faults create a series of parallel lying elongate valleys separated by low elevation ridges. Many of the valleys once contained lakes that have become extinct only recently in geologic time[1]. Today, these valleys contain a vast alluvial meadow system that serves as the headwaters of the Feather River (See p.14, Map of Alluvial Valleys), and adds to the rivers uniqueness amongst Sierran streams.

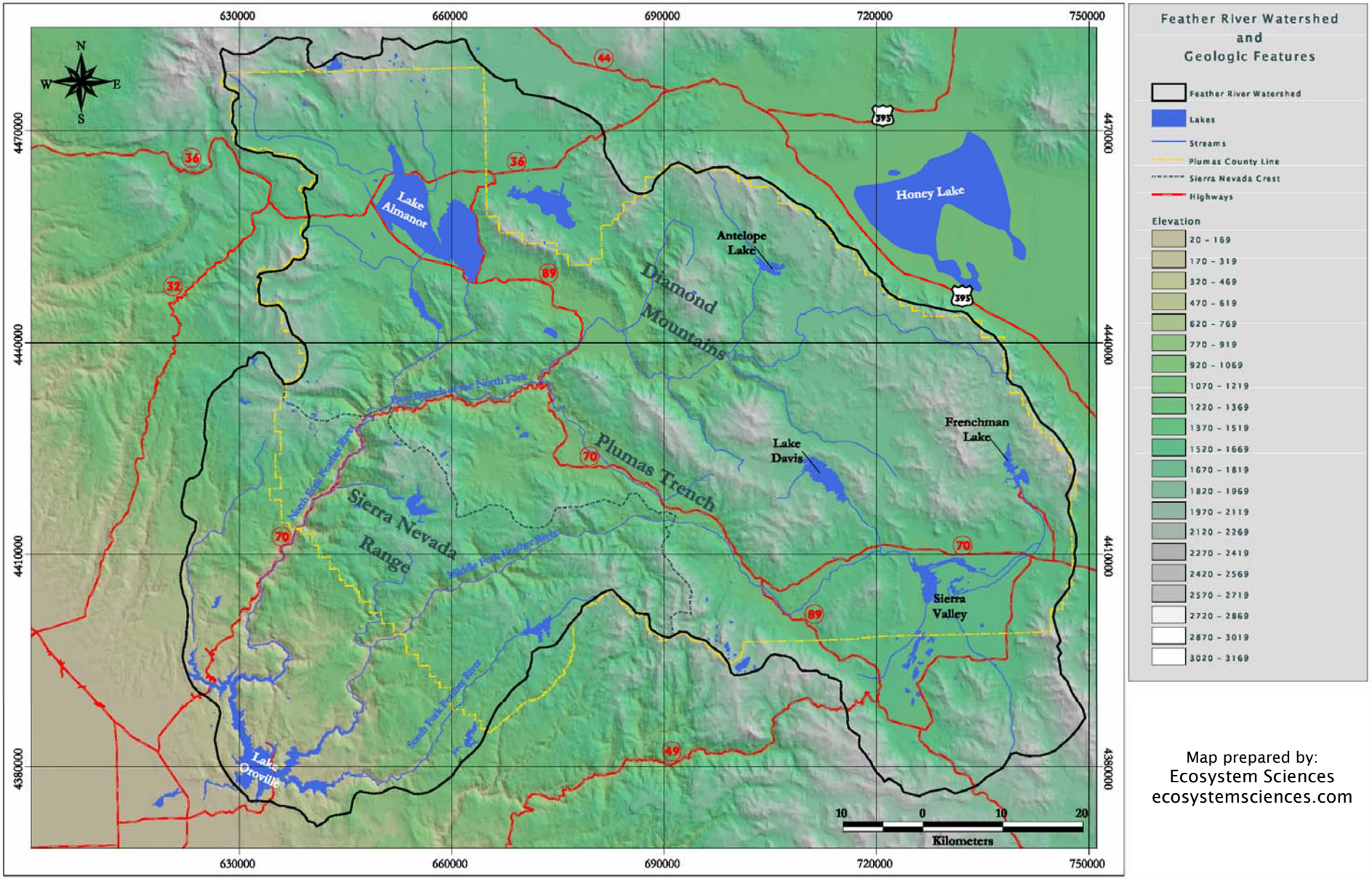
The Diamond Mountains and Sierra Nevada Range are structurally separated by a low strip of land extending from Sierra Valley to American Valley know as the Plumas Trench[1]. In geologic terms the Plumas Trench is an elongate northwesterly trending graben[3]. West of the Plumas trench is the Northern Sierran Nevada and the western portion of the Feather River Watershed.

Dividing the watershed, the crest of the Sierra Nevada follows the steep scarps above Sierra Valley, Mohawk Valley, American Valley and Meadow Valley. Beyond the North Fork of the Feather River the Sierran crest turns to the north, forming the northwestern boundary of the watershed, and terminates at a poorly defined point west of Lake Almanor[1] (See p.6, Map of Feather Watershed).

The western portion of the Feather River Watershed is distinctly different from the east. Most streams of the east side flow through wide alluvial valleys, while the streams of the west flow through steep V-shaped canyons. The reason for the difference is the geologic configuration of the Sierra Nevada and the weather pattern it creates. The Sierra Nevada is a block of the earth's crust about 400-miles long, consisting mostly of granitic plutons that have been uplifted and tilted westward[1]. The crest of this 400-mile piece of the earth's surface forms a near impenetrable barrier to storm systems moving in an easterly direction from the Pacific Ocean. Storm systems crossing the central valley of California meet the Sierra crest and stop. These storms then deposit the majority of their precipitation along the west slope of the range, thus creating a rain shadow effect east of the Sierra crest. This rain shadow is well documented within the Feather River Watershed, as precipitation ranges from over 69.7in (177cm) in the west to less than 12.2in (31cm) in the east. The plentiful precipitation west of the Sierra crest provides rivers with enough flow and energy to carve deep v-notched canyons. The Middle Fork and North Fork canyons of the Feather River are excellent examples of the canyon formation west of the Sierran crest. Dividing the canyons are plateau-like areas with quite gentle relief in contrast to the steep walls of the v-shaped canyons[1]. In conclusion, the geology of the Feather River Watershed creates its distinct east and west sides, thus making the Feather River unique amongst Sierran streams.

Notes:

1. *Durrell, C. 1987. Geologic History of the Feather River Country, California.*
2. Turner, H.W. 1897. *Description of the Downieville quadrangle, California.*, Durrell, C., and D'Allura, J.A. 1977., Van Couvering, J.A. 1962. *Geology of the Chilcoot quadrangle, Plumas and Lassen counties, California.*
3. Durrell, C., and D'Allura, J.A. 1977. *Upper Paleozoic section in eastern Plumas and Sierra counties, northern Sierra Nevada, California.*



Map prepared by:
Ecosystem Sciences
ecosystemsciences.com

Notes and Additional Resources:

Geologic features – Diamond Mountains, Sierra Nevada Range, Sierra Nevada Crest and Plumas Trough – position mapped according to the position given in: *Durrell, C. 1987.* ***Geologic History of the Feather River Country, California****. University of California Press. Berkeley California.*

The dominant soil types in the watershed include highly erodeable granitic and sedimentary deposits in ancient lakes that once occupied most of the valleys. Human activity over time has resulted in decreased vegetative cover from logging and grazing, channel clearing, levee construction and water diversions. All of which, contribute to increasing the sediment yield from these sensitive soils and runoff from the subwatersheds. The primary sources of sediment are streambank erosion and erosion from road cut and fill slopes. Thus, water quality and water quantity are the two central problems throughout the watershed.

Sediments from all of the erosion sources results in water quality conditions that impact fish and other biotic habitat; sediments deposit behind dams throughout the watershed decreasing reservoir capacity and impairing flood control capability and power generation storage. Lack of riparian and upland vegetation means precipitation is not retained and stored in upper watershed water tables and aquifers resulting in rapid runoff, flooding in high water years, and dry tributary streams in late summer.

