Cow Creek
Watershed Management Plan

Prepared By:
Western Shasta Resource Conservation District
and the Cow Creek Watershed Management Group
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COW CREEK WATERSHED MANAGEMENT PLAN

A. EXECUTIVE SUMMARY

Watersheds contain vast resources important for wildlife, regional economies, and local communities. As a result, the concept of watershed management should be to evaluate, prioritize and carry out actions that result in beneficial outcomes for the entire watershed. The goal of watershed management planning should be to ensure that decisions and actions are guided through the integration and coordination of science, the needs of the local communities and the overall health of the watershed. The integration of science and management can be best achieved through the use of adaptive management. The process of adaptive management strengthens long-term management actions through the addition of science integrated into actions taken within the watershed. Adaptive management provides a structured analysis of actions, which provides managers with the ability to modify actions to obtain the desired outcomes.

A watershed approach to management acknowledges that there is a direct relationship between different resources within a watershed, and the overall health of the watershed. An example of this are practices to increase water quality and quantity, which can have a direct positive benefit to fisheries as well. Increased water quality and quantify can be achieved by modifying vegetation, encouraging restoration activities, modifying water use practices and education of landowners.

The Cow Creek Watershed Management Group (CCWMG) works within the 275,000-acre Cow Creek Watershed, a tributary of the Sacramento River in Shasta County, which contains 6 major tributaries with a combined length of 164.4 river miles. The CCWMG is focused on improving the watershed while maintaining viable timber and agricultural industries. The CCWMG mission is "To use the resources in the Cow Creek Watershed in a way to meet the needs of today without infringing on the needs of future generations". The desired outcomes of actions taken by the CCWMG are to promote a healthy, diverse, resource based local economy, education of the community about the value of wise watershed management, promotion of a safer watershed, and to maintain and enhance the water quality, fisheries, wildlife and wildlife habitat of the watershed, promote the removal of invasive exotic vegetation, and to preserve the rural characteristic of the watershed. To obtain desired outcomes, the CCWMG works in partnership with the Western Shasta Resource Conservation District to fund continuing watershed management activities by obtaining grants, commitments from long-term funding sources, cost sharing and individual initiatives. A key component of this is the encouragement of the community to understand, support, and become more involved in the goals and activities of the CCWMG.

This Management Plan gives guidance on future watershed management through defined actions to be taken that meets the CCWMG mission statement and desired outcomes. Direction given in this document was derived through the formation of a Technical Advisory Committee with participation from the CCWMG, local landowners and businesses, state and federal agencies, and through a public review process that allowed stakeholder input and direction.

This management plan outlines specific steps to be taken in five categories water quality and quantity, fisheries, botanical and wildlife resources, fire prevention and fuels management, and education and outreach to enhance the Cow Creek Watershed.

WATER QUALITY AND QUANTITY

Water quality and quantity are cornerstones of watershed health. Fecal coliform bacteria and temperature are the primary concerns within the watershed as a result of the important implications for communities and anadromous fish populations. Currently Little Cow Creek, Oak Run Creek, Clover Creek, and South Cow Creek are 303(d) listed as not meeting water quality standards. The current level of water quality and quantity information for the Cow Creek watershed is not adequate to characterize system wide conditions and is insufficient to document long-term trends. By supporting good watershed stewardship, implementation of best management practices and long term monitoring there is expected to be an increase in water quantity and quality. The implementation of focused long-term monitoring for bacteria and temperature that coordinates with other watershed monitoring, is properly analyzed, and is publicly available is a key step that will feed back valuable evaluation of the best management activities to increase water quality and quantity in the Cow Creek Watershed.

FISHERIES

The Cow Creek Watershed provides habitat for several species of fish, including Chinook salmon and steelhead. Several key factors have been identified that may be limiting the possible improvement of current fish populations, including flow and temperature, and a lack of ladders and screens on diversions for irrigation and power generation use. To enhance native fish populations in the Cow Creek Watershed this plan suggests conducting an inventory of anadromous fish abundance for baseline information and adaptive management feedback, working with willing landowners to install screens and/or ladders on diversions, and investigating ways to increase water flows to provide potential cooler temperatures and to facilitate fish passage.

BOTANICAL AND WILDLIFE RESOURCES

The vegetation in the Cow Creek watershed has had changes in species composition, diversity and density over time. These changes are primarily the result of intensive grazing, habitat conversion, disruption of the natural fire regime, non-native invasive plant substitution and land management. Wildlife has also been affected by changes in the vegetation component of the watershed, as well as land development, the introduction of non-native species, and statewide policy decisions. To better understand and enhance existing wildlife resources and preserve the rural open space of the Cow Creek Watershed, inventories are recommended to document existing conditions. Inventories will allow for the development of management/eradication/control strategies for detrimental non-native invasive plant and animal species and the identification and prioritization of habitat enhancement and preservation projects.

FIRE PREVENTION AND FUELS MANAGEMENT

Fire exclusion and suppression in the Cow Creek Watershed have resulted in a significant increase in fuel loading and potential for catastrophic wildfire. Although it is widely known that current fuel loading is unacceptably high, no detailed local fuel inventories have been completed. This management plan expands strategic fuel reduction planning for the watershed to include the latest CDF Fire Prevention strategy at a community-based level. Actions are identified to minimize damage to property and resources resulting from wildfires, which includes conducting fuel inventories, developing strategic plan maps, increased public support for projects and community education about the importance of fuels reduction, establishing shaded fuel break and creation of community fire safe zones.

EDUCATION AND OUTREACH

Education and watershed stewardship play a critical role in every aspect of watershed health; objectives to increase watershed awareness are geared to address the other four components of this Watershed Management Plan. Through education and the promotion of good watershed stewardship, and awareness and participation in the activities of the CCWMG there will be an increase in community understanding and awareness of important watershed issues.

CONCLUSIONS

The CCWMG, the TAC, and residents and landowners came to agreement on the goals and objectives of the Cow Creek Watershed Management Plan during a series of seven TAC meetings and two community meetings. The Watershed Management Plan is a living document that should be reviewed and updated about every five years. The document contains 25 major objectives that are found in the following sections:

OBJECTIVES	SECTION
6	Water Quality and Quantity
4	Fisheries Resources
6	Botanicals and Wildlife Resources
6	Fire Prevention and Fuels Management
3	Education and Outreach

A total of 93 project goals were identified and of this total, many were detailed with cost estimates and can be found in the appendix of this document.

The CCWMG is already implementing focused monitoring activities for water quality and quantity on the main tributaries of the Cow Creek Watershed. Projects that work to decrease the risk of wildfire including a 20-mile long defensive fuel profile zone on the watersheds eastern boundary and increased agriculture and water use efficiency projects are underway. The CCWMG Board of Directors meets monthly in an open forum monthly and holds quarterly community meetings within the watershed to increase the awareness of important issues throughout the watershed.

B. INTRODUCTION

The 275,000-acre Cow Creek Watershed is a large, generally uncontrolled tributary to the Sacramento River, located in Shasta County on the eastern side of the Sacramento River, downstream of Shasta Lake. The watershed is unique in that land ownership is almost evenly divided between commercial forestland, commercial agriculture, and small rural property owners, with minimum government ownership.

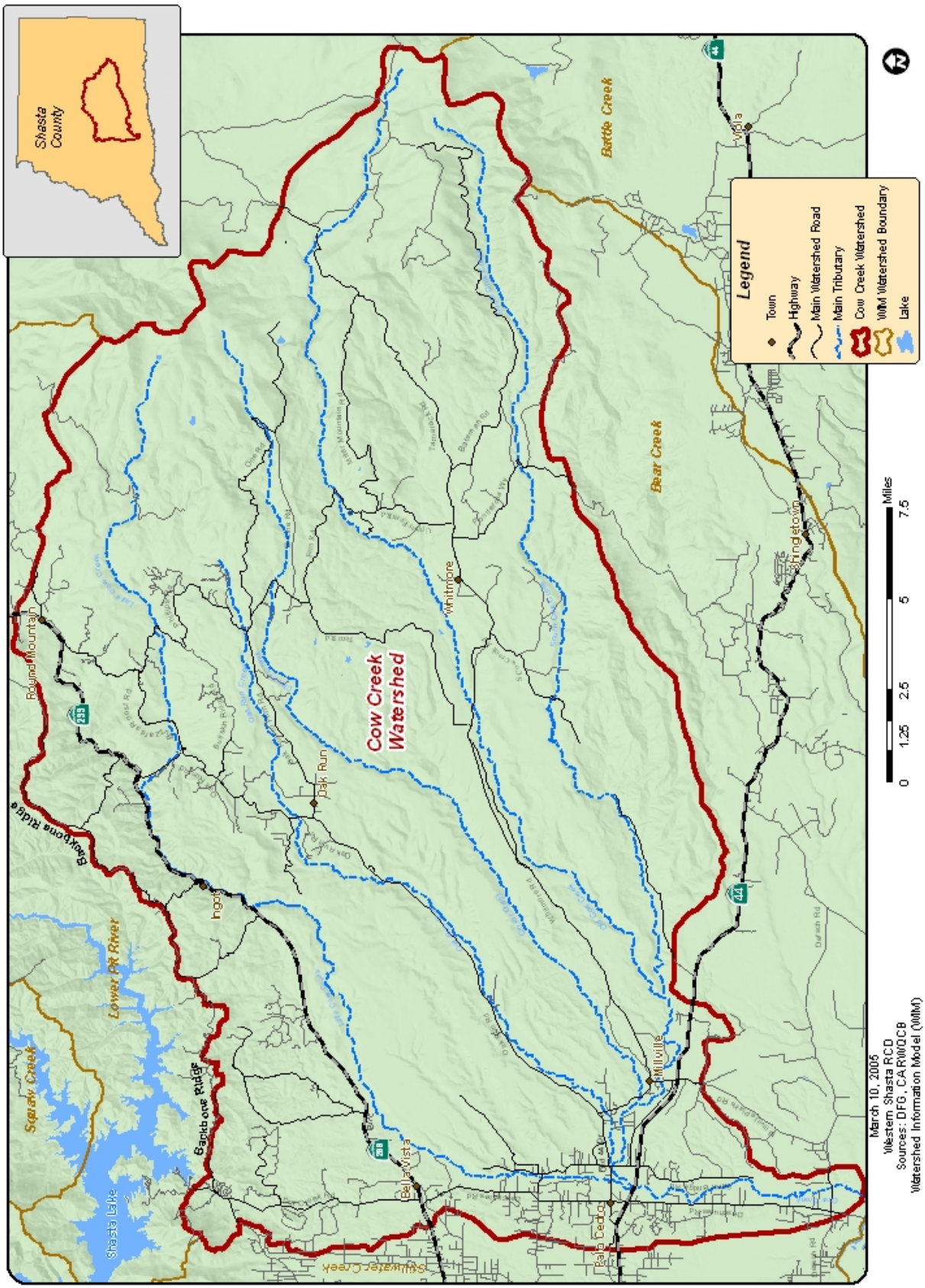
The Cow Creek Watershed Management Group (CCWMG) was formed in 1999 with the assistance of the Western Shasta Resource Conservation District (WSRCD). The CCWMG is a non-governmental group of residents, landowners and businesses in the watershed focused on improving the watershed while maintaining viable timber and agricultural industries. Using grant funding, a Cow Creek Watershed Assessment was completed in 2001, which detailed Action Options ranging from water quality improvement and fisheries rehabilitation to land use guidelines. Rehabilitation as used herein includes protection, enhancement, and restoration as appropriate to each situation.

In 2003, the U. S. Fish and Wildlife Service provided a grant through the Central Valley Project Improvement Act (CVPIA) Anadromous Fisheries Restoration Program for the completion of a Cow Creek Watershed Management Plan. This plan provides CCWMG Board of Director's guidance for rehabilitation activities and education efforts to address concerns and enhance watershed health.

CCWMG has focused the plan on water quality and quantity, fisheries, botanical and wildlife resources, fire prevention and fuel management, and education. A Technical Advisory Committee (TAC) was formed, consisting of landowners, businesses, CCWMG members and key agencies including US Fish and Wildlife Service, US Natural Resource Conservation Service, Ca. Dept. of Fish and Game, Ca. Dept. of Water Resources, Central Valley Regional Water Quality Control Board, Ca. Dept. of Forestry, WSRCD, and the Shasta County Fire Safe Council. The TAC developed the management plan and it has been reviewed by the CCWMG Board of Directors and the community at large.

Many of the activities defined in this plan will require receipt of public and/or private grants won by the WSRCD, working as partners with the CCWMG. Details of the individual activities will be developed at the time of each specific grant opportunity by a team of CCWMG, WSRCD and necessary support groups. On-the ground activities will require the participation of willing landowners.

Cow Creek Watershed



C. WATER QUALITY AND QUANTITY

1. Watershed Assessment Conclusions: Water quality parameters identified as being at levels of concern should be monitored to identify more specific problems and possible solutions that can be implemented to maintain the various beneficial uses identified for the watershed.

Fecal coliform bacteria concentrations have been found at levels which exceed state standards for protection of water contact recreation. The tributaries that exceeded contact recreational standards are Little Cow Creek, Oak Run Creek, Clover Creek, and South Cow Creek. No data are available to determine the specific origins of the fecal coliform bacteria. High levels of weed and algae growth have been observed in the lower reaches of some Cow Creek tributaries, but it is not known if this is the result of natural factors or due to accelerated nutrient input.

Water quality (temperature) and quantity (flow) have important implications for the health of Cow Creek Basin anadromous fish populations (See Fisheries Section). Chinook salmon and steelhead rainbow trout adults and juveniles have access to Cow Creek; however, the lower reaches of the tributaries within the Cow Creek Watershed may have an unsuitable temperature range during the months of May through October. A Shasta College study observed water temperature in the mainstem of Cow Creek exceeded preferred thresholds for salmon from May to October (Hannaford, 2000). The reaches above 2600 feet have lower summer temperatures; however, access to the higher reaches is limited to most salmon and steelhead adults and juveniles by a steep gradient change and geologic features.

Water quality studies in the Cow Creek Watershed have not been adequate to accurately characterize water quality conditions throughout the watershed and differences between tributaries. Baseline data is also insufficient to evaluate long-term trends in watershed conditions that may result from future management practice changes and rehabilitation activities. Much of the available water quality data are for discrete locations and, in general, are greater than 20 years old and poorly documented. More recent studies by the Central Valley Regional Water Quality Control Board and Shasta College have added to our knowledge of existing water quality conditions. Mitigation efforts designed to remedy concerns should only be undertaken once specific water quality problems have been identified.

To gather additional water quality data, the CCWMG embarked on a seventeen-month water monitoring program in June 2004. Twenty-two sampling sites in the Cow Creek Watershed were selected to characterize water temperature and fecal coliform levels in the upper, middle and lower reaches of the five tributaries and mainstem.

Stream flow in Cow Creek and its tributaries is typically at very low levels during the summer season, particularly in the middle and lower reaches. This is a combination of natural hydrologic factors and the result of diversion and use for irrigation, recreation, and hydropower. Cow Creek is a fully adjudicated stream. Low flow conditions impact water quality (through concentration of chemical constituents), limit recreational use and aesthetics, and reduce available aquatic habitat. The timing and success of anadromous fish use is largely dependent on available stream flow during the fall for in-migration of adults and the spring for out-migration of juveniles.

2. Prescription: Support landowners in acting as good stewards of water resources within the Cow Creek Watershed through implementation of best management practices, efficient management and wise use of water.

3. Implementation Strategy: CCWMG has identified the following objectives to improve Water Quality and Quantity in the Cow Creek Watershed:

Objective WQ-1: Implement focused monitoring on key water quality parameters to define baseline conditions and assess the need for improved management practices and/or rehabilitation.

a. Implement fecal coliform bacteria (*E. coli*) monitoring aimed at defining existing bacteria concentrations both seasonally and spatially. (Project underway)

b. Identify potential sources of elevated bacteria concentrations (i.e. Irrigation tailwater discharges, septic systems, urban/residential runoff, and rangeland runoff).

c. Implement temperature monitoring aimed at defining the existing temperature regime both seasonally and spatially. (Project underway)

d. Identify potential sources of temperature increase in the watershed.

Objective WQ-.2: Develop and implement a continuing, long term watershed monitoring program to allow water quality/quantity decisions to be made on a data driven, scientific basis.

a. Establish current water quality/quantity conditions, which can be compared against past and future information. (Project underway)

b. Evaluate water quality/quantity stressors where existing conditions do not meet state and federal water quality objectives and are not protective of identified beneficial uses.

c. Track long term changes and trends in water quality/quantity that are expected to result from improved management practices, stream improvement projects, and community education. Parameters to be tracked would include flow, temperature, bacteria, fish and macroinvertebrate populations, riparian and aquatic habitat conditions, and sediment/turbidity.

Objective WQ-3: Develop a Monitoring Coordination Strategy to coordinate CCWMG ambient water quality/quantity monitoring with other monitoring efforts in order to maximize overall knowledge of Cow Creek Watershed conditions.

Opportunities for collaboration include:

a. water quality and stream condition monitoring by private timber companies, Latour State Forest and power generation companies;

b. studies by UC Cooperative Extension relating to water quality, fisheries, and range condition;

c. monitoring of water quality done for the Regional Water Quality Control Board's Irrigated Land Waiver program (project underway);

d. monitoring for various purposes by schools, individuals and local entities, and state/federal resource agencies (project underway).

Objective WQ-4: Establish a process and a center for data storage, data analysis, and public distribution of water quality and quantity and other watershed monitoring information.

Objective WQ-5: Assist in implementing Best Management Practice (BMP) projects in order to demonstrate and evaluate their effectiveness to improve water quality in the Cow Creek Watershed.

The following are possible Best Management Practice (BMP) projects designed to improve water quality:

a. Irrigation tail-water management. (Project awarded)

b. Control of drainage and discharge from confined animal facilities.

c. Road surface stabilization and drainage improvement.

d. Proper use of home and garden pesticides and fertilizers.

e. Improved irrigation efficiency.

f. Instream flow augmentation/

g. Conservation easements protecting riparian corridors and large land holdings. (Project underway)

h. Septic system rehabilitation.

i. Improved livestock grazing management practices, including fencing to protect creeks and riparian zones and off-creek watering sources.

j. Stream channel improvements which reduce bank erosion and enhance floodplain
k. access and function.

Objective WQ-6: Assist in implementing Best Management Practice (BMP) projects in order to demonstrate and evaluate their effectiveness to increase water quantity within the Cow Creek Watershed.

The following are possible BMP projects designed to enhance instream flow in Cow Creek Watershed:

a. Improved irrigation efficiency.

b. Ditch lining and piping. (Project awarded)

c. Vegetation removal along ditches.

d. Dedication of unwanted/unneeded water rights.

e. Purchase of water by public and private entities from willing sellers.

f. Use of ground water in lower reaches instead of creek water for irrigation.

g. Reduction of overstocked forest stands and excess vegetation.

h. Removal of unused diversions.

i. stream channel improvements leading to seasonal water storage in floodplains, wet meadows, and marshes

D. FISHERIES

1. Watershed Assessment Conclusions: The Cow Creek Watershed provides habitat for several native fish species including fall-run and late-fall-run Chinook salmon, and steelhead. Salmon and steelhead have developed a life history strategy that allows them to spawn downstream of complete fish barriers and have their offspring leave the lower elevations before summer water temperatures become lethal. The native populations of trout and non-game fish above the barriers are augmented by the California Department of Fish and Game with planted trout. Lower elevation reaches support warm-water native and non-native fish species (i.e., sucker, bass, bluegill, etc.). Natural physical barriers limit access to the upper elevations in some of the tributaries.

Key factors limiting the possible improvement of current fish populations are:

- low fall and summer stream flow for adult fish passage
- lack of ladders for passage over irrigation diversions during low flow conditions
- lack of screens to protect emigrating juveniles
- elevated temperatures in the mid to lower reaches of the tributaries for adult passage, spawning success, and juvenile emigration

Significant portions of the flows of all tributaries are diverted for irrigation and power use. Few diversions are screened. Pumps in Old Cow Creek and the main stem divert significant additional flows; some pump intakes are also not screened.

Few data are available on resident and anadromous fish populations in the Cow Creek Watershed. Available data are sporadic and anecdotal, and trend analysis is unreliable. In general, fish population studies are associated with permitted developments, such as hydropower plants or periodic DFG surveys. Additional studies are needed to develop baseline population data and to determine the benefit of any actions.

Additional data is required on the bank stability and impact of sediment on fish habitat in Cow Creek. Limited data is available for spawning gravel quality and quantity. Comprehensive aquatic habitat analyses are also lacking.

2. Prescription: Improve native fish populations in the Cow Creek Watershed by conducting an inventory of anadromous fish abundance, work with willing landowners to install screens and/or ladders on diversions and investigate ways to increase water flows to provide the potential for cooler temperatures and to facilitate fish passage.

3. Implementation Strategy: CCWMG has the following objectives to improve fisheries in the Cow Creek Watershed:

Objective F-1: Establish baseline data and a continuing comprehensive monitoring program for anadromous fish populations, enabling biologists to verify abundance/distribution of existing populations, evaluate stressors and track future population trends.

a. Collect baseline data via rotary screw traps, snorkel and spawner surveys. Also monitor temperature and flow as they relate to fish abundance (also see water quality/quantity).

b. Compile reports that include annual run size estimates and timing for fall and late fall Chinook salmon and steelhead. Map spatial and temporal distribution of each population relative to temperature and flow.

Objective F-2: Rank diversions by impact on fisheries and develop a program to financially assist landowners to install screens and ladders.

a. Conduct a diversion characteristics inventory. Data will include the capacity of diversion in cubic feet per second, location, need and presence/absence of screen and/or ladder. Rank unscreened diversions by impact.

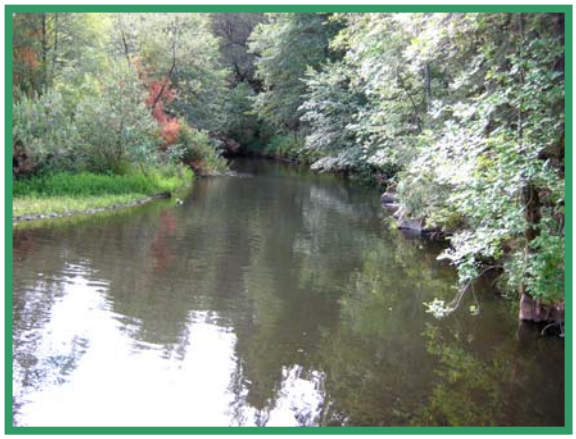
b. Conduct a screen and/or ladder demonstration project on a few diversions and monitor the results. (Project awarded)

Objective F-3: Rank pumps by impact on fisheries and develop programs for screening pump intakes.

a. Conduct a pump intake inventory similar to the strategy described for 3.2.

b. Conduct a fish screen demonstration project on a few pumps and monitor the results. (Project awarded)

Objective F-4: Implement actions to increase instream flow, particularly during the fall and spring migration periods (see Water Quality/Quantity Section 3.6 for options to increasing stream flow).



E. BOTANICAL AND WILDLIFE RESOURCES

1. Watershed Assessment Conclusions: Botanical and wildlife resources, a key component in watershed health and function, must be treated as an integral part of the overall management plan.

Botanical: The vegetation in the Cow Creek Watershed has changed significantly in the last 100 years. These changes include changes in species composition, diversity and density. Changes have resulted primarily from; intensive grazing or conversion of habitat, disruption of natural fire regime, non-native plant substitution and land management.

Vegetative structure becomes denser, both vertically and horizontally, at increased elevation. Although general vegetative mapping is available from many sources, the resolution is insufficient to address the needs for management input or to assess the success of inputs. Inventory and mapping is needed for; non-native invasive plants, riparian corridors, brush density in foothill grassland areas and brush and ladder fuel density in coniferous forests.

Wildlife: Wildlife populations in the Cow Creek Watershed have been modified by changes in vegetation management and diversity, development, introduction of non-native species and statewide policy decisions. However, little watershed-specific information is available. No available reports, with the exception of deer data showing a declining population, are supported by infield monitoring. Several non-native species exist in the watershed including wild turkey, feral pig, and elk.

2. Prescription: Work to better understand existing wildlife resources, and to enhance native plant and animal resources to preserve the rural open space of the Cow Creek Watershed. Activities include; conduct inventories to document existing conditions, develop management/eradication strategies for detrimental non-native invasive plant and animal species, identify and prioritize habitat enhancement and preservation projects.

3. Implementation Strategy: CCWMG has the following objectives to promote the health of native plant and animal species in the Cow Creek Watershed:

Objective BW-1: Conduct vegetation inventories to better understand existing conditions and trends.
Inventory and trend data will include:

a. Detrimental non-native plant species and noxious weeds.

b. Brush and ladder fuel density and invasion into coniferous forests.

c. Riparian vegetation.

Objective BW-2: Increase knowledge of the sensitive botanical and wildlife species in the watershed.

a. Develop comprehensive monitoring programs for populations of sensitive plant and wildlife species to monitor trends over time.

Objective BW-3: Protect existing riparian corridors and encourage the rehabilitation of degraded riparian corridors.

a. Conduct a riparian health and habitat assessment inventory including a mapping and inventory program to identify riparian communities and areas where native communities could be re-established.

b. Conduct long-term monitoring to measure the improvements and changes over time as a result of management plan implementation.

c. Rehabilitate riparian habitat with projects that are adaptively integrated with other goals of the management plan.

d. Develop a list of best management practices to increase riparian health and encourage landowner implementation.

e. Encourage the use of conservation easements as a method of conserving valuable wildlife resources and critical habitats.

Objective BW-4: Quantify, locate and develop management strategies for non-native plant and animal species.

a. Assess current levels of detrimental non-native plants and animals, including population assessments to establish locations and trends useful for management.

b. Develop management strategies for either eradication or control of identified detrimental non-native species.

c. Develop a strategic plan for preventing other detrimental non-native species from entering or leaving the watershed.

d. Develop a list of best management practices to reduce detrimental non-native species from entering and colonizing the watershed and encourage landowner implementation.

Objective BW-5: Conserve existing oak woodlands and support projects that enhance oak woodland health.

a. Develop a program to educate landowners in the lower watershed on oak woodland regeneration and conservation issues. (Project underway)

b. Assist interested landowners in obtaining cost share opportunities for oak conservation on their property.

Objective BW-6: Utilize fuel management to increase wildlife habitat quantity and quality.

a. Educate landowners on the benefits of a prescribed fire program that will enhance forage, benefit wildlife by establishing early successional vegetation and reduce potential effects caused by wildfire. (Project underway)

F. FIRE PREVENTION AND FUELS MANAGEMENT

1. Watershed Assessment Conclusions: The past 100 years of fire exclusion have resulted in significant fuel loading and potential for catastrophic fire. Although it is widely known that current fuel loading is unacceptably high, no detailed local fuel inventory is available.

2. Prescription: The plan for Fire Prevention and Fuels Management is based on the *Cow Creek Watershed Strategic Fuel Reduction Plan (WSRCD, SHN Consulting, December 2002)* and the *Backbone Ridge Defensible Fuel Profile Zone Final Plan (WSRCD, SHN Consulting, December 2002),* but has been expanded to include the latest CDF Fire Prevention strategy. The plan is to identify actions needed to minimize damage to property and resources resulting from wildfires, which includes conducting fuel inventories, developing strategic plan maps, increase public support for and community education about the importance of fuels reduction. To enhance the success of this plan, the CCWMG is also the Cow Creek Fire Safe Council and is an active participant on the Shasta County Fire Safe Council.

Definition of Terms:

- **A shaded fuelbreak** is removal of understory and ladder fuels and breaking up continuous crowns in the overstory.

- **A fuel reduction project** is an extension of defensible space that encompasses large areas around improvements or communities. Fuel reduction projects are constructed using the same techniques as shaded fuelbreaks, but are done on a larger scale.

- **A landscape level fuel reduction project** refers to the treatment (reduction) of fuel in blocks of large acreages that results in the modification and reduction of heavy fuel load continuity.

3. Implementation Strategy: CCWMG will take the following steps to improve fire safety and reduce the existing fuel load within the Cow Creek Watershed:

Objective FP-1: Develop a watershed fuels inventory. Map vegetation cover types and the distribution of these types within the watershed including vegetation relative to slope, aspect, elevation and land use.

Objective FP-2: Implement shaded fuelbreak and community fuel reduction projects using a mixture of equipment and handwork, utilizing commercial timber harvest, biomass harvest, chippers, masticators, and other ground based equipment.

Shaded fuelbreak projects include:

S (a) Oak Run Road Fuelbreak – an 18.0-mile long roadside shaded fuelbreak starting at the intersection of Highway 299 and Oak Run Road and running south to Palo Cedro. Note: portions of this fuelbreak are situated in grasslands, and will not require treatment.

S (b) Oak Run to Fern to Whitmore Road Fuelbreak – a 16.2 mile long roadside shaded fuelbreak starting at the intersection of Oak-Run-Road and Oak-Run-to-Fern-Road, looping around to Fern, then continuing on to Fern Road West to the intersection of Whitmore Road. This fuelbreak is located in an area where few fuel reduction activities have been implemented. Note: portions of this fuelbreak are situated in grasslands, and will not require treatment.

S (c) Fern Road East Fuelbreak – a 7.7-mile long roadside shaded fuelbreak starting at the intersection of Tamarack Road and Fern Road East, and ending at the intersection of Fern Road East and Oak-Run-to-Fern-Road. This fuelbreak runs perpendicular to prevailing winds, and establishes a fuelbreak between the lower-lying grass and oak woodland areas and the timbered slopes above the road.

S (d) Phillips Road Fuelbreak – a 7.3-mile long roadside shaded fuelbreak starting at the intersection of Buzzards Roost Road and running south to the intersection of Oak-Run-to-Fern Road. This provides another north to south fuelbreak that is situated predominantly within mixed conifer forests and runs perpendicular to prevailing winds.

S (e) Buzzards Roost Road Fuelbreak – a 6.0-mile long roadside shaded fuelbreak starting at the intersection of Highway 299 near Round Mountain running southwest to the intersection of Oak Run Road.

S (f) Bateman Road Fuelbreak – a 12.5-mile long roadside shaded fuelbreak starting at its intersection with Tamarack Road and running to the eastern-most boundary of Latour State Demonstration Forest and the headwaters of the watershed. It provides an east to west fuelbreak through commercial timberlands that can have extremely active fire behavior and very high fire severity. The west end of the fuelbreak is the primary priority; the east half is of secondary priority as it is situated mid-slope in a canyon, which is not a advantageous location for a fuelbreak.

S (g) Ponderosa Way Fuelbreak – a 5.5-mile long roadside shaded fuelbreak starting at the intersection of Whitmore Road and Ponderosa Way and running south to the ridgeline between South Cow Creek and Bear Creek. This maintains an existing and effective fuelbreak on the southern end of the watershed and provides a connecting link in the cross-watershed fuelbreak system, which is perpendicular to prevailing winds.

S (h) Tamarack Road Fuelbreak – an 11.0-mile long roadside shaded fuelbreak starting at the intersection of Whitmore Road and Fern Road East and running northeast to the watershed boundary. This fuelbreak runs through the southeastern portion of the watershed, and provides protection to forest resources in the upper watershed.

S (i) Whitmore Road Fuelbreak – a 17.0-mile long roadside shaded fuelbreak starting at the community of Millville and running east to the intersection of Fern Road East and Tamarack Road, just east of the community of Whitmore. This fuelbreak provides a significant northeast to southwest fuelbreak from Millville to Whitmore, effectively bisecting the southern one-third of the watershed. The high priority portions of this fuelbreak include a short stretch near the Go Away Ranch and from the Old Cow Creek crossing at Whitmore Road, east to Whitmore. The lower half of this fuelbreak is a low priority, because fuel load conditions are low. Note: portions of this fuelbreak are situated in grasslands, and will not require treatment.

S (j) Highway 299 Fuelbreak – a 25.0-mile long northeast to southwest running shaded fuelbreak that cuts through the northern most portion of the watershed and provides a key location for fire suppression activities.

S (k) Backbone Ridge Defensible Fuel Profile Zone (DFPZ) – A 24.0-mile (DFPZ) along Backbone Ridge, which divides the Cow Creek and Pit River watersheds; using Backbone Ridge Road as the centerline. (Project underway)

Community Fuel Reduction Projects include:

C (a) Round Mountain Community Fuel Reduction Project – The Cow Creek Fire Safe Council (CCFSC) will assist the Round Mountain Community with the planning and implementation of fuel reduction activities around the community to include Cedar Creek School, the Round Mountain Community Center and Halcomb Cemetery.

C (b) Oak Run Community Fuel Reduction Project – The CCFSC will assist the Oak Run Community with the planning and implementation of fuel reduction activities around the community to include the post office, the shopping center and Oak Run Elementary School.

C (c) Whitmore Community Fuel Reduction Project – The CCFSC will assist the Whitmore Community with the planning and implementation of fuel reduction activities around the community to include Whitmore School, the post office, the store, the Volunteer Fire Department and the Community Center.

C (d) Millville Community Fuel Reduction Project - The CCFSC will assist the Millville Community with the planning and implementation of fuel reduction activities around the community to include the Volunteer Fire Department, the Masonic Lodge, and Millville School.

C (e) Bella Vista Community Fuel Reduction Project – The CCFSC will assist the Bella Vista Community with the planning and implementation of fuel reduction activities around the community to include the post office and the Volunteer Fire Department.

C (f) Jones Valley Community Fuel Reduction Project – The CCFSC will assist the Jones Valley Community with the planning implementation of fuel reduction activities around the community to include the Hidden Valley Store and the Jones Valley Subdivision.

Objective FP-3: Encourage the use of landscape level fuel reduction projects to modify fire behavior and intensity and make large fire events easier to control:

a. Encourage the use of controlled burning and biomass as methods of reducing the fuel load throughout the watershed. (Project underway)

b. Encourage landowner participation in programs including the CDF Vegetation Management Program for cost effective solutions to landscape level fuel reduction. (Project underway)

c. Use landscape level projects to set priorities for fuelbreaks and community fuel reduction projects.

Objective FP-4: Continue educating the community on the importance of fuels reduction, the construction and maintenance of fuelbreaks, and landscape-level fuel treatment zones.

a. See the Education section of this plan for details.

Objective FP-5: Facilitate community implementation discussions at local community locations.

a. The need for public education and support for fire safe clearance around structures, for fuel reduction work in general, and for regulatory relief of smoke management and forest practice rules. (Project underway)

b. The relative importance of fuel breaks, community fuel reduction projects and landscape level fuel treatment zones

c. Fuel treatment methods, combinations, limitations for differing vegetation cover types, and the importance of maintenance following treatment

d. Display and use the Fire Safe Trailer to stimulate conversation centering on Fire

Prevention and Fuels Management. (Project underway)

e. Fire history.

f. Fire weather.

g. Landowner awareness of fuel reduction methods including the use of thinning, grazing, and the proper use of herbicides by trained personnel, hand clearing, mechanical clearing, mastication, and prescribed fire.

Objective FP-6: Maintain existing fuelbreaks for long-term benefit and protection of investments.

a. Educate and encourage private landowners with completed fuel reduction work on their property to continue with the necessary maintenance and upkeep, and improve neighborhood fuel reduction coordination and cooperation.

b. Develop a maintenance schedule for implemented fuel reduction projects, including mapping of all existing fuel reduction projects and recent fires, compiling the dates each project was completed, and periodic visual surveys to check existing conditions of each fuelbreak project.

G. EDUCATION AND OUTREACH

Education plays a critical role in every aspect of watershed health, and as such, education objectives will be geared to address the other four components of this Watershed Management Plan: Water Quality and Quantity, Fisheries, Botanical and Wildlife Resources, and Fire Prevention and Fuels Management.

1. Watershed Assessment Conclusions: Education and Outreach was not included in the Cow Creek Watershed Assessment.

2. Prescription: Promote good watershed stewardship, in part through awareness of and participation in the activities of the CCWMG. Increase overall community understanding and awareness of important watershed issues.

3. Implementation Strategy: CCWMG will take the following steps to conduct education and outreach projects in the Cow Creek Watershed:

Objective EO-1: Promote awareness of and increase participation in CCWMG by showing the relationship between CCWMG projects and the resulting benefits to Cow Creek watershed residents, businesses and industries.

a. Develop public outreach programs to educate Cow Creek watershed residents about the efforts of the CCWMG to maintain and improve Cow Creek watershed health. (Project underway)

b. Increase posting of Cow Creek watershed maps and signage throughout the watershed and particularly near CCWMG projects.

Objective EO-2: Promote, provide and facilitate watershed management education and outreach opportunities.

a. Facilitate classroom, field workshops and exhibits at community events, to educate Cow Creek Watershed landowners and residents about Best Management Practices (BMPs) in relation to common land use practices. Provide information and demonstrate BMPs for a variety of topics including:

   i. Fire safety. (Project underway)

   ii. Proper septic system design, use and testing.

   iii. Noxious weed identification and control. (Project underway)

   iv. Proper use of fertilizers and pesticides.

   v. Management of impervious surface runoff and other hazardous runoff to creeks.

   vi. Water conservation.

   vii. Fish passage needs. (Project underway)

b. Connect landowners with WSRCD, NRCS and UC Extension Service, for assistance with project design and development, farm and ranch plans and grant writing.

c. Assemble an agency data base. (Project underway)

d. Develop an agency contact information directory with guidelines that inform landowners which practices require permits.

e. Develop a library of information containing web site addresses, UC Extension Service brochures, