Summary Information

Plumas Corporation

Upper Last Chance Restoration Project Monitoring

Amount sought: $473,804

Duration: 36 months

Lead investigator: Ms. Leslie Mink, Plumas Corporation

Short Description

This project will continue on−going monitoring studies in the Last Chance Creek watershed, a tributary to the Feather River, in Plumas County. Last Chance Creek is the site of a nine−mile gully elimination project using the geomorphic pond and plug technique. The monitoring will focus on surface water discharge and timing, groundwater storage areas and volume, the evolution of channels newly subjected to bankfull flows, water temperature, evapotranspiration, and vegetative and beaver responses. The proposal also includes further refinement of the WEHY model currently being developed.

Executive Summary

This proposed monitoring program would continue on−going studies in the Last Chance Creek watershed, a tributary to the Feather River, in Plumas County. Last Chance Creek is the site of a nine−mile gully elimination project using the geomorphic pond and plug technique. The proposal seeks to increase understanding of the evolution and response of meadow floodplain systems to landscape−scale restoration. The monitoring focuses on surface water discharge and timing, groundwater storage areas and volume, the evolution of channels newly subjected to bankfull flows, water temperature, evapotranspiration, and vegetative and beaver responses. The proposal also includes further refinement of the WEHY model currently being developed for this watershed by UC Davis. Project monitoring is expected to provide information for future project designs, and to decision makers on the use of this technology to address California's water storage challenges. The size and approach (i.e. restoring floodplain function) of the project addresses well the foundation of the ERP program: the restoration of ecological processes associated with flow, channels, watersheds and floodplains.

Last Chance Creek Watershed Restoration Project
Monitoring & Evaluation Project Description

PROBLEM, GOALS AND OBJECTIVES

This proposal seeks to continue monitoring a nine-mile, 4000+ acre CalFed-funded Ecosystem Restoration project in the Last Chance Creek watershed, a headwater tributary to the Feather River (please see maps at the end of this document). The Last Chance Creek watershed is the longest contiguous meadow complex (37 miles) in the Sierra Nevada. The goal of the restoration project was to restore hydrologic function, enhance meadow condition, and improve habitat value in the upper 1/3 of the Last Chance Creek watershed. (We have begun project initiation for the next 10 mile segment). Restoration objectives included: increase summer base flow; improve water quality; decrease magnitude of floods; monitor and quantify the expected benefits; wetland enhancement; education and technology transfer.

Last Chance Creek was identified as a high priority watershed for restoration in several studies by the Forest Service (1990), Soil Conservation Service (1989), and Plumas Corporation (1992). In 1997, the Feather River CRM also designated the Last Chance Creek Watershed as a demonstration watershed for focused efforts on restoration and monitoring. The first phase of the restoration was constructed in the summer and fall months of 2002, 2003 and 2004, and restored 6.25 miles of channel within the nine-mile project area, in nine discreet treatment areas, using the pond and plug technique of gully elimination. Areas not treated were either in functional condition, were being treated by beaver activity, were archeologically significant, or were reserved by a landowner for continued grazing needs. The treatment involved eliminating the existing gully in Last Chance Creek by filling it in with material obtained from excavating parts of the gully wider and deeper (thus creating ponds). Flow was re-directed into existing remnant (or sometimes constructed) channels on the meadow surface. The problem that the restoration project sought to address is the lack of hydrologic function caused by incised channels and lowered water tables, which resulted in negative impacts to beneficial uses and the timing of flow delivery to the Bay-Delta.

The goal of this monitoring and evaluation is to test the overall hypothesis that restoring an incised channel back to meadow elevation over a large landscape results in improved timing of flows (i.e. attenuated peak flows, and increased summer base flow), and improved water quality (i.e. lower summer water temperature), as well as concomitant hypotheses regarding functional processes of selected ecosystem elements in this eastside watershed. Questions to be answered by this proposal are expected to help guide future projects of this type. The specific questions to be answered in this proposal are:

- How much does the project affect discharge?
- How much water is being stored in the floodplain?
- How are the remnant channels evolving morphologically?
- How has the project affected the vegetative community, including the rare plant *Ivesia aperta*?

- What is the rate of evapotranspiration in a functional versus a degraded meadow?
- How does the project affect water temperature?
- How are beaver in the area responding to project activities?

These questions are developed more specifically, as hypotheses, in the following section.

JUSTIFICATION (CONCEPTUAL MODEL AND HYPOTHESES)

- *Assumption #1*: Prior to Euro-American settlement the meadow/floodplain ecosystem on Last Chance Creek functioned as a hydrologic sponge, absorbing and storing winter/spring rains and snow melt. The channels in the system were meandering Rosgen "E" channels (Rosgen 1996), on the surface of the meadow. The vegetative community consisted of mesic/moist species.
Discussion: Pre-Euro-American conditions have been surmised from evidence such as fluvial geomorphic features, the early historic presence of dairy operations, pre-historic hunting and village locations, and old beaver dams. The project development team is fairly certain of these pre-Euro watershed conditions, however, perhaps some of those conditions versus current conditions could be related to climatological differences, not just human land-use activities.
- *Assumption #2*: Water stored in the floodplain during winter precipitation was released later in the season as summer flow.
Discussion: This assumption does not take evapotranspiration into account. Other watershed elements undoubtedly also affect this assumption. The effect of evapotranspiration on late season flows in this watershed is now beginning to be quantified in two studies, one funded by CalFed, and one by the National Science Foundation (NSF). The NSF study, currently underway by Stanford University, relates groundwater to surface water and evapotranspiration using high resolution infrared photography. The Calfed-funded UC Davis Watershed Environmental Hydrology (WEHY) model has the capacity to expand evapotranspiration measurements to provide dynamic information over the whole watershed and relate such measurements to other hydrologic processes in the basin. Casual observations also indicate that the effect of evapotranspiration in this watershed may be significant. The Soil Conservation Service conducted willow eradication projects in the watershed (presumably in the 1950's), and it is assumed that they were trying to eliminate the effects of evapotranspiration on summer in-stream flows. (Interviews with landowners indicate that the removal of willows also coincided with channel incision in some areas.)
- *Assumption #3*: Human activities such as roads and railroads, timber harvesting, over-grazing, as well as wildfire have contributed to channel destabilization in the watershed, which has resulted in incised channels.
Discussion: Evidence of the impact of these activities is: railroad grades in areas with downcut channels, gully locations that appear to be old roads, and project team observations of the effects of recent over-grazing, timber harvesting and wildfire.
- *Assumption #4*: Incised channels and the attendant loss of healthy meadow root systems have reduced the floodplain capacity to absorb precipitation.

Discussion: The loss of absorption is due to the size of the gullied channel, which carries all of the flows during major precipitation events. Because the gullies are so deep, flood flows cannot spill over the banks onto the floodplain.
- *Assumption #5*: Eliminating the gully and restoring the channel to meadow/floodplain elevation (in conjunction with grazing management changes) will result in the restoration of functional floodplain processes, in turn leading to a dynamically stable channel, and its ancillary benefits to vegetation, wildlife, water quality, etc.
Discussion: Functional floodplain processes (i.e. flood flows spilling onto the floodplain) are expected to manifest primarily as attenuated flood flows and increased summer base flows. However, as mentioned above, evapotranspiration is a process that needs to be considered when evaluating the project's effects on summer base flows. Other benefits expected from a functional floodplain include increased riparian vegetation, which is expected to improve filtration of overland flow, and increase shade. These are expected to result in reduced water turbidity, and summer water temperatures, respectively. However, again, evapotranspiration may reduce flow and/or it may help reduce instream water temperatures. Increased riparian vegetation is also expected to improve habitat for riparian-dependent wildlife species.
- *Assumption #6*: Beaver are a keystone species in this watershed.
Discussion: There has been considerable historic discussion as to whether or not beaver are a native species to Last Chance Creek. It is now generally accepted that they are native to this place, evidenced by old beaver dams visible in gully walls several feet below current meadow elevation. Beaver were nearly extirpated from the watershed in by the early 1900's, however, now their populations are rapidly expanding throughout the upper Feather River watershed. Old beaver dams are visible in many meadows, and appear to have helped reduced down-cutting in some areas (Bailey 2001).

It should be noted that the WEHY model is germane to all of the above discussions on watershed process assumptions. Because the WEHY model has the capability of detailing the makeup of the outflow hydrograph into its different components (i.e. groundwater, direct channel precipitation, subsurface stormflow, surface run-off, etc.), detailed information on watershed processes (both restored and unrestored) can be provided.

The following hypotheses are to be tested:

Surface water discharge:
The proportion of daily average stream flows in June – September to total water year streamflow volume is greater in post-project conditions than pre-project conditions at the Doyle Crossing station.

The winter hydrograph is flattened on Last Chance Creek at Doyle Crossing, as compared to Notson Bridge on Red Clover Creek.

Channel evolution (Fluvial Geomorphology):

Channels designed to carry the bulk of the flows through the treated areas evolve into Rosgen "E" channels, with reduced width:depth ratio and slope, and increased sinuosity, compared to pre-project conditions.

The development of new stable "E" channels is a function of vegetation and bank material.

Groundwater:
There is more water stored as shallow groundwater in the floodplain after project completion versus pre-project conditions.

Water temperature:
Summer water temperatures in treated areas are lower than summer water temperatures in untreated areas.

Vegetation:
There is a greater percentage of mesic/moist species along vegetative transects on Last Chance at Charles Creek after project completion, than were there prior to project completion.

Stream banks of the new design channels have 100% vegetative cover, consisting of >50% willows and sedges.

Project areas dominated by sagebrush prior to implementation show a visible conversion to grassland after implementation.

Ivesia plant numbers and vigor are reduced in areas that have become moist due to implementation, and plant numbers and vigor increase in areas that are dry, on the margin of the hydrologic effects of the project.

Evapotranspiration:
There is a difference in the rate of evapotranspiration in a functional versus a degraded meadow.

Beaver:
There is more beaver activity in the nine-mile project area after project completion than there was prior to the project.

The methods for testing these hypotheses are discussed further in the scope of work section of this proposal.

PREVIOUSLY FUNDED MONITORING

The Last Chance Creek Watershed Restoration Project included a monitoring component, some of which was started by the Feather River CRM prior to the Last Chance Creek

project, as part of the CRM's overall watershed monitoring program. Researchers from UC Davis and Stanford University are also currently engaged in studying the effects of restoration in this watershed. This proposal seeks to continue monitoring the FR-CRM's project-specific parameters, and includes a continuation of partner studies being conducted by UC Davis (to be completed in early summer 2005) and an expansion of the Stanford study (to be completed in 2006). Continuance of the UC Davis modeling effort includes further refinement and calibration of the UC Davis watershed model and technical assistance in the operation of the model. The Stanford effort includes an evapotranspiration (ET) component that the CRM seeks to continue in order to more completely evaluate the effects of restoration on ET, and ET's effects on surface flow. On-going monitoring that this proposal seeks to continue are:

Discharge: In 1999, the FR-CRM installed a continuous recording flow and temperature Campbell CRX10 at Doyle Crossing, located about ten miles downstream of the project area. As the project was constructed in 2002-4, this station contains pre-and post-project data, although some of the project effects may be "washed-out" due to the distance between the station and the project. The FR-CRM has maintained operation of this station through various funding sources, such Clean Water Act and SWAMP. Continued calibration and operation of the station is funded by local funds as well as the CalFed-funded Watershed Model study by UC Davis. Additionally, the UC Davis modeling effort funded the installation (and operation fall 2003-spring 2005) of a similar continuous recording station at the Million Dollar Bridge, in the middle of the restoration project area.
This proposal would fund: a comparative analysis of data from Doyle Crossing of pre-, during, and post-project flows and temperatures, along with annual and monthly precipitation data, which has been generated in the watershed at a weather station at Doyle Crossing (installed by DWR in 1999); operation and calibration of the Million Dollar Bridge station from Spring 2005 - Spring 2008, and summary and analysis of flow data from installation through Spring 2008. While there are no pre-project data available from this site, there will be a comparative analysis of flows within the project area to flows downstream at Doyle Crossing. Analysis would also include a comparison of Last Chance flows with Red Clover Creek (a similar, but untreated watershed) flows.

Fluvial Geomorphology: Fluvial geomorphological features were surveyed and analyzed as part of project design data collection. Channel cross-sections and longitudinal profiles were surveyed using a laser level and rod eye and graphed in order to identify pertinent features, such as remnant channels and valley crowns, for project design. Monumented cross-sections were set up under pre-project conditions. Two cross-sections per treatment area have been re-surveyed and graphed as part of the restoration project documentation.
This proposal would fund: One to two sets of post-project surveys, and data analysis from the same two cross-sections per treatment area. One set would be in 2007, the last year of this monitoring proposal. Whether or not the other set is surveyed depends on precipitation events. If there is a significant event, that set of surveys would be conducted during the summer after the event.

Groundwater: The Last Chance Creek Watershed Restoration Project funded the installation and monitoring of 14 groundwater monitoring wells, located above and below the Charles Creek fan on the floodplain of Last Chance Creek. Data from these wells include one year of pre-project data, as well as three years of data collected during various phases of project completion. The UC Davis watershed modeling study funded the installation and monitoring of 14 wells on the floodplain of the Alkali Flat treatment area of the project. The Stanford study also installed 40 wells, within the project area and downstream, for controls.
This proposal would fund: continued monthly monitoring of the installed wells, development of graphical depiction of groundwater levels on one y-axis, with precipitation data on the other y-axis, on a time x-axis for all of the wells; a comparison of pre-, during, and post-project data from the wells near the Charles Creek fan; a comparison of treated vs untreated wells; and an estimate of groundwater levels throughout the basin in conjunction with the UC Davis Watershed Environmental Hydrology (WEHY) Model.

Water Temperature: Hobotemp thermographs were placed along the mainstem of Last Chance Creek in summer 2004 to compare temperatures in treated versus untreated areas. Those data have not yet been analyzed. However, it was discovered that thermographs need to be in place in June, as some sections of the channel dried up, resulting in only a short duration of water temperature data for summer 2004. Additionally, the Stanford study includes thermal imaging collected from low-elevation flights, in 2004. They will continue flights in 2005. Images from the 2004 flights provide a degree of resolution that shows source water, however, the 2004 flights occurred after the flow ceased in the project area.
This proposal would fund: Three more years of comparative treated vs untreated area water temperature measurement with instream Hobotemps and analysis; and two years of low-elevation color-infrared photography. Data from 2005 and onward are expected to be more representative of project effects since the project was still being constructed during the 2004 sampling season, resulting in groundwater recharge that may have affected instream flows and temperatures.

Vegetation: In conjunction with the groundwater monitoring wells at Charles Creek, plant species were identified. There is one year of this pre-project, and one year of during-construction, plant survey. The FR-CRM hopes that plant monitoring can replace the more time-consuming and costly well monitoring, thus both were monitored at this site. In addition to the monitoring of the general plant community at Charles Creek, rare plant (*Ivesia aperta)* plots were established at the Meadowview treatment area. Data from those plots include one year of pre-project data, and one year of post-project data (Meadowview was completed in 2002). Monitoring documentation of the Last Chance Creek watershed restoration project also included the development of photo points. Photo points are an excellent documentation of overall landscape changes, however, most of those changes appear in photos as vegetative changes. The thermal imaging conducted by the Stanford study also shows changes in vegetation in treated versus untreated areas.
This proposal would fund: three more years of plant survey at the Charles Creek site, which should help determine the succession of plant species in response to meadow-

rewatering projects; three more years of *Ivesia aperta* monitoring in plots, which is expected to show plant migration away from moist areas to dry areas; and riparian vegetation cover and vigor, as measured by photography, to be conducted each year for three years. The low-level color-infrared flight mentioned under temperature would also provide spatial vegetative change data.

Evapotranspiration: The goal of the Stanford study (2004-2006), funded by the National Science Foundation, seeks to develop the use of thermal imaging as a useful tool to look at watershed processes. Preliminary results from the study show that thermal imaging very clearly shows changes in vegetation. The study includes the development of an algorithm to relate vegetative temperatures to evapotranspiration rates. One flight has been performed in 2004, and another is scheduled for June 2005.
This proposal would fund: One additional flight in July 2005 (Stanford would complete the analysis) and a 2006 flight and analysis. A valuable piece missing from the study, however, is direct evapotranspiration measurements. This proposal also includes the installation of two eddy flux towers, one at the treated area at Alkali Flat, and one downstream above Doyle Crossing, that has not yet been treated.

WEHY model refinement: UC Davis, with the FR-CRM as a partner subcontractor, is currently developing and initially calibrating a watershed environmental hydrology model (WEHY) for Last Chance Creek. The model will be complete in early summer 2005, and will enable the FR-CRM and other decision makers to quantify groundwater and discharge effects of restoration by examining model results under before and after restoration simulations.
This proposal would fund: Further refinement of the sediment/environmental constituent transport module of the model with field measurements of flow, sediment, turbidity, and nutrients for one additional year, thus reducing uncertainty in model results, because results will be based on a wider range of hydrologic conditions. It would also fund expanded training for FR-CRM staff in the use of the model.

Beaver: As part of developing the Last Chance restoration project design, local beaver experts and wildlife consultants, Jim and Cris Bailey, conducted a survey of the nine-mile project area for beaver activity. The Baileys produced a report that documented the number and location of established structures, castor mounds, harvest patches, food caches, and evidence of transient beaver.
This proposal would fund: one year of post-project beaver survey and mapping work.

APPROACH AND SCOPE OF WORK

The Feather River CRM has always preferred simple, low-cost monitoring over complicated and costly methods. This proposal includes both the low-cost approach, as well as some higher-cost items, that continue current academic studies in this demonstration watershed. This approach builds on the existing monitoring infrastructure, and also seeks to expand it, to further develop our understanding of meadow evolution after restoration. All of the tasks can be completed with the low-cost approach, except evapotranspiration (6) and WEHY model refinement (8), however, even these will still be completed in their currently funded form. This proposal seeks to extend and enhance

these studies. All of the proposed monitoring parameters have been initiated during project implementation. There are seven broad areas of inquiry regarding the effects of this project: surface water, channel development, groundwater, water temperature, vegetation, evapotranspiration, and wildlife. The areas of inquiry are inter-related, but can also be investigated separately. Tasks are listed below by areas of inquiry, with additional tasks for WEHY model refinement and outreach.

The FR-CRM has been implementing pond and plug projects in the Last Chance watershed since 1995. It has been our experience that it takes about three years for the meadow floodplain to fully respond to the project work. The ability to monitor changes during this period will contribute to our understanding of how meadow floodplains work. Because of the large size of this watershed and this project, we also expect that knowledge gained from this monitoring can contribute to solving California's water storage problems. Included below is a task to disseminate information gathered during this monitoring effort.

Task 1. Monitor surface water discharge. This task tests the hypotheses that summer base flow is augmented, and winter hydrograph peaks are attenuated as a result of the restoration project. The specific questions to be answered are: Is the proportion of monthly stream flows in June – September to total water year streamflow volume greater in post-project conditions than pre-project conditions? Within the same years, are the hydrographs at Doyle Crossing and the Million Dollar Bridge flattened compared to the hydrograph at Notson Bridge on Red Clover Creek?

1a. Develop comparative graphs showing pre-, during, and post-project flows from the Doyle Crossing station, along with annual and monthly precipitation data. Using flows as a proportion of total water volume will negate interannual variability.

1b. Conduct calibration flow measurements, bi-monthly downloads, and annual summary and analysis of the Million Dollar Bridge and Doyle Crossing stations, using the same protocols, per the FR-CRM Watershed Monitoring Program QAP. (Notson Bridge calibration is funded elsewhere.)

1c. Develop graphs showing flows within the project area at the Million Dollar Bridge station compared to flows downstream at Doyle Crossing in a variety time scales (daily, weekly, monthly, annual), and compare these also to the hydrograph from Red Clover Creek at Notson Bridge. (Red Clover Creek is geographically parallel to, and very similar to Last Chance Creek, and has only a small restoration area.)

1d. Write a summary report that discusses the questions to be answered by this task. The hypotheses will be tested using a chi-square test at 90 and 95 percent confidence intervals, and will be true if there is a significant difference in pre- vs post-project summer flows, and in winter event flows between the three stations. Results will also be discussed in terms of the WEHY model results.

Task 2. Monitor channel evolution (fluvial geomorphology). This task tests the hypothesis that channels are developing into Rosgen "E" forms with a low width:depth ratio and slope, and increased sinuosity compared to pre-project conditions. It also tests the hypothesis that the rate of morphological changes in the new channels is a function of pre-project vegetation and substrate. The specific questions to be answered are: On pre-project monumented remnant channel cross-sections, what is the new width:depth ratio?

What is the sinuosity of the new channel? What is the slope of the new channel? What is the bank material and substrate of the new channel? What is the vegetative cover on the banks and bottom of the new channel? Is the new channel trending toward stability?

In order to get a longer time perspective on channel evolution after pond and plug restoration, this task will also include monitoring channels outside of the Last Chance Restoration Project area (but still within the Last Chance watershed) that have undergone exactly the same pond and plug treatment. The advantage of going to other project areas is finding different soil types, substrates, slopes, and projects that have been on the ground longer.

2a. Re-survey the two pre-selected monitoring monumented cross-sections within each of the treatment areas on Last Chance Creek, following the same protocols used in the original survey, according to the Last Chance Creek Watershed Restoration Project QAP.

2b. Select and re-survey six monumented cross-sections from the Clarks Creek and Stone Dairy project areas (same protocols as 2a).

2c. Re-survey the longitudinal profile of each treatment area, according to the same QAP.

2d. During the longitudinal profile survey, conduct a stream bank vegetation survey according to the USFS Region 5 Stream Condition Inventory Survey protocol (this protocol looks at stability as a function of vegetation).

2e. During the longitudinal profile survey, conduct a pebble count at each previously monumented cross-section, according to the USFS Region 5 Stream Condition Inventory Survey protocol.

2f. Develop comparative graphs that show pre- and post-project cross-sections and longitudinal profiles.

2g. Develop a data table that displays pre- and post-project remnant channel widths and depths, percent vegetative cover, and substrate size classes.

2h. Conduct an analysis of variance of the vegetative cover and substrate between rapidly changing new channels and slowly changing new channels. Stratify by age of project. Define rapidly changing channels as channel widths and depths that are greater than 20% different than pre-project conditions (versus less than less than 20% different).

2i. Write a summary report that discusses the questions to be answered by this task. The channel form hypothesis will be true if the analysis of variance shows a significant difference (at the 90 and 95% confidence limit) in pre- vs. post-project channel morphometrics (width, depth, slope, and sinuosity). The hypothesis regarding the function of vegetation and substrate in rate of channel change will be correct if channels that have changed quickly have less vegetative cover, and smaller bank particles, than channels that have changed more slowly.

Task 3. Monitor groundwater. This task tests the hypothesis that groundwater levels are higher throughout the year in post-project conditions, compared to pre-project conditions. (Quantification of groundwater is included in the WEHY task.) This task also continues monitoring wells at Alkali Flat, Ferris Flat, and control wells above Doyle Crossing that have no comparative pre-project data, but can assist in the estimate of the volume of groundwater storage in one of the project area meadows. The specific question to be answered is: How much higher are groundwater levels in treatment areas in post-project conditions, compared to pre-project conditions?

3a. Monitor groundwater levels in the existing 40 monitoring wells on a monthly basis, using protocols per the approved QAP for the Last Chance Creek Watershed Restoration Project.
3b. Develop a graph of groundwater levels on a timeline including pre-project conditions to post-project conditions for each well. Include precipitation on a second x-axis.
3c. Write a summary report that discusses the questions to be answered by this task. The groundwater hypothesis would be tested with a chi-square test for significant difference between pre- and post-project water levels at each well. The report will also discuss the graphical display of groundwater levels, and will compare these results with the UC Davis WEHY model results.

Task 4. Monitor Water Temperature. This task tests the hypothesis that summer water temperatures in treated areas are lower than summer water temperatures in untreated areas. (Unfortunately, pre-treatment summer water temperature data are not comparable due to low flows that completely dried up the channel early in the season before the project. Also pre-project data from Doyle Crossing is too far downstream (ten miles) from the project area to accurately reflect how temperature is affected by the project.)
4a. Calibrate Hobotemps and the Doyle Crossing and Million Dollar bridge station temperature sensors.
4b. By June 1, place Hobotemps in the channel at the following locations: Bird Creek at the road, Last Chance at top and bottom of the Bird treatment section, top and bottom of Bird-Jordan; top and bottom of Jordan Flat; top and bottom of Ferris Creek; top and bottom of Ferris Flat; and top and bottom of Alkali Flat (air temperature data will be available from the two weather stations in the watershed).
4c. Collect and download Hobotemps.
4d. Develop comparative graphs that depict temperature changes through the project area.
4e. Work with Stanford study to analyze flight data and develop graphic spatial display of water temperatures throughout the project area.
4f. Write a summary report that discusses the differences in water temperatures in treated versus untreated sections of Last Chance Creek. The hypothesis will be tested with a chi-square test for significant difference between treated vs untreated sections of the channel of daily maximum, daily average, and weekly average water temperatures at the 90 and 95% confidence intervals. The infrared map will also provide a visual and qualitative display of temperatures differences. Discussion of the results of this task will include a comparison to the results of the high-resolution water temperature study currently underway by Stanford.

Task 5. Monitor vegetation. This task tests the following hypotheses: as a result of the restoration work, the vegetative community will change from a mesic/xeric to a mesic/moist type; areas of the treated meadows have been converted from sagebrush to grassland; and, *Ivesia* plant numbers and vigor are reduced in areas that have become moist due to implementation, and increased in areas that are dry, on the margin of the hydrologic effects of the project. The specific questions to be answered are: What is the percent change of mesic/dry to mesic/moist species on the vegetation transects at the

Charles Creek reach? Are the number of *Ivesia* plants decreasing, increasing or remaining the same along the moisture gradient (as evidenced in the sample plots)? Are the existing plants increasing or decreasing in vigor (indicated by length and number of leaves, and number of flowering stalks)?
5a. Re-survey the 14 plant transects associated with the wells at the Charles Creek reach, according to pre-project protocols.
5b. Re-survey the Ivesia plots according to pre-project protocols.
5c. Re-photograph ground photo points, and fly-over photos.
5d. Develop map and analyze infrared flight data for aerial extent of riparian corridor moist vs. dry vegetation in treated versus untreated areas of the project.
5f. Write a summary report that discusses the questions to be answered by this task. The conversion from xeric to moist vegetation hypothesis will be tested using the data generated in task 5a, with a chi square test for significant difference between years of the number of plants in moisture categories as described in the National List of Plant Species that occur in wetlands: California (Region 0) (USFWS & USDOI Biological Report #88. 1988). The conversion from sagebrush to grassland will not be statistically tested, but will be discussed and accompanied by photo point, fly-over documentation, and a visual and numerical comparison of the areas of sage vs grass from the infrared analysis . The *Ivesia* hypotheses will be tested with a chi-square test for significant difference in each of the vigor and population measurements.

Task 6. Monitor Evapotranspiration. Casual observations indicate that vegetation is an integral component in maintaining a functional meadow system. Evapotranspiration from the vegetation appears to be a significant force in this eastside watershed, and improving understanding of its impact on surface flow will help evaluate the effectiveness and broader ecological significance of these projects, and the ecological functions they seek to restore. The question is: how much water is required by functional meadow/ floodplain systems? This task seeks to quantify the loss of water required to maintain the vegetation that maintains the watershed. This task tests the hypothesis that evapotranspiration (ET) from vegetation required to maintain a functional meadow is greater than ET in a degraded meadow. This task also takes into account that open meadow systems in the Feather River Watershed (as in most areas in California) are used for cattle grazing. Therefore, there is a subtask to address the grazing component. The questions addressed by this task also dovetail with, and complement the work being conducted by Stanford University and UC Davis. Direct measurements from eddy flux towers will refine and validate the vegetation temperature/ET algorithm being developed by Stanford, and the ET module of the WEHY model. This task also includes infrared photography flights that have proven useful through the Stanford study. Images and data from the flights would also be used for water temperature and vegetation analysis.
6a. Continue to participate in data collection and analysis in 2005 and 2006 with Stanford University and UC Davis.
6b. Conduct NEPA analysis for installation of eddy flux tower at Alkali Flat.
6c. Purchase and install two continuous recording eddy flux towers, one at Alkali Flat (treated area), and one above Doyle Crossing (untreated area).
6d. Calibrate, download and maintain the flux towers.
6e. Manage data generated by the flux towers.

6f. Install one utilization cage in each project reach (treated and untreated areas). (Note: The project area will not be grazed until 2007.)
6g. Monitor permittee grazing use in each project reach.
6h. Conduct a low-level infrared flight in July 2005 (as follow-up to Stanford's scheduled flight in June), and a similar flight in July 2007.
6i. Analyze infrared flight data for ET rate based on vegetation temperatures.
6j. Write a summary report that discusses the questions to be answered by this task. The difference in ET hypothesis will be tested with a Chi-square test for mm of water per hour between the treated and untreated flux towers. The amount of water generated at each flux tower can be extrapolated to other areas using the infrared data to quantify estimated ET throughout the project area. ET will also be discussed in the context of grazing land-use, and the WEHY model.

Task 7. Monitor beaver. This task tests the hypothesis that beaver activity is greater after project work than before. It answers the specific question of how beaver respond to project activities.
7a. Re-survey the project area using the same survey protocols used for pre-project beaver surveys per the approved QAP.
7b. Using the existing pre-project beaver activity maps, develop comparative maps showing pre- and post-project beaver activity locations.
7c. Write a summary report that discusses beaver activity in the project area. The hypothesis will not be statistically tested, but will be considered true or false based on pre- and post-project quantitative and qualitative observations.

Task 8. WEHY Model Refinement. This task specifically continues UC Davis' involvement with the FR-CRM in monitoring the Last Chance Watershed. The model will continue to be used to predict changes in the watershed based on restoration and other management changes. Refinement of the model during evolution of the meadows as project work matures will be very valuable in verifying the model's accuracy. Results from the model are expected to assist decision makers in weighing the value of watershed restoration versus other water management options. The FR-CRM is also expecting to use the model to extrapolate similar project benefits to other areas in the Feather River watershed. Continuing model refinement will also corroborate the results of monitoring in the surface water, groundwater, vegetation and evapotranspiration tasks.
8a. Collect and analyze vegetation, water, and meteorological data to further calibrate the model.
8b. Refine model calibration for the transport module.
8c. Generate additional distributed atmospheric data for the purpose of running simulations with the watershed model in order to perform tasks 8d, e, & f.
8d. Develop graphical surface water estimations across time, space, and precipitation variations.
8e. Develop graphical groundwater volume estimations across time, space, and precipitation variations.
8f. Develop graphical evapotranspiration rate estimations across time and space.

8g. Write a summary report that compares these modeling results with results from the other monitoring tasks. Include a discussion on the use of watershed restoration in solving California's water storage problems.

Task 9. Outreach. The purpose of this task is to disseminate information learned from the project monitoring to scientific, restoration, and government communities. (Project outreach also includes involving students in the Last Chance watershed monitoring, however, this activity is funded under another FR-CRM program.)
9a. Develop a poster session presentation showing a graphic conceptual model of channel/floodplain interactions in degraded versus restored conditions.
9b. Present the poster at one CalFed or other restoration or watershed conference, and display the poster in two public locations in Plumas County.
9c. Develop a power point presentation describing the monitoring parameters, methods, and results completed under this grant.
9d. Make a power point presentation at one CalFed or other restoration or watershed conference, one Plumas County Board of Supervisors meeting, one California Watershed Council meeting, and one Forest Service ecosystem management meeting.
9e. Draft and submit a paper for publication to a peer-reviewed restoration or hydrologic journal.
9f. Print and disseminate task summary reports to CRM agencies and other interested publics as they are generated.
9g. Upload task reports onto FR-CRM website.

FEASIBILITY

The monitoring proposed herein is both feasible and appropriate, as it is primarily a continuation of monitoring that has been on-going. Protocols have been tried, and preliminary results are currently being compiled. Project-funded monitoring is due on December 31, 2004 to the CalFed ERP program. Partner studies are due for completion in 2005 and 2006. Data that have been collected thus far, both pre- and post-project have, unfortunately, been collected during a prolonged drought. It is our hope that data collected under this agreement will include at least one year with substantial precipitation events. However, weather is difficult to predict. Because of the staggered implementation of different treatment areas, this monitoring proposal will allow concurrent monitoring of project areas of varying age. This should be highly valuable in creating a coherent depiction of the evolution of project area recovery, response, and expected benefits. The CalFed ERP Program has purchased two snowmobiles for project monitoring. Because these tools allow winter access to the project area, there is no foreseeable reason that the project monitoring scope of work detailed above would not be completed. Most of the monitoring equipment (two continuous recording flow and temperature stations and two weather stations, all on National Forest land) is already in place. NEPA analysis would be required for installation of the eddy flux tower on National Forest land, but it would be in a discreet location, and is not expected generate controversy. The Last Chance drainage is not inhabitated, and is used on an infrequent basis by hunters, woodcutters, or OHV users. Casual encounters with users in the area usually involve curiosity. In general, people like the restoration project because they can

see the change from a previously, obviously degraded condition (i.e. lots of sagebrush and a big gully) to a condition that immediately appears more functional (i.e. meadows with grass).

EXPECTED OUTCOMES AND PRODUCTS

Expected outcomes and products are listed below by task, as described in the Scope of Work.

Task 1. Monitor surface water discharge. Products from this task include comparative graphs and a summary report, which are described in the scope of work. The graphs will be compiled on an annual basis, and the report will be drafted at the end of the three year monitoring period. Also see task 8 products.

Task 2. Monitor channel development. Products from this task include: comparative cross-section and longitudinal profile graphs that will be developed once at the end of the three year monitoring period, or twice, if, during the term of this agreement, there is a significant flow event; an analysis of the vegetative cover and substrate materials between rapidly changing new channels and slowly changing new channels, analyzed in conjunction with the other survey data (i.e. one to two times); and a summary report drafted at the end of the term of the agreement.

Task 3. Monitor groundwater. Products from this task include: Graphed groundwater elevations over time for each well, with precipitation on a secondary x-axis, produced annually, with a summary report produced at the end of the agreement. Also see Task 8 products.

Task 4. Monitor Water Temperature. Products from this task include: comparative graphs of daily maximum, average, and weekly average temperatures above and below each treatment area to be produced annually; high-resolution color-infrared map and video of water temperatures through the project area. The summary report will be produced at the end of the agreement.

Task 5. Monitor vegetation. Products from this task include: plant transect and plot tabular data; photo-point and fly-over photographs, color-infrared map of vegetation temperatures and a summary report at the end of the agreement.

Task 6. Monitor Evapotranspiration. Products from this task include: installation of two eddy flux towers in 2005, eddy flux tower data (2005-2007); installation of utilization cages in 2005. The map of vegetation temperatures converted to ET rates using Stanford's conversion and the summary report would be submitted at the end of the agreement. Also see task 8 products.

Task 7. Monitor beaver. Products from this task include: comparative maps and a report discussing beaver activities in relation to project activities, to be submitted at the end of the agreement.

Task 8. WEHY Model Refinement. Products from this task include: Graphical depictions of groundwater volume and surface water flows and over time and space, evapotranspiration estimates consistent with observed vegetation and meteorological data, and simulation results quantifying changes to the basin hydrology associated with restoration activities.

Task 9. Outreach. Products from this task include: one set of poster materials, presented three times; one power point presentation, presented four times, two papers submitted to a peer-reviewed journal; eight white-paper summary reports, and one complete final report (including the reports from each task) printed and disseminated to CRM agencies and others interested, as well as uploaded onto the FR-CRM website.

DATA HANDLING, STORAGE AND DISSEMINATION

The data collected under this proposal would be incorporated into the FR-CRM's existing data management system. Field data would also be collected with a handheld computer, when possible, or paper (and entered into an excel spreadsheet). Data are downloaded (or entered) into excel spreadsheets in the FR-CRM data computer. Data are backed-up monthly onto another computer's hard drive, as well as onto CDs, and stored at the monitoring coordinator's home. All of the FR-CRM's monitoring data are available to the public through the CRM's website. CRM projects are also listed on the NRPI website, and there is link to the FR-CRM website from the Sacramento River Watershed Program's website. The CRM is also working with the SWRCB to begin entering our data onto the state-wide Surface Water Ambient Monitoring Program (SWAMP) database. UC Davis will archive simulation results of the model and the data collected for use in the model. Storage will be on writable DVDs, to be stored in the UC Davis hydrology lab, with copies stored at Plumas Corporation.

PUBLIC INVOLVEMENT AND OUTREACH

One of the goals of the FR-CRM is public education about our watershed. The Calif. Dept. of Water Resources has funded CRM education and outreach coordinators, who are working with schools and landowners to participate in watershed stewardship projects and monitoring. While the project area is relatively remote, Portola schools have been involved with the restoration project re-vegetation, and we plan to continue their involvement with monitoring.

The outreach task (9) in the Scope of Work section describes specific presentations and audiences. In addition to those activities, the CRM will continue to use Last Chance Creek as a demonstration watershed, involving schools, partner agencies, and the public. The CRM conducts semi-annual tours of projects, which are widely advertised, and usually well-attended, and have included a Last Chance Creek visit since the restoration was begun. The seven areas of inquiry each include their own summary report. Project final reports are regularly disseminated to CRM participating agencies. As mentioned above, project and monitoring information is available on the FR-CRM website

(www.feather-river-crm.org). The synergism of studies and restoration in this watershed offer great opportunities to significantly advance knowledge in scientific, management, and stakeholder communities. Tours, reports, presentations, publications, project work, and the website are our primary vehicles for outreach and involvement. (Tours and school involvement are not included in the scope of work because they are already funded under other CRM programs.)

WORK SCHEDULE

The following table more fully describes the timeline for project accomplishments, as listed in the Tasks and Deliverables form. Because of weather and the Stanford study timeline, a start date of July 2005 is assumed.

Month	Accomplishment	Comments
1 assume July 05	Project management*; Calibration flow msmt*; Monitor groundwater*; WEHY water sample collection and analysis, veg and weather data (*thru month 12); Begin eddy flux NEPA; Calibrate & Install Hobotemps; Infrared photography flight to Stanford protocol	* tasks will be on-going each month of the term of the agreement (except WEHY)
2	Purchase & install eddy flux on private land	
3	Purchase & install eddy flux on national forest land; Download Hobotemps; CalFed Quarterly Report and Invoice**	** quarterly reports & invoices will be submitted each calendar quarter for term of agreement
4	download eddy flux towers (6d)and discharge stations (1b)***	***download all continuous recording equipment bi-monthly throughout agreement
5	Additional WEHY atmospheric data complete (8c)	
6	Develop comparative hydrographs of Doyle Crossing, Million Dollar Bridge, Red Clover Creek, and WEHY model (1c). Analyze Doyle Crossing data for sig diff btwn pre and post project flows (1a) & annual flow summary report (1d)	
7	Develop annual water temperature graphs	
8	Develop color-infrared water temperature maps	
9	Develop WEHY estimation reports & train CRM staff (8d-g)	
10		
11		
12	Calibrate & Install Hobotemps;	
13	Beaver field survey (7a)	
14	Field surveys of channel evolution tasks (2a-2e)	
15		
16		
17	Channel evolution graphs, data table, and ANOVA (2f-h)	
18	Develop annual comparative hydrographs of Doyle Crossing, Million Dollar Bridge, Red Clover Creek, and WEHY model (1c). Analyze Doyle Crossing data for sig diff btwn pre and post project flows (1a) & annual flow summary report (1d)	
19	Develop annual water temperature graphs; Beaver summary report and maps (7b&c)	
20		
21		

22		
23	Purchase and install grazing utilization cages	
24	Calibrate & Install Hobotemps; Field surveys for vegetation (5a-c)	
25	Conduct one low-elevation infrared photography flight	
26		
27	develop and analyze color-infrared vegetation (5d) and ET (6i) map	
28		
29	Channel evolution summary report (2i);	
30	Develop annual comparative hydrographs of Doyle Crossing, Million Dollar Bridge, Red Clover Creek, and WEHY model (1c). Analyze Doyle Crossing data for sig diff btwn pre and post project flows (1a) & annual flow summary report (1d)	
31	Develop annual water temperature graphs	
32	Vegetation summary report (5f); Poster presentation (9a&b)	
33	Develop groundwater graphs for each well (3b); Power point (PP) presentation (9c&d)	
34	Groundwater (3c) and water temperature (4g) summary reports; two PP presentations (9d)	
35	ET summary report (6j); publication manuscript (9e)	
36	Final report for project (0); dissemination (9f&g)	

APPLICABILITY TO ERP GOALS

This monitoring proposal primarily addresses CalFed's ERP ecological processes and habitat goals. One objective of this large nine-mile restoration project is to restore processes on a large enough scale to produce measurable differences in timing of flows, as well as improving the efficacy of ecological processes in a functional floodplain system in the upper watershed of the Bay-Delta. This monitoring proposal seeks to demonstrate measurable improvements in timing of flows (goal 2, obj 5), storage of groundwater (goal 2, obj 6), channel evolution (goal 2, obj 8), water quality (temperature is a water quality issue in the Feather River) (goal 6), vegetation and beaver (goal 4, obj 2). The proposal also seeks to increase understanding of the effect of evapotranspiration on the timing of flows in functional floodplain systems, which also contributes to the ERP ecological processes goal.

This monitoring proposal is integrated with existing studies in the watershed underway by UC Davis and Stanford, as described in the Scope of Work. It will also contribute pre-project data to further restoration efforts in the Last Chance watershed, downstream of the existing project. Some of the tasks include monitoring of similar projects in the watershed, but outside of the project area, in order to increase the time scale of restored area evolution. Similarly, results from this monitoring on Last Chance will be used in the FR-CRM's watershed monitoring efforts, as many of the protocols are the same. Results of this monitoring will inform water resource management decisions, as well as future geomorphic project design.

QUALIFICATIONS

The Feather River CRM has successfully implemented the restoration project, and has documented preliminary project effects according to the QAP. A final report on the restoration project and project monitoring will be submitted to CalFed via the National Fish and Wildlife Foundation in December 2004. The UC Davis Hydrologic Research Laboratory is currently developing the WEHY model for Last Chance Creek. All monitoring work in this proposal would be continued by staff that are currently inplementing such work. Additionally, the FR-CRM Monitoring Committee provides oversight to CRM staff on monitoring projects. Specifically, those staff are: Leslie Mink, M.S. in Zoology from University of Maine (1986); six years as Forest Fishery Biologist for Plumas National Forest; two years associate faculty at Feather River College, three years FR-CRM Watershed Coordinator; co-authored paper in Hydrobiologia (2002). Jim Wilcox, nineteen years as FR-CRM Program and Project Manager, implementing over 30 restoration projects with monitoring. Terry Benoit, B.S. in Biology from Humboldt State, 1970; 26 years as hydrologist for Forest Service (now retired and on FR-CRM staff); authored and co-authored several papers. From UC Davis, personnel on this project include: Dr. Michael Anderson, post-doctoral Research Engineer, UC Davis; team leader on the WEHY model development for Last Chance Creek. Dr. M. Levent Kavvas: leader of UC Davis Hydrologic Research Laboratory.

Plumas Corporation, a 501(c)3 non-profit houses the FR-CRM staff, and will be the fiscal agent for the project. As a subcontractor to Plumas Corporation, UC Davis will lead the WEHY task. Stanford University will continue their thermal imagery study, and will use and analyze the data gathered from the 2005 flight, and the eddy flux towers. Plumas Corporation will subcontract the analysis of the 2007 flight to the flight and imaging company. Plumas National Forest will contribute grazing management control, and NEPA review for eddy flux tower installation at Alkali Flat.

COST

See the budget form for annual costs for each task. Because this agreement is integrated with on-going studies, the studies' contributions to tasks herein are considered as cost-shares. Primarily, the analysis and development of maps vegetation, water temperature and ET from the July 2005 infrared photography flight. The value of the data analysis is estimated at $5,000. Only the flight will be paid for from this budget (NSF is funding a June flight in the same year). Also, both UC Davis and Stanford will use and analyze data from the eddy flux towers. The value of that analysis is approximately $4,000 in the first year of the agreement. Cattle grazing management by the Plumas National Forest in the project area in the last year of the agreement is valued at $2,000. Because the FR-CRM agencies have designated Last Chance Creek as a demonstration watershed, monitoring funds will be focused here in the future, after the term of this agreement, although monitoring will continue on a less-intensive level. The Plumas National Forest often has monitoring dollars, as well as potential funding from the Regional Water Quality Control Board and Dept. of Water Resources, who have both contributed to monitoring in this watershed.

COMPLIANCE WITH STANDARD TERMS AND CONDITIONS

Plumas Corporation agrees to comply with the standard terms and conditions of an ERP grant agreement that would result from this proposal, as we have with other ERP agreements.

LITERATURE CITED

Bailey, Cris. 2001. Investigation, analysis, and recommendations on the use of beaver (*Castor canadensis*) in the Last Chance project area. Prepared for Plumas Corporation.

Plumas Corporation. 1992. Non-Point Source Water Pollution Study, CWA Section 205(j).

Rosgen, Dave. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

Soil Conservation Service. 1989. East Branch North Fork Feather River Erosion Inventory Report.

US Forest Service, Plumas National Forest. 1990. Cumulative Watershed Effects Analysis.

NONPROFIT VERIFICATION

See attached letter from the IRS.

INTERNAL REVENUE SERVICE
DISTRICT DIRECTOR
P. O. BOX 2508
CINCINNATI, OH 45201

DEPARTMENT OF THE TREASURY

Date: AUG 07 1997

Employer Identification Number:
68-0216418
DLN:
317239569
Contact Person:
TYRONE THOMAS
Contact Telephone Number:
(213) 894-2289
Addendum Applies:
No

PLUMAS CORPORATION
PO BOX 3880
QUINCY, CA 95971-3880

Dear Applicant:

Based on the information you recently submitted, we have classified your organization as one that is not a private foundation within the meaning of section 509(a) of the Internal Revenue Code because you are described in sections 509(a)(1) and 170(b)(1)(A)(vi).

Your exempt status under section 501(a) of the Internal Revenue Code as an organization described in 501(c)(3) is still in effect.

This classification is based on the assumption that your operations will continue as you have stated. If your sources of support, or your purposes, character, or method of operation change, please let us know so we can consider the effect of the change on your exempt status and foundation status.

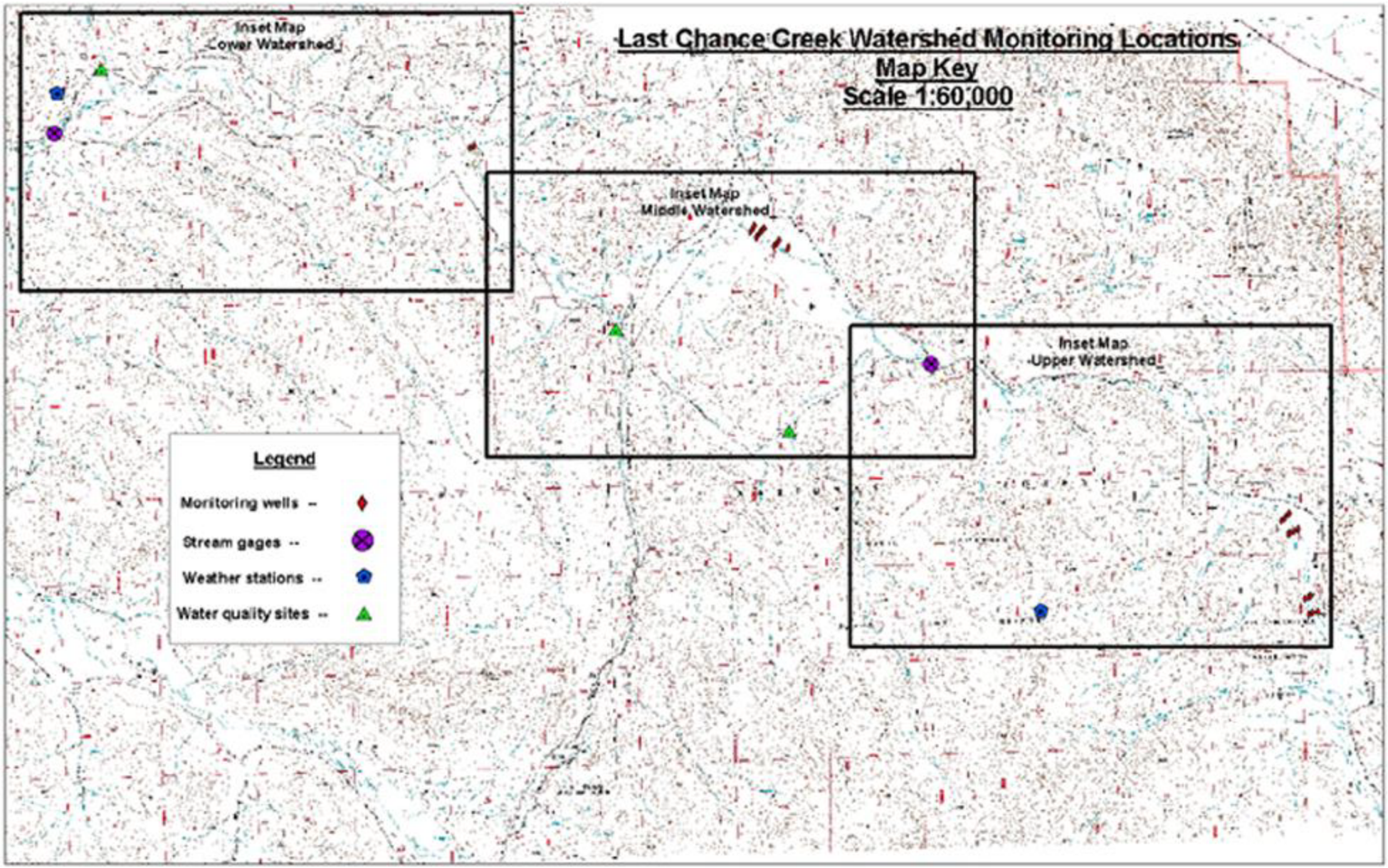
This supersedes our letter dated July 14, 1997.

Grantors and contributors may rely on this determination unless the Internal Revenue Service publishes notice to the contrary. However, if you lose your section 509(a)(1) status, a grantor or contributor may not rely on this determination if he or she was in part responsible for, or was aware of, the act or failure to act, or the substantial or material change on the part of the organization that resulted in your loss of such status, or if he or she acquired knowledge that the Internal Revenue Service had given notice that you would no longer be classified as a section 509(a)(1) organization.

As of January 1, 1984, you are liable for taxes under the Federal Insurance Contributions Act (social security taxes) on remuneration of $100 or more you pay to each of your employees during a calendar year. You are not liable for the tax imposed under the Federal Unemployment Tax Act (FUTA).

You are required to file Form 990 only if your gross receipts each year are normally more than $25,000. For guidance in determining whether your gross receipts are "normally" more than $25,000, see the instructions for Form 990. If a return is required, it must be filed by the 15th day of the fifth month after the end of your annual accounting period. A penalty of $10 a day is charged when a return is filed late, unless there is reasonable cause for the delay. However, the maximum penalty charged cannot exceed $5,000 or 5 percent of your gross receipts for the year, whichever is less. This penalty may also be charged if a return is not complete, so please be sure your return is complete before you file it.

Last Chance Project Area Within Feather River Watershed


Last Chance Creek Watershed Monitoring Locations
Map Key
Scale 1:60,000
Inset Map
Lower Watershed
Inset Map
Middle Watershed
Inset Map
Upper Watershed
Legend
Moritoring wells --
Stream gages --
Weather stations --
Water quality sites --

Tasks And Deliverables

Upper Last Chance Restoration Project Monitoring

Task ID	Task Name	Start Month	End Month	Deliverables
0	Project Management	1	36	Semiannual and final reports. Periodic invoices
1	Monitor Discharge	1	36	Annual Doyle Crossing, Million Dollar Bridge, and Red Clover discharge tables and graphs; Summary report at end of agreement.
2	Monitor Channel Evolution	14	36	Comparative pre-and post-project cross-section and longitudinal graphs; survey data table of pebble counts and vegetation; analysis of variance results; summary report, all at the end of the agreement.
3	Monitor Groundwater	1	36	Groundwater level and precipitation graphs; summary report to be submitted at the end of the

				agreement.
4	Monitor Water Temperature	1	36	Annual hobotemp water temperature graphs; One Infrared flight map and video at the end of the agreement; Temperature Summary report at the end of the agreement.
5	Monitor Vegetation	24	36	One vegetation summary report at the end of the agreement that includes transects and rare plant survey results, as well as photo point pictures and infrared photo analysis.
6	Monitor Evapotranspiration	6	36	Eddy Tower NEPA clearance in month 1; Converted Infrared to ET map and ET summary report at the end of the agreement.
7	Monitor Beaver	13	24	One summary report that discusses beaver activity in the area, due at the end of the second year of

				the agreement.
8	WEHY Model refinement	1	12	One summary report due at the end of the 1st year, that includes calibrated model estimates of discharge, groundwater volumes, and ET, with comparison to other monitoring results.
9	Outreach	32	36	Poster session presentation; power point presentation; journal manuscript; white paper task summaries distributed top agencies; web reports.

Comments

If you have comments about budget justification that do not fit elsewhere, enter them here.

Budget Summary

Project Totals

Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
$117,240	$22,276	$9,700	$5,400	$176,500	$122,000	$0	$0	$453,116	$20,688	$473,804

Do you have cost share partners already identified?
Yes.

If yes, list partners and amount contributed by each:

Stanford University infrared photogrpahy flight analysis $5000 eddy flux tower data analysis $2000

UC Davis eddy flux data analysis $2000

Plumas National Forest Grazing Management $2000

Do you have potential cost share partners?
No.

If yes, list partners and amount contributed by each:

Are you specifically seeking non−federal cost share funds through this solicitation?
No.

Upper Last Chance Restoration Project Monitoring

Upper Last Chance Restoration Project Monitoring

Year 1 (Months 1 To 12)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
0: project management (12 months)	**7200**	**1368**	**200**	**200**	**0**	**0**	**0**	**0**	$8,968	**1285**	$10,253
1: Monitor Discharge (12 months)	**4800**	**912**	**600**	**0**	**2000**	**1000**	**0**	**0**	$9,312	**857**	$10,169
3: Monitor Groundwater (12 months)	**8200**	**1558**	**600**	**0**	**0**	**0**	**0**	**0**	$10,358	**1463**	$11,821
4: Monitor Water Temperature (12 months)	**1200**	**228**	**200**	**1000**	**0**	**0**	**0**	**0**	$2,628	**214**	$2,842
6: Monitor Evapotranspiration (7 months)	**6000**	**1140**	**600**	**0**	**12000**	**120000**	**0**	**0**	$139,740	**1071**	$140,811
8: WEHY Model refinement (12 months)	**7200**	**1368**	**600**	**0**	**133000**	**0**	**0**	**0**	$142,168	**1285**	$143,453
Totals	**$34,600**	**$6,574**	**$2,800**	**$1,200**	**$147,000**	**$121,000**	**$0**	**$0**	**$313,174**	**$6,175**	**$319,349**

Year 2 (Months 13 To 24)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And	Other Direct	Direct Total	Indirect Costs	Total

							Rights Of Way	Costs			
0: project management (12 months)	**4800**	**912**	**200**	**0**	**0**	**0**	**0**	**0**	$5,912	**856**	$6,768
1: Monitor Discharge (12 months)	**4800**	**912**	**600**	**0**	**2000**	**0**	**0**	**0**	$8,312	**856**	$9,168
2: Monitor Channel Evolution (11 months)	**6000**	**1140**	**1200**	**0**	**0**	**1000**	**0**	**0**	$9,340	**1071**	$10,411
3: Monitor Groundwater (12 months)	**8200**	**1558**	**600**	**0**	**0**	**0**	**0**	**0**	$10,358	**1230**	$11,588
4: Monitor Water Temperature (12 months)	**1200**	**228**	**200**	**0**	**0**	**0**	**0**	**0**	$1,628	**214**	$1,842
5: Monitor Vegetation (1 month)	**0**	**0**	**0**	**0**	**5500**	**0**	**0**	**0**	$5,500	**0**	$5,500
6: Monitor Evapotranspiration (12 months)	**4800**	**912**	**600**	**0**	**0**	**0**	**0**	**0**	$6,312	**856**	$7,168
7: Monitor Beaver (12 months)	**800**	**152**	**0**	**0**	**7000**	**0**	**0**	**0**	$7,952	**142**	$8,094
Totals	**$30,600**	**$5,814**	**$3,400**	**$0**	**$14,500**	**$1,000**	**$0**	**$0**	**$55,314**	**$5,225**	**$60,539**

Year 3 (Months 25 To 36)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And	Other Direct	Direct Total	Indirect Costs	Total

							Rights Of Way	Costs			
0: project management (12 months)	**8000**	**1520**	**200**	**1000**	**0**	**0**	**0**	**0**	$10,720	**1428**	$12,148
1: Monitor Discharge (12 months)	**8640**	**1642**	**600**	**2000**	**0**	**0**	**0**	**0**	$12,882	**1542**	$14,424
2: Monitor Channel Evolution (12 months)	**7200**	**1368**	**600**	**0**	**0**	**0**	**0**	**0**	$9,168	**1285**	$10,453
3: Monitor Groundwater (12 months)	**8000**	**1520**	**200**	**0**	**0**	**0**	**0**	**0**	$9,720	**1428**	$11,148
4: Monitor Water Temperature (12 months)	**3000**	**570**	**200**	**0**	**0**	**0**	**0**	**0**	$3,770	**535**	$4,305
5: Monitor Vegetation (12 months)	**2000**	**380**	**200**	**200**	**0**	**0**	**0**	**0**	$2,780	**357**	$3,137
6: Monitor Evapotranspiration (12 months)	**7200**	**1368**	**600**	**0**	**15000**	**0**	**0**	**0**	$24,168	**1285**	$25,453
9: Outreach (5 months)	**8000**	**1520**	**900**	**1000**	**0**	**0**	**0**	**0**	$11,420	**1428**	$12,848
Totals	**$52,040**	**$9,888**	**$3,500**	**$4,200**	**$15,000**	**$0**	**$0**	**$0**	**$84,628**	**$9,288**	**$93,916**

Budget Justification

Upper Last Chance Restoration Project Monitoring

Labor

Task 0: Management 84 days @ $200/day Task 1: Discharge 72 days @ $200/day; 12 days @ $320/day Task 2: Channel Evolution 66 days @ $200/day Task 3: Groundwater 71 days @ $200/day; 36 days @ $320/day Task 4: Water Temperature 27 days @ $200/day Task 5: Vegetation 10 days @ $200/day Task 6: Evapotranspiration 90 days @ $200/day Task 7: Beaver 4 days @ $200/day Task 8: WEHY 36 days @ $200/day Task 9: Outreach 40 days @ $200/day

Benefits

Benefits are calculated at 19% of salary for each employee.

Travel

Task 0: $ 600 Task 1: $1800 Task 2: $1800 Task 3: $1400 Task 4: $ 600 Task 5: $ 200 Task 6: $1800 Task 7: $ 0 Task 8: $ 600 Task 9: $ 900 (non−local travel to conferences and presentations)

Supplies And Expendables

Task 1: printing, office supplies $1200 Task 4: replacement hobotemps $1000 Task 5: photo development $ 200

Services And Consultants

Task 2: Sagraves Environmental to install, maintain, and calibrate our continuous recording instruments. That role would continue. $6000. Task 5: Butterfly Botanicals to survey plots and transects ($60/hr). $5000 Task 5: Clay Clifton to take aerial photographs of the project area. $500 Task 6: Infrared Image Solutions would fly the project area in 2005 at

$12,000, and would fly and analyze photos in 2007 for $15,000. Task 7: Cris Bailey Consulting would survey, map, and report beaver activity. $7000 Task 8: UC Davis Hydrologic Laboratory would continue data analysis to calibrate model and train CRM staff in its use. $133,000 would fund the model team half time for one year (including salary, benefits and 10% overhead)

Equipment

Included in equipment is equipment repair – $1000 for laser levels for Task 2. $60,000 each for two continuous recording eddy flux towers; one in a treated meadow and one in an untreated meadow.

Lands And Rights Of Way

Not applicable.

Other Direct Costs

Not applicable.

Indirect Costs/Overhead

Indirect costs were calculated by multiplying labor and benefits by 15%. They include rent, phones, general office supplies.

Comments

Please note that, as mentioned in the scope of work introduction, each task can be accomplished separately, if the review team prefers only partial funding of this proposal.

Environmental Compliance

Upper Last Chance Restoration Project Monitoring

CEQA Compliance

Which type of CEQA documentation do you anticipate?
X none
− negative declaration or mitigated negative declaration
− EIR
− categorical exemption

If you are using a categorical exemption, choose all of the applicable classes below.
− Class 1. Operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of use beyond that existing at the time of the lead agency's determination. The types of "existing facilities" itemized above are not intended to be all−inclusive of the types of projects which might fall within Class 1. The key consideration is whether the project involves negligible or no expansion of an existing use.
− Class 2. Replacement or reconstruction of existing structures and facilities where the new structure will be located on the same site as the structure replaced and will have substantially the same purpose and capacity as the structure replaced.
− Class 3. Construction and location of limited numbers of new, small facilities or structures; installation of small new equipment and facilities in small structures; and the conversion of existing small structures from one use to another where only minor modifications are made in the exterior of the structure. The numbers of structures described in this section are the maximum allowable on any legal parcel, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
− Class 4. Minor public or private alterations in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees except for forestry or agricultural purposes, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
− Class 6. Basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies. These may be strictly for information gathering purposes, or as part of a study leading to an action which a public agency has not

yet approved, adopted, or funded.
– Class 11. Construction, or placement of minor structures accessory to (appurtenant to) existing commercial, industrial, or institutional facilities, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.

Identify the lead agency.

Is the CEQA environmental impact assessment complete?

If the CEQA environmental impact assessment process is complete, provide the following information about the resulting document.

Document Name
State Clearinghouse Number

If the CEQA environmental impact assessment process is not complete, describe the plan for completing draft and/or final CEQA documents.

NEPA Compliance

Which type of NEPA documentation do you anticipate?
– none
– environmental assessment/FONSI
– EIS
X categorical exclusion

Identify the lead agency or agencies.

US Department of Agriculture, Plumas National Forest, Beckwourth Ranger District

If the NEPA environmental impact assessment process is complete, provide the name of the resulting document.

If the NEPA environmental impact assessment process is not complete, describe the plan for completing draft and/or final NEPA documents.

Plumas Corporation staff would survey the area and write the document for Beckwourth Ranger District staff review and Ranger signature. (We have done several NEPA documents this way.)

Successful applicants must tier their project's permitting from the CALFED Record of Decision and attachments providing programmatic guidance on complying with the state and federal endangered species acts, the Coastal Zone Management Act, and sections 404 and 401 of the Clean Water Act.

Please indicate what permits or other approvals may be required for the activities contained in your proposal and also which have already been obtained. Please check all that apply. If a permit is *not* required, leave both Required? and Obtained? check boxes blank.

Local Permits And Approvals	Required?	Obtained?	Permit Number (If Applicable)
conditional Use Permit	–	–	
variance	–	–	
Subdivision Map Act	–	–	
grading Permit	–	–	
general Plan Amendment	–	–	
specific Plan Approval	–	–	
rezone	–	–	
Williamson Act Contract Cancellation	–	–	
other	–	–	

State Permits And Approvals	Required?	Obtained?	Permit Number (If Applicable)
scientific Collecting Permit	–	–	
CESA Compliance: 2081	–	–	
CESA Complance: NCCP	–	–	
1602	–	–	

CWA 401 Certification	–	–	
Bay Conservation And Development Commission Permit	–	–	
reclamation Board Approval	–	–	
Delta Protection Commission Notification	–	–	
state Lands Commission Lease Or Permit	–	–	
action Specific Implementation Plan	–	–	
other	–	–	

Federal Permits And Approvals	Required?	Obtained?	Permit Number (If Applicable)
ESA Compliance Section 7 Consultation	–	–	
ESA Compliance Section 10 Permit	–	–	
Rivers And Harbors Act	–	–	
CWA 404	–	–	
other	–	–	

Permission To Access Property	Required?	Obtained?	Permit Number (If Applicable)
permission To Access City, County Or Other Local Agency Land Agency Name	–	–	
permission To Access State Land Agency Name	–	–	
permission To Access Federal Land Agency Name Plumas National Forest	–	–	
permission To Access Private Land Landowner Name John And Corinne Matley The Nature Conservancy Igor Vasey (Has Agreed To The Project)	X	X	

If you have comments about any of these questions, enter them here.

The Plumas National Forest is a CRM partner and active participant in this project, no formal permission required; monitoring equipment is extant on PNF lands (weather stations, flow stations), with previous permissions. NEPA process would be required for installation of eddy flux tower on PNF land. Igor Vasey has formally requested restoration work on his lands, however, we have not received a letter permitting eddy flux tower installation, but would pursue if funded.

Land Use

Upper Last Chance Restoration Project Monitoring

Does the project involve land acquisition, either in fee or through easements, to secure sites for monitoring?
X No.
– Yes.

How many acres will be acquired by fee?

How many acres will be acquired by easement?

Describe the entity or organization that will manage the property and provide operations and maintenance services.

Is there an existing plan describing how the land and water will be managed?
– No.
– Yes.

Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?
– No.
X Yes.

Describe briefly the provisions made to secure this access.

We have received letters from the Nature Conservancy and the Matley Ranch to access their lands. We will request a letter from Igor Vasey, who has requested restoration work (and with whom we have initiated contact), to install an eddy flux tower on his property. The Forest Service is an integral partner, with equipment extant on their lands. We will conduct NEPA for eddy flux tower installation.

Do the actions in the proposal involve physical changes in the current land use?
X No.
– Yes.

Describe the current zoning, including the zoning designation and the principal permitted uses permitted in the zone.

Describe the general plan land use element designation, including the purpose and uses allowed in the designation.

Describe relevant provisions in other general plan elements affecting the site, if any.

Is the land mapped as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance under the California Department of Conservation's Farmland Mapping and Monitoring Program?
X No.
– Yes.

Land Designation	Acres	Currently In Production?
Prime Farmland		**–**
Farmland Of Statewide Importance		**–**
Unique Farmland		**–**
Farmland Of Local Importance		**–**

Is the land affected by the project currently in an agricultural preserve established under the Williamson Act?
X No.
– Yes.

Is the land affected by the project currently under a Williamson Act contract?
– No.
X Yes.

Why is the land use proposed consistent with the contract's terms?

Land use in the area is agricultural cattle grazing. The restoration project increased the grazing productivity of the floodplain meadows, and the land will continue to be used for grazing on the private lands. Utilization cages and grazing monitoring in the ET task will provide an estimate of the grazing productivity in the project area.

Describe any additional comments you have about the projects land use.

We hope to use estimates of productivity to interest other landowners in similar projects that increase their productivity while also providing watershed protection.