Streambank and bottom degradation is lowering the water table in the valleys causing changes in riparian habitat as well as in adjacent grazing lands. Decreased cover, channel clearing, and levee construction in streams on the valley floors causes channel bottoms to erode down which leaves channel banks high and vertical. The combination of increased runoff and lowered base flow level of the larger creeks in the valleys causes headcutting in the tributary streams. Poor grazing management that suppresses the growth of riparian and upland vegetation exacerbates headcutting in the tributary streams. Steepened banks begin failing and water tables drop, as vegetation is lost. Upper watershed tributaries to the large valley streams are characteristically deeply incised and form gullies that continuously grow upslope[1]. (See the photos and illustrations on p.8)

The 1989 erosion inventory for a portion of the watershed showed that the largest source of sediments is from streambanks (55%). About 73% of this erosion is on smaller streams tributary to the major streams in the valleys. The second largest single source of sediments is road and railroad cut and fill slopes (43%). Road cut slopes contribute 28% and road fill slopes contribute 15% of the total erosion[2].

While the decline of water tables in bank storage areas is typical of eroded streams, the depletion of deeper aquifers is also a serious problem on valley floors. Poor vegetation cover prevents the rapid infiltration of precipitation to recharge aquifers. Groundwater pumping furthers the depletion of aquifers such that in some areas of the watershed groundwater is being “mined” when recharge cannot keep pace with extraction.

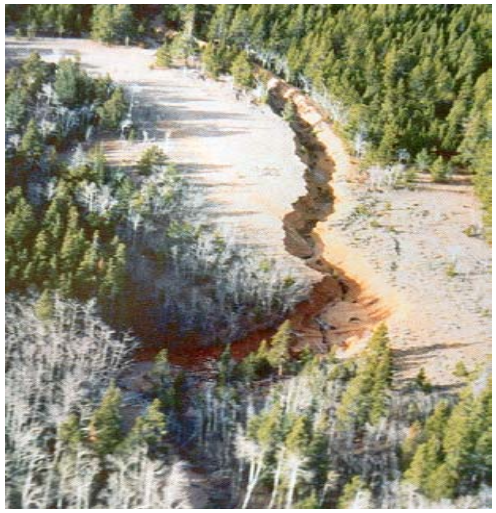
Sources of Erosion in the Feather River Watershed[2]

Streambank	55%
Road and Railroad Cut and Fill	43%
Gullies	1.5%
Sheet and Rill	0.5%

Notes:

1. Description of watershed conditions are from direct observation by the scientific team of Ecosystem Sciences and literature review of Feather River Watershed documents.
2. Source: East Branch North Fork Feather River Erosion Inventory Report. 1989. USDA

Watershed Condition



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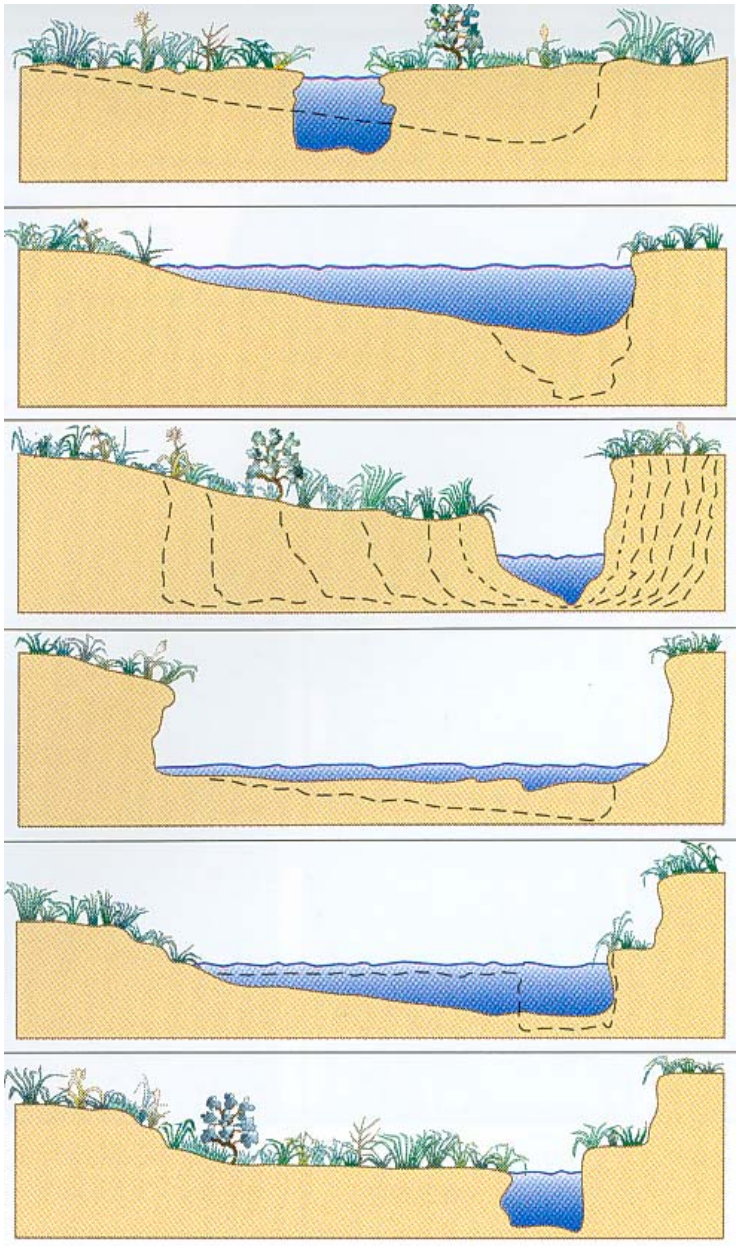

1. Photo of headcutting and erosion

2. Photo of headcutting and incised channel

3. Photo of erosion in tributary channels

4. Illustration of channel geomorphology and change overtime due to watershed degradation

4a. Valley bottom stream channel

4b. Loss of vegetation causes instability of banks leading to erosion

4c. The channel bottom begins to erode down (headcutting) and leaves banks high and vertical

4d. Steep cutbanks slough off into the channel causing increased sediment loads and bank undercuts

4e. Laidback and stepped channel profile begins to stabilize as vegetation holds the streambanks

4f. Inset stream channel. The stream is now functioning within the historic channel with decreased baseflow and riparian vegetation management and protection.

Notes and Additional Resources:

Photos 1,2, and 3 and Illustration 4 are from: Rosgen, D. 1996. *Applied River Morphology*. Printed Media Companies Minneapolis, Minnesota.

Achieving the goals of the settlement agreement with the monies available and within the time frame set requires a focused effort to maximize benefits. Watershed restoration can be approached from two perspectives – passive and active intervention. Passive intervention is generally the least costly approach where nature is allowed to do the heavy lifting. Passive restoration concentrates on removing those perturbations causing stream degradation with such actions as grazing management, road closures, establishing riparian buffer zones, or improved instream flows that allow natural processes to restore ecosystems to a functional condition.

The ideal passive approach for the Feather River watershed to counter headcutting would be to increase base flow levels in major valley streams in combination with grazing management. Re-establishing flows at a water surface elevation in valley floor streams that halts tributary headcutting and grazing practices that allow the regeneration of riparian and upland vegetation would, in time, reduce sediment export and result in bank stabilization and water retention. However, solely a passive approach to restoration is not feasible in the Feather River watershed because of conditions, economics, and time. The major valley streams are now so widened from channelization, levees, and erosion that there is probably not enough water in the system to meet these new base flow conditions. The economic cost in terms of lost agriculture production to restore the necessary base flows would be prohibitive even if sufficient water were available. And, finally, allowing natural processes to restore the effects of headcutting and gully erosion would take geologic time, probably hundreds of years. Consequently, active intervention is needed throughout the watershed.

Active intervention relies upon geomorphic techniques that focus or restoring stream channels from an unstable condition to a stable condition based on the dynamic and synergistic balance between bedload and sediment/discharge relationships and the landscape the stream occupies. The Feather River Coordinated Resource Management Group (CRM)[1] has been employing a variety of geomorphic restoration techniques throughout the watershed for over 20 years and has identified several types of interventions that appear effective at halting headcutting, reducing sediment export, increasing riparian and upland vegetation, and recharging and retaining groundwater. The CRM's most promising geomorphic restoration techniques have been applied in tributaries to the major valley streams. These streams are the best candidates for these types of interventions because of their size and the fact that they occupy very sensitive landforms such as meadows, which are most susceptible to erosion, headcutting, and water table degradation.

Active intervention in the Feather River watershed also needs to be accompanied, in most cases, by passive techniques to ensure that the restoration is lasting and self-sustaining. This is particularly true in situations where erosion and headcutting are exacerbated by poor land management activities such as overgrazing. For example, without proper grazing strategies to ensure that riparian and upland vegetation are allowed to develop, the benefits of the active intervention could be lost and the stream channel returns to the same degraded condition very quickly. Every degraded stream channel presents a unique set of causes and conditions, which is equally true for the adjacent land and water management activities; thus, each restoration project will be different.

Notes:

1. London, J and Kusel, J. 1995. *Applied Ecosystem Management: Coordinated Resource Management in the Feather River Watershed.*

Additionally, restoration projects must be accompanied by land and/or water management plans that ensure the sustainability of the intervention.

In areas of the watershed where headcutting is less of a problem but lack of groundwater recharge and water retention is, restoration may not require geomorphic interventions, but passive intervention with a focus on land and/or water management. Poor grazing practices typically result in low stubble height of grasses and forbes at the end of the grazing season. These land areas are "flashy" in that water is not retained but runs off quickly as rill or overland flow and erosion. Without the retention of precipitation (especially rain on snow events) and a deep vegetation root system the underlying aquifers are poorly recharged. Adjacent pastures irrigated by groundwater pumping results in aquifer mining. In situations such as this the restoration technique could include altering the timing of grazing (on/off), stocking rate (AUMs), livestock rest-rotation, and/or water conservative irrigation practices[1].

The major valley streams present a difficult set of conditions for which geomorphic techniques will probably not work. The channels in these larger valley streams are so widened and incised that physical restructuring may be impossible if not cost prohibitive. Restoration of these streams will depend upon inset channels to restore functionality[2]. Passive interventions that focus on flow management and land management will allow the development of new channel structure within the existing widened and deepened channels. While this is far from pristine and for the most part not desirable restoration, riparian vegetation associated with inset channels will hold the streambanks in place preventing additional sloughing and incising so that sediment export is reduced and flooding is attenuated. Inset channels can develop rather quickly when proper land and flow management are applied; however, establishing good grazing and agriculture practices on a large geographic area (the subbasins of the major valley streams) and implementing more efficient irrigation to allow for higher base flows can take many years.

County-wide comprehensive planning to protect floodplains, control encroachment from development, and manage stormwater is another important passive restoration tool[3]. Most of the major valley streams and many of their tributaries flow through or near urban areas. Land in the valley bottoms is for the most part privately owned. New developments (residential housing, golf courses, municipal growth) all impact and exacerbate current watershed conditions. Comprehensive planning that includes codes and ordinances for the protection of streambanks, buffer zones for riparian systems, prevention of floodplain incursion, and limits to encroachment on stream fluvial processes are not only preventative actions against future degradation, but also allows natural process to begin restoring some reaches of these streams.

East Branch of the North Fork, Feather River
Photo by Ecosystem Sciences

Notes:

1. Platts, W.S. 1991. *Chapter 11 Livestock Grazing.*
2. See the illustrations on p. 8 for a description of inset channels.
3. See the discussion of comprehensive planning on p.26

1. Grazing throughout the valleys of the Feather River Watershed has had a large impact on landscape, riverine and stream conditions. Grazing management tools will greatly reduce this impact and improve instream, streamside riparian, meadow and range integrity.

2. Heavily grazed tributary stream to Frenchman Lake. Note the lack of vegetation on streambanks and degraded channel condition.

3. Wetland Area in Sierra Valley bounded by heavily grazed pasture.

4. Pasture Condition in Sierra Valley.

1

2

3

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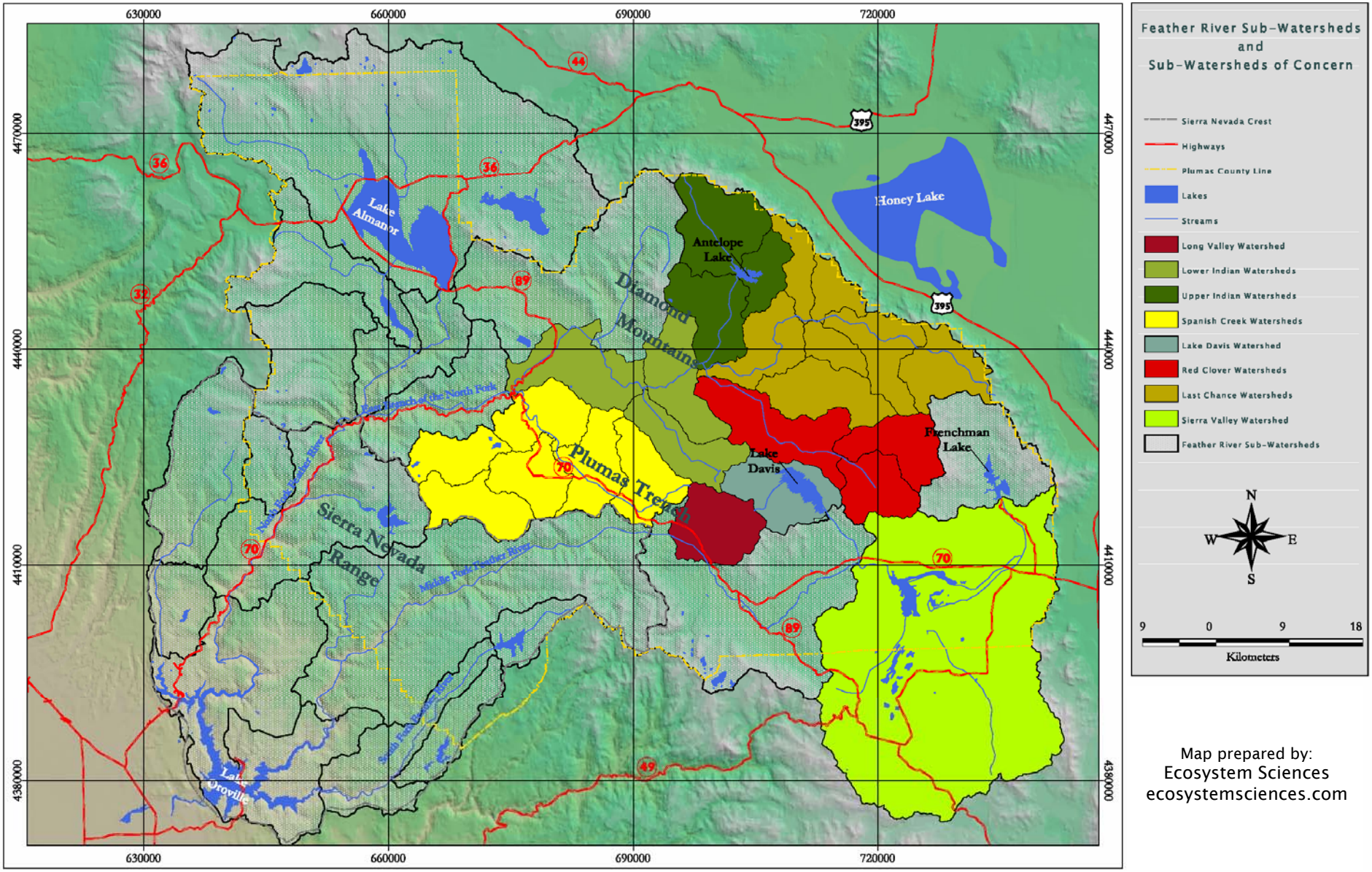
Notes and Additional Resources:
Photos of Feather River Watershed by Ecosystem Sciences.
Locations: 1. Sulphur Creek near Clio, CA. 2. Frenchman Lake, CA. 3. Sierra Valley, CA. 4. Sierra Valley, CA.



Notes and Additional Resources:

1. Feather River Watersheds Shapefile courtesy of the Plumas National Forest Fifth and Sixth Field Hydrologic Units.
2. Subwatersheds of concern were selected on the basis of their overall degradation specifically, sediment export and number of stream in a degraded condition.

1. Vigorous vegetation and grasses along the stream banks and throughout the meadow are the result of a rotational grazing management strategy. These meadows continue to be grazed under a planned utilization schedule.

2. Similar to photo #1, after years of degradation this meadow along the Owens River is showing signs of improvement. Woody riparian plants (willow and cottonwood) are beginning to emerge to further stabilize banks and improve the instream conditions along the river.

3. This illustration depicts a valley bottom stream corridor that is losing valuable vegetation ground cover and stream side vegetation. Consequently the stream is down cutting the channel bottom, eroding the stream banks and adding sediment to the aquatic stream system.

4. The illustration shows an inset stream channel. The inset channel now functions within the eroded valley bottom channel that is bracketed by bench and terrace landforms creating a lowered floodplain and valley bottom.

1

3

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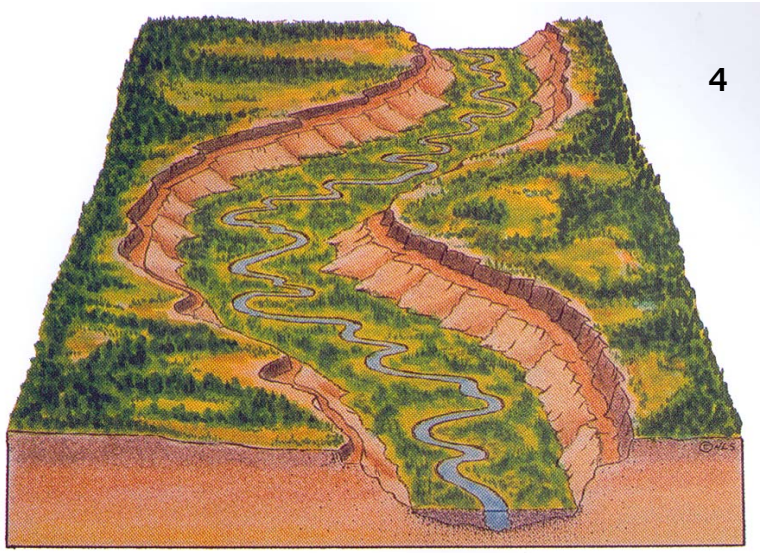
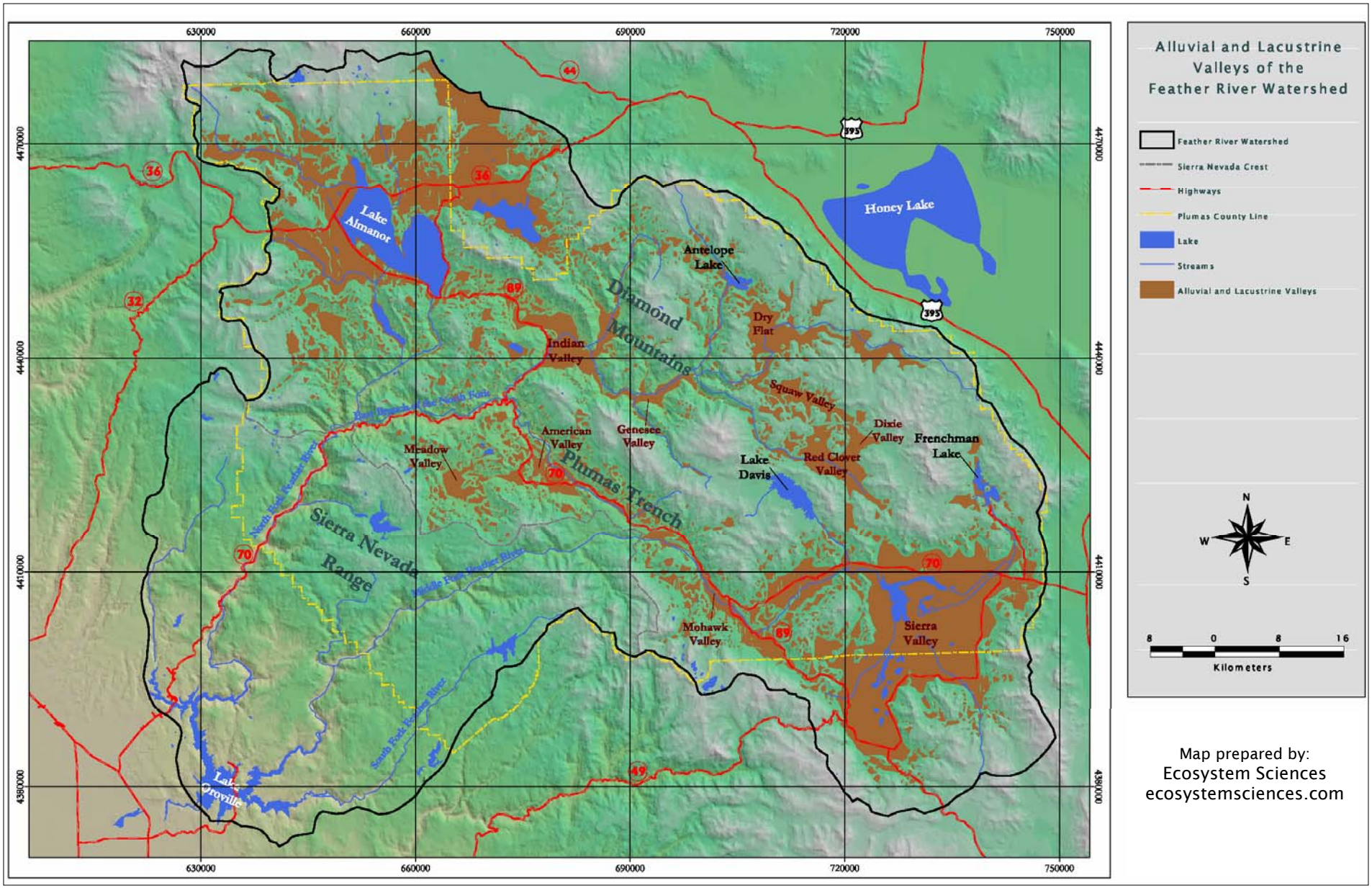


4

Notes and Additional Resources:

Photos #1 and #2 are from the Owens Valley, Upper Owens River in California in the Eastern Sierra Nevada. Photos are by Ecosystem Sciences.

Illustrations #3 and #4 are from: Rosgen, D. 1996. *Applied River Morphology*. Printed Media Companies Minneapolis, Minnesota.



Map prepared by:
Ecosystem Sciences
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Notes and Additional Resources:

Alluvial and lacustrine valleys were derived by querying elevation data (DEM) for areas less than or equal to 6% slope. Landforms less than or equal to 6% slope are classified as gently sloping to flat.

Given the time and money available for restoration of the Feather River watershed, comprehensive restoration is not possible. Restoring all streams and subwatersheds to functional ecological conditions would require decades and tens of millions of dollars. Consequently, the fundamental strategy that is needed is one that maximizes return on investment to achieve the goals of the Monterey Settlement.

The strategy for watershed management must focus on priority areas and projects where restoration interventions will have the greatest beneficial impact on water quality and quantity. Establishing the priorities for watershed restoration is based upon several criteria:

1. Westside versus Eastside

As described previously, the Feather River watershed is divided by the Sierra Crest, such that there is geological distinct east and west sides. The west side is characterized by steep, forested v-notched valleys. The west side is less susceptible to erosion and headcutting; thus, the west side is less degraded than the east side and exports considerably less sediment[1]. 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. More land is under U.S. Forest Service control on the west side while most of the land in eastside valley bottoms is privately owned. In brief, the east side is more sensitive to human activities and is more degraded as a consequence of those activities; thus, the eastside of the watershed should be given the priority for the limited resources.

2. Road Density

Rill and sheet erosion from roads (Plumas County, state highways, railroads and Forest Service roads) constitutes the second most important sediment source throughout the watershed[1]. Road density is an indicator of the magnitude of the problem in terms of sediment contribution. While road density varies from subwatershed to subwatershed, Forest Service roads are the primary factor in determining density. Recognizing the problems associated with old logging roads or poorly built roads or roads in sensitive areas such as riparian zones, the Forest Service has been actively engaged in restoration of the watershed by closing roads and in some cases re-vegetating roads to eliminate sediment sources. Reducing sediment problems associated with roads remains the key Forest Service restoration activity[2]. Expecting the Forest Service to continue restoration with a focus on roads will free-up Monterey Settlement funds for other watershed problems. Restoring roads should be a lower priority than other restoration interventions.

3. Sediment Transport

The 1989 watershed erosion study quantified sediment transport from eastside subwatersheds[1]. Although some improvements have occurred from restoration projects, it can be assumed that the highest yields of sediments are from the same subwatersheds. Since sediment transport is an indicator of overall conditions in a subwatershed, those subwatersheds contributing the greatest amount of sediments should be given the highest priority for restoration actions. The priority subwatersheds are listed on p.18.

Notes:

1. Source: East Branch North Fork Feather River Erosion Inventory Report. 1989. USDA
2. Source: Forest Service Document

4. Groundwater Condition

Loss of water tables and depletion of shallow aquifers is a typical consequence of headcutting throughout the watershed. Poor retention of precipitation is also a consequence when headcutting lowers water tables and vegetation changes to more desert types. Active intervention on streams where this occurs will restore water tables and shallow aquifers when headcutting is reversed and riparian and upland vegetation recovers. However, 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 which need to be managed as a separate priority. Sierra Valley is an example of a high desert groundwater basin developed for agriculture and experiences periodic drought depletions that only recover during wet periods. Prior to the end of the 1970's most groundwater use in the valley was stock water from deep, flowing artesian wells. In the early 1980's, many deep, large capacity, irrigation wells were developed to grow alfalfa and other crops. Significant groundwater declines developed in the most heavily pumped areas. Since its inception in 1980, the Sierra Valley Groundwater Management District has monitored groundwater levels and installed flow meters to monitor pumpage on all wells in the valley pumping 100 gpm or more. In response to the declining groundwater levels, the District established water budgets in the areas of significant agricultural pumping. In order to manage the drought depletions, enhancement of recharge should be investigated. Some areas of the basin, where monitoring is at a minimum, have experienced recent development of groundwater. 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. While other aquifers may also be in jeopardy, the highest priority should be placed on the Sierra Valley groundwater basin.

5. Density of Meadows

The most sensitive landforms in the watershed are meadow areas associated with the upper subwatersheds. Meadows are remnant lake bottoms of highly erodable soil types. Meadows are also heavily used for grazing. The subwatersheds with the highest density of meadows are also those that export the greatest volume of sediments; thus, 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 Monterey Settlement goals to a significant degree.

6. Riparian and Streambank Condition

Streams in the upper watershed (tributaries to the major valley streams) share the common characteristic of denuded streambanks. Headcutting exacerbates this condition; however, it is likely that longterm grazing and/or logging and water diversion began the decline of riparian vegetation before headcutting became the dominant force. Riparian vegetation and riparian corridors are essential to protect and maintain streambanks. Reestablishing riparian systems will be a key component of active intervention to halt and reverse headcutting. Without riparian vegetation to hold streambanks in place the benefits of geomorphic restoration cannot be sustained. 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.

7. Upland Vegetation Condition

Reducing sediments from surface runoff and rill erosion as well as improving water retention and base flow conditions is dependent upon upland slopes, fans and meadows, being well vegetated with hydrophilic vegetation community types like grasses, forbes, emergent, wet meadow and wetland plants. In addition to the benefits of retaining water, reducing erosion, and recharging water tables, well vegetated uplands provide high quality forage for livestock. Restoration of upland vegetation[1] (as well as riparian vegetation) is usually dependent upon sound grazing management in addition to active intervention techniques. Just as with riparian systems, upland conditions that remain degraded and unchanged will ensure that active intervention projects are not sustainable. Priority should be given to those upper watershed areas where land use management can work synergistically with the intervention technique to maximize benefits.

8. Potential Benefits

Highest priority should be placed on those watershed areas and projects where restoration will result in multiple resource benefits. The multiple goals of the Monterey Settlement dictate that restoration will be synergistic. 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. As an example, a pond and plug project accompanied by a detailed, written grazing plan in a Last Chance Creek meadow area will provide multiple resource benefits (all those described above) versus a project to simply provide fish passage with a ladder on the North Fork.

9. Economic and Social Feasibility

Restoration projects can be expensive. The larger and more complicated the project the greater the cost. Cost alone should not be a deciding factor; however, high cost projects should provide substantial multiple benefits. In some cases projects can be so large in an attempt to encompass a vast geographic area suffering severe degradation that the project is cost prohibitive. Nevertheless, an underlying assumption of the Monterey Settlement is that monies will be leveraged for other sources of funding. Contributing funds from the settlement can be matched with other sources to the extent that large, complicated restoration projects become feasible.

In areas such as Sierra, Indian and American Valleys, irrigation agriculture is a major land and water use issue. The CA 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 Conditional Waiver of Waste Discharge from Irrigated Lands for discharge of irrigation and storm water from irrigated agricultural lands (i.e. the Ag Waiver program). These requirements include water quality monitoring and implementation of best management practices (BMPs) to minimize discharge of agricultural pollutants such as sediment, nutrients and other agricultural chemicals. In many instances, BMPs will include project activities such as riparian buffers, channel stabilization, creation of wetlands and marshes, and improved irrigation efficiency. There will likely be opportunities for restoration projects that are mutually advantageous to the agricultural community and to the objectives of the Monterey Settlement. Priority should be given to projects which work towards meeting the requirements of the Ag Waiver program, fit within the priorities of the watershed management strategy, and include economic incentives for (and contributions from) the landowner.

Projects must also be socially feasible. Public access without the property owner's permission is not a requirement of this strategy. Successful projects will have landowner support and willingness to participate. Also, public opinions are transformed and awareness is built with proven success; thus, 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.

Notes:

1. Quincy Library Group fuels the management program.

Priority Subwatersheds and Streams

➢Last Chance Subwatershed
- Main Stem
- Clarks Creek Upstream

➢Red Clover Subwatershed
- Dixie Creek
- Main Stem

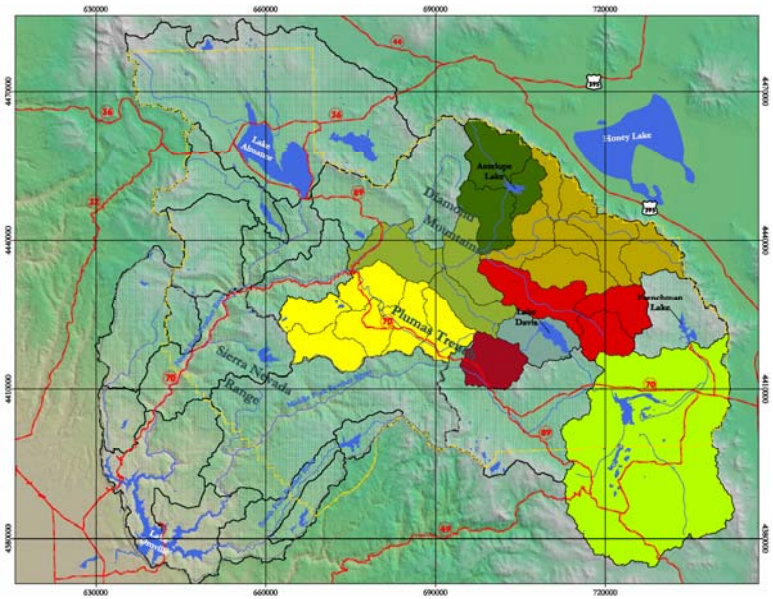
➢Spanish Creek Subwatershed
- Main Stem
- Upper Spanish Creek
- Meadow Valley Creek
- Greenhorn Creek
- Thompson Creek

➢Lower Indian Subwatershed
- Hosselkus Creek
- Indian Creek
  Taylorsville Reach
- Main Stem

➢Upper Indian Subwatershed
- Main Stem

➢Lake Davis-Long Valley Subwatershed
- Sulphur Creek
- Jamison Creek
- Poplar Creek
- Smith Creek

➢Sierra Valley Subwatershed



See the enlarged map on p. 12

All of the subwatersheds exhibit degradation to one degree or another. All of the subwatersheds contribute sediments to the total export from the watershed. Dry tributary channels in late summer, lowered water tables, poor water retention and streambank erosion and incision are common to most streams throughout the watershed. As stated previously, the Monterey Settlement cannot restore every stream in every subwatershed, but the resources provided in the settlement can be assigned to the worst conditions to measurably meet the goals. Based on the criteria to prioritize watershed areas and projects, the subwatersheds, streams, and projects to the left will be the focus of the watershed management strategy. There is no ranking or order of importance to the listed areas. Also, while the settlement signaled out the three State Water Projects (Antelope Reservoir, Lake Davis, and Frenchman Lake) for special attention in the restoration effort, these areas are not as high a priority as other areas.

Notes and Additional Resources:
1. Feather River Watersheds Shapefile courtesy of the Plumas National Forest Fifth and Sixth Field Hydrologic Units

First Tier Projects

This strategy does not endorse any particular restoration technique. The most appropriate techniques should be the best method for the conditions to be restored; that is the site and causes of degradation will dictate what type of intervention that will be most successful. The intent of the Monterey Settlement 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.

Restoration projects are grouped by tier and described by type as follows (categories in each tier are weighted equally):

- Type 1 First Tier Projects: Type 1 projects must focus on headcutting in the upper watersheds on the priority streams. Type 1 projects must result in multiple benefits emphasizing the goals of improving retention of water to increase base flows, reduction of sedimentation, protection of streambanks, improvement of upland vegetation, and improvement of 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 First Tier Projects: 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 AUMs. Other Type 2 projects include design and implementation of more water efficient irrigation methods and irrigation management.

- Type 3 First Tier Projects: Type 3 projects are BMP projects which correlate the goals of the Monterey Settlement with requirements for waivers for discharge from irrigated lands on 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 includes matching funds or in-kind contributions.

- Type 4 First Tier Projects: Type 4 first tier projects can be viewed as preventative rather then restorative. Expansion of urban areas and rural developments that encroach on floodplains, fans, and near-stream areas that are geomorphologically dynamic causes new degradation which, 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. Storm water discharge from urban areas is also a critical issue, which impacts both stream water quality and channel stability.

First Tier Projects

TYPE 1

Headcutting in priority streams of the upper watershed. Multiple benefits that emphasize the main goals.

TYPE 2

Groundwater and aquifer recharge in subwatersheds through grazing management.

TYPE 3

BMP projects which include main goals and conditional waivers for discharge from irrigated lands and priority streams.

TYPE 4

Preventative projects, planning efforts, zoning and ordinance for environmental protection.

Second Tier Projects

TYPE 1

Enhancement and improvement of first tier projects that promote sustainability

TYPE 2

Major valley streams within priority subwatersheds as indicated by monitoring and evaluation.

TYPE 3

Improvement of county roads that cause substantial erosion.

Second Tier Projects

Second tier projects are lower priority type projects that may or may not be limited to the priority streams or subwatersheds. 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).

- Type 1 Second Tier Projects: 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 Second Tier Projects: 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 Second Tier Projects: While the premise of this strategy is to rely upon the Forest Service to address road restoration, there are county owned roads, which cause substantial erosion and are sources of sediment. Because road restoration generally provides only singular benefits (erosion control), and the early program effort is 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 TAC, under adaptive management, should move ahead with a project to address the issue.

Educational Projects

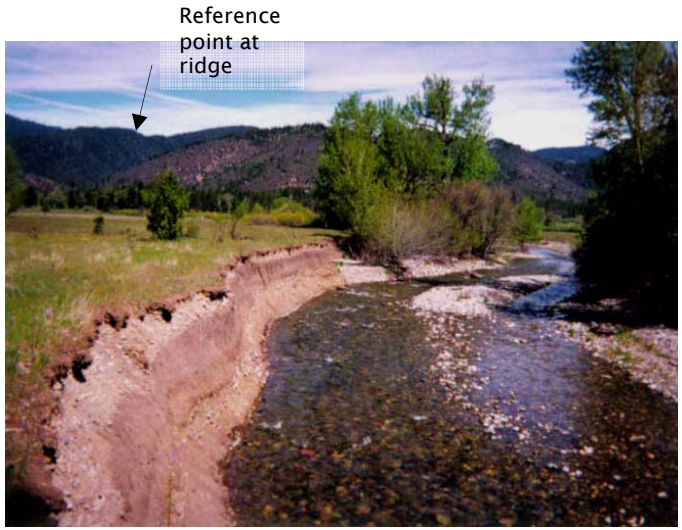
The watershed forum will encourage the development of educational projects that convey the Strategy and restoration effort into schools. Field trips, field exercises, and educational projects that familiarize young people with the watershed and the science and engineering that are part of the restoration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

Innovative Projects

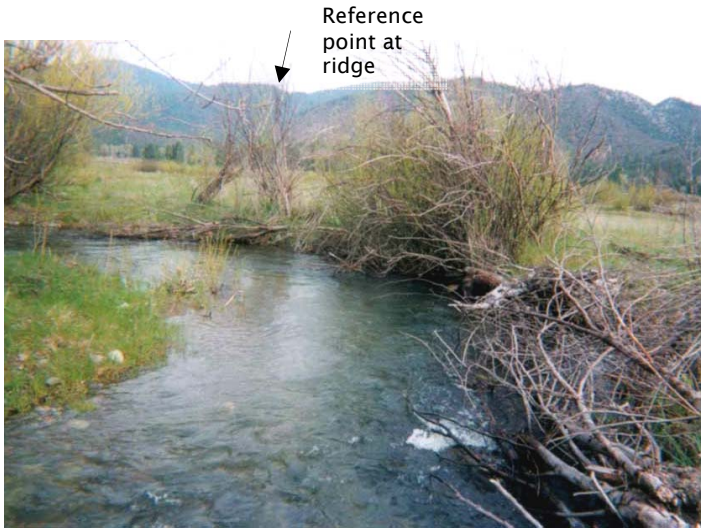
The TAC will encourage projects that are innovative. While there are known restoration techniques that work, not all techniques are suitable for all site conditions. Consequently, the TAC will be open to new, perhaps untried, techniques (including approaches to monitoring techniques). Such projects,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

1 *Pre-project, Wolf Creek* 1999

2 *Post-project, Wolf Creek* 2000



3 *Pre-project, Ward Creek* 1999



4 *Post-project, Ward Creek* 2000

Note: Duplicating exact photo points is extremely difficult with Plug and Pond restoration techniques. See reference.

These two projects are local examples within the Feather River Watershed of stream restoration techniques. Photos #1 and #2 represent restoration within an entrenched channel and are located on Wolf Creek in an urban setting. Photos #3 and #4 represent the *Plug and Pond*[1] technique and are from Ward Creek.

1. Pre project photo of Wolf Creek on the Dunham Property showing a deep entrenched channel, and cut banks with no riparian vegetation.

2. Post project photo of the same channel and bank after restoration using rock vanes and riparian vegetation.

3. Pre project photo of Ward Creek showing deeply downcut channel with no riparian vegetation.

4. Post project photo of Ward Creek channel after implementation of the *Plug and Pond*[1] restoration technique. The new channel pictured here is 300' west of the gully in photo #3.

Notes and Additional Resources:

Photos of Wolf and Ward Creeks by Jim Wilcox

1. *Plug and Pond* Restoration Techniques: Wilcox, J. et.al., 2001. *Evaluation of Geomorphic Restoration Techniques Applied to Fluvial Systems.*

Project Solicitation Process

The TAC is the first level of project decision. Projects will be proposed to the TAC or solicited by the committee. The TAC will forward approved projects with recommendations to the Watershed Forum for the final decision. Projects will be evaluated on the basis of specific criteria (see below). The TAC will evaluate projects in a two-stage process. However, the TAC and Forum may override the selection process for compelling reasons.

Concept Proposal

In the first stage, project proponents will submit a concept document that the TAC will review for merit based on the priorities described in this strategy. If the project fits the priorities and criteria and is economically feasible, the TAC may invite the project proponent to submit a detailed proposal. The concept proposal should be in letter form consisting of the following points:

- Project name
- Project sponsor
- Statement of Qualifications
- Project location (The following information should be contained on the map: project title; project boundary; stream names; road numbers; legal location; township, range, and section designations; scale bar; compass orientation; and legend. One page per map.
- General project description and type of program
- Statement of how the project fulfills the goals of the Monterey Settlement
- Statement of how the project meets priorities of the Watershed Management Strategy
- Gross cost estimate and schedule

In the second stage, project proponents shall use the Detailed Proposal Instructions listed in the Appendix to develop their proposal package. The TAC will use the detailed proposal instructions in their evaluation of the detailed project proposals.

Project Selection Criteria

The TAC will review proposals objectively using the criteria that reflect the goals of the Monterey Settlement as well as the priorities of the Watershed Management Strategy. Proposal will be numerically scored using the weighting and point values associated with each criterion. An example scoring sheet is shown below. The points assigned by the reviewer are multiplied by the weighting for that criterion to arrive at a score; the individual criterion scores are then summed for a total score. In the event numerous proposals are before the TAC, the highest scores will direct the selection of proposals. The TAC may change the values or points shown in this example in the course of time.

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

Monitoring and Evaluation

At one level, project performance is measured by completion that is on time and within budget. Projects must also meet the stated objectives that justified the project. These measures, however, fail to provide feedback on the success or failure of specific active restoration techniques. Feedback is essential so that over the course of time those projects that most often succeed and those which frequently fail are understood. Naturally, those restoration techniques that exhibit poor performance will be excluded from funding. 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 to simply generate sufficient data and information for project evaluation. Consequently, monitoring of projects should be efficient with a focus only on those measurements that provide the desired information. The following monitoring components are examples of the minimal monitoring requirements:

1. Cross channel, terrace to terrace, transects that measures geomorphic surface elevations. This measurement prior to the project and subsequent to the project will show changes in channel depth, streambank building, and changes in adjacent landforms.

2. Longitudinal or thalweg profile along the length of the restored reach will provide a before and after measure of incision and channel response.

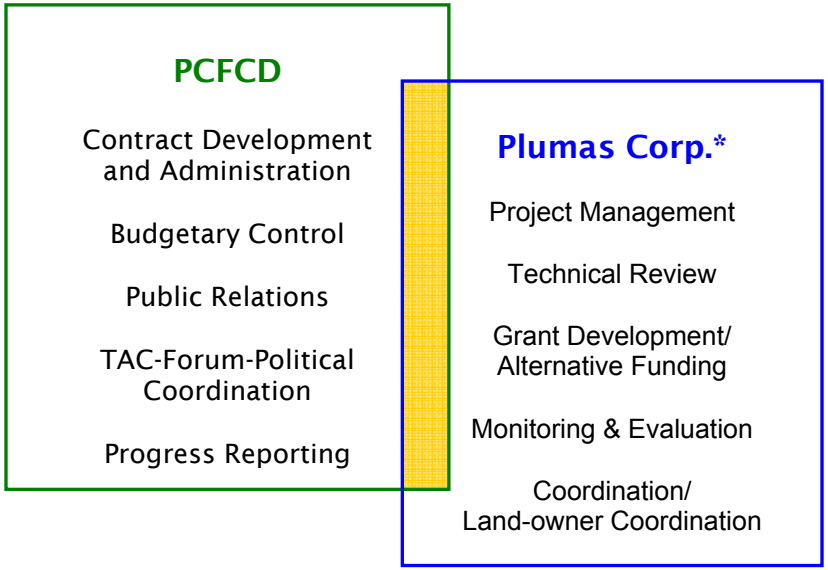
3. Photo points, located by GPS, will illustrate changes in vegetation over time as a response to the intervention.

Project proponents will define the monitoring elements that will best measure project performance and success. The time frame for monitoring will be important in that data and information needs to be available in a reasonable period of time in order to measure at least the trend of the restoration effort. Also, monitoring should emphasize pre-project and post-project conditions.

Administration and Management

The Feather River watershed management program will require considerable day-to-day participation and involvement that will be beyond the capability of the TAC to perform. The program, to lead it successfully, will require substantial experience and capability in many different areas. A certain amount of the monies available through the settlement will need to be assigned to administration and management; however, the intent is to put as much money "on-the-ground" as possible, thus overhead costs associated with administration and management must be minimized. This means that administration and management responsibilities need to be delegated to existing county organizations with the infrastructure, personnel and structure in place so that start-up costs are avoided.

Administration and management of the program will require ability and experience in contract development, contract administration, budgetary control, public relations, coordination with the TAC, Watershed Forum, and county supervisors, day-to-day project management, technical problem solving and technical review, grant development and alternative funding sources, monitoring and evaluation, Federal and state agency coordination and cooperation, progress reporting, and land-owner coordination. A myriad number of issues will need to be addressed on an on-going basis, which will be beyond the capability of a single organization. Consequently, administration and management should be shared by those organizations with the necessary skills and experience. While there are numerous county organizations within which these responsibilities can be assigned, the need for expertise, efficiency and least-cost administration and management suggests that no more than two organizations share the responsibility. The two organizations best suited to the task, because of infrastructure capability and experience, are the Plumas County Flood Control District (PCFCD) and Plumas Corp. Responsibilities will be shared as shown in the following diagram:



Outreach and Extension

PCFCD and Plumas Corp. staff as well as TAC members will provide an active outreach and extension effort. The purpose is to keep the public and landowners informed about project goals, progress and how the strategy works. Presentation and information meetings will be given to civic organizations, irrigation districts, grazing associations and other user groups.

Notes:
* - Other legal entities such as RCD's and Districts to be substituted as cooperators for Plumas Corp.

Comprehensive Planning

Comprehensive planning for counties and communities is an important tool that considers the future of the watershed and the protection of the landscape. Primarily, this comprehensive plan should, at the very least, describe the role and place of rural lands and established communities facing development. A growing demand for new development and economic growth can constrict the natural ecology and diminish its ability to sustain the weight of human impacts. Comprehensive plans focus attention on regional growth and the appropriate relationship between urban, rural and natural systems. To find that focus and achieve restoration and management goals the plan should identify patterns that foster positive interrelationships that move all systems toward equilibrium and healthy ecology.

Containing growth, conserving critical landscapes, and strengthening existing communities are essential to counteract sprawl, loss of agrarian and open space, and preserve and restore the ecosystem. Rural lands and open space need to be conserved. Water systems, wetlands, rivers, and streams need to be protected. Habitat, corridors, buffers, and native species should be encouraged and promoted. In doing so, the comprehensive plan will protect the natural systems that communities rely on and preserve the quality of life that is enjoyed in this watershed.

As part of a holistic watershed management strategy comprehensive planning policies should include features that address the following:

1.) Require site specific stormwater management measures and infiltration requirements. Site specific stormwater design capacities are based on small to average storm events, while larger events are conveyed to larger stormwater facilities.
2.) Minimize directly connected impervious areas. Impervious areas directly connected to stormwater conveyance systems are the greatest contributor to water pollution.
3.) At waterway, stream, and drain crossings design bridges in lieu of culverts. Culverts restrict the ability of the stream to function naturally regarding water flow, fish passage, streamside vegetation, and contiguous riparian zones.
4.) Implement planning and management policies for restoration of local streams and waterways that improve environmental conditions.
5.) Define development envelopes on each site and protect critical site features. Site features to be protected may include important existing trees, steep slopes, erosive soils, natural drainage, riparian areas, and wetlands.

Performance Measures:
1.) Work to achieve on-site stormwater infiltration rates that treat and infiltrate small to normal storm events on site.
2.) Riparian buffer setbacks should be maximized to the extent possible with minimums being set at: 40' either side of stream centerline minimum, or a median width of 100' either side of centerline along the length of stream. Buffer averaging may be used to achieve appropriate buffer quality while accommodating unique areas and existing buildings.
3.) Stream buffers, or right-of-ways should extend to include adjacent wetlands, steep slopes, critical habitats, and, when possible, the extent of the 100 year floodplain.
4.) Stream and riparian buffers design.
5.) Use of riparian stream side buffers for stormwater runoff treatment should be carefully prescribed to not negatively effect the natural riparian vegetation.
6.) Stormwater designs must be appropriate to NPDES permit requirements.
The requirements can be achieved through appropriate BMP designs and placement that work to achieve TMDL targets.

APPENDIX

FEATHER RIVER WATERSHED RESTORATION

PROJECT SOLICITATION AND PROPOSAL INSTRUCTIONS

A. Use as few abbreviations as possible and minimize the use of technical jargon that may not be widely understood.

B. Formatting: You may only use this form as part of the application. Any proposal that does not use this form or exceeds six pages (excluding worksheets and attachments) will not be considered. All type must be 12 point. Proposal must also be submitted on CD.

C. Attachments: The only attachments to accompany the project proposal form are: letters of support from collaborator; a project area map; a project work plan; and the monitoring plan. Support letters should detail specific contributions the collaborators are making to the project such as support staff, funds, equipment, etc.

D. Project Work Plan. Describe "how" the work will be accomplished with an itemized work plan that identifies significant milestones, timeframes, responsible parties, etc. The work plan should tie to the goals. A well-developed work plan is critical.

DETAILED PROPOSAL INSTRUCTIONS

1. Project Name. Provide a *Project Name* that is short, yet descriptive.

2. County. Specify the *County* in which the project is located. If the project area encompasses more than one county, then specify.

3. Project Number. Leave blank.

4. Project Sponsor. Identify the name of the entity, individual, or group proposing the project. If several collaborators are involved specify the primary *Project Sponsor* only (the person to be reached for further information, if necessary), and provide a list of other collaborators in Block 10- "Project Description." Include landowner's letter to show interest in the project (sample attached).

5. Date. Enter the *Date* of project submission. Use the following format: 05-17-2002.

6. Sponsor's Phone Number. Enter the *Project Sponsor's* daytime *Phone Number.*

7. Applicant Capability. Provide a Statement of Qualifications that describes the capability to perform the project based on previous experience and performance.

8. Sponsor's E-mail. Enter the *Project Sponsor's E-mail address.* If none, enter N/ A.

9. Project Location (attach project area map). Submit an appropriate *Project Area Map* along with the submission form. The following information should be contained on the map: project title; project boundary; stream names; road numbers; legal location; township, range, and section designations; scale bar; compass orientation; and legend. The map scale should be no larger than 2.64 inches/mile and no smaller than 1 inch/mile.

9a. National Forest. Identify the appropriate *National Forest* unit (e.g., Plumas National Forest, Lassen National Forest).

9b. Forest Service District. Identify the appropriate *Forest Service District.* If the project occurs within two or more districts, then specify and denote the lead district with an asterisk (*).

9c. State/Private/Other Lands Involved? Specify non-federal lands included within the project area boundaries.

9d. Legal Location: Township. Range. and Section(s). Specify the *Legal Location* of the project, including all townships, ranges, and sections where the project occurs.

10. Justification. Goals and Objectives.
State the *Project Justification, Goals and Objectives* in a clear, measurable, succinct manner.

11. Project Description. *State exactly, and very briefly, "what" you are going to do in general terms.* Do not reiterate other descriptive details provided elsewhere in the application but be sure to highlight any unique aspects or special circumstances. Use this space to show work that may have been accomplished to date.

12. Coordination of Project with Other Related Project(s) on Adjacent Lands?
If yes, then provide a brief description of what type of coordination is needed with regard to other related project(s) on adjacent lands. Is the sequence of project implementation important for achieving a successful outcome? Will the achievement of stated project goals and objectives be contingent on the implementation of other related or complimentary project(s) on adjacent lands?

13. How Does Proposed Project Meet Purposes of the Monterey Settlement?
14. Project Type.

15. Measure of Project Accomplishments/Expected Outcomes.

16. Estimated Start Date. Enter the *Estimated Start Date* (Example: 04-31-2003).

17. Estimated Completion Date. Enter the Estimated Completion Date (Example: 05-31-2003).

18. Proposed Method(s) of Accomplishment.

19. Anticipated Project Costs. Is this a multi-year funding request?

20. Identify Source(s) of Other Funding for Project Identified Above. For all other contributions identified in Worksheet 2, *Column* C, identify the source(s) of contribution and the amount(s) being contributed by the source(s). (max. 7 lines)

21. Monitoring Plan.

a. What measures or evaluations will be made to determine how well the proposed project meets the desired ecological conditions? Describe the specific evaluations to be made in order to determine how well the proposed project meets its stated goals and objectives, particularly in regard to the desired ecological conditions. Identify who will be responsible for completing this monitoring item. (max. 7 lines)

22. Failure to comply with terms of the Agreement. What is in place to ensure that this project will be completed? What happens if it is not? What ensures that project coordinators (you) will do what they say they are going to do? Please illustrate your qualifications and experience with similar types of projects.

23. Details of the landowner agreement: with specifics that will be a part of the proposal and entered into before construction begins.

Status of Project Planning; Worksheet 1

a. NEPA and/or CEQA Complete. Check "yes" or "no" for completion of required analysis and documentation under the National Environmental Policy Act (NEPA) and or California Environmental Quality Act (CEQA).

b. If no, give estimated date of completion. If NEPA/CEQA is not completed, then provide the estimated date for completion. Use the following format: 10-01-2001.

c. NMFS Sec. 7 ESA Consultation Complete. If Section 7 Endangered Species Act (ESA) consultation has been completed with the National Marine Fisheries Service (NMFS). For projects covered under programmatic biological opinions, enter "yes" only if required documentation is completed.

d. USFWS Sec. 7 ESA Consultation Complete. If Section 7 ESA consultation is complete with the U.S. Fish and Wildlife Service (USFWS). For projects covered under programmatic biological opinions, enter "yes" only if required documentation is completed.

e. RWQCB/CDFG Permits for In-stream Restoration Work Obtained. Describe whether or not the required in-stream restoration work permits have been obtained from the Regional Water Quality Control Board (RWQCB) and California Department of Fish and Game (CDFG).

f. RWQCB /COE 401/404 Fill/Removal Permit Obtained. Describe whether or not the required fill/removal permit has been obtained from the Regional Water Quality Control Board (RWQCB) and Army Corps of Engineers (COE). If the proposed project work falls under the regional permit, then check "yes."

g. SHPO Concurrence Received. Describe whether or not project - level concurrence has been received from the State Historic Preservation Office (SHPO).

h. Project Design(s) Completed. Describe whether or not the required project designs are completed.

i. FEMA/National Flood Insurance Program (NFIP) compliance. All projects altering channel or flow conditions need to comply with NFIP guidelines regarding potential changes to delineated 100-year floodplains and/or established base flood elevations.

j. Local/Regional Permits and Regulatory Compliance.

Project Cost Analysis; Worksheet 2

Federal Agency Appropriated Contribution. Identify any funding matches provided through Federal agency appropriations for each cost item.

Other Contributions. Identify any other matching contributions (in-kind or other type) provided from non-Forest Service or non-BLM appropriations for each cost item.

Total Funds.

a. Field Work & Site Surveys. Identify the costs for all necessary fieldwork and site surveys, including data collection.

b. NEPA & Sec. 7 ESA Consultation. Identify the costs for completing NEPA and Section 7 ESA Consultation.

c. Permit Acquisition. Identify the costs for acquiring all required permits for project implementation.

d. Project Design & Engineering. Identify the costs for project design and engineering support.

e. Contract Preparation. Identify the costs for developing necessary contracts for advertisement and award. If the Project Sponsor is a federal entity, then include costs for contracting officer support.

f. Contract Administration. Identify the costs for administering all necessary contracts. Include costs for contracting officer's support. If the Project Sponsor is a federal entity, then include costs for contracting officer support.

g. Contract Cost. Provide an estimate for the actual *Contract Cost.*

h. Workforce Cost. Provide an estimate for the actual *Workforce Cost*. Materials & Supplies. Identify the costs associated with all Materials and Supplies necessary to complete the project.

i. Monitoring. Identify the costs to complete the required monitoring components outlined in the Monitoring Plan.

j. Other (specify). Identify any other costs associated with the project and specify.

k. Indirect Costs. Include a percent indirect cost applied to the Project Sub-Total. For multiyear funding requests, the total amount of indirect costs for the entire project should be reflected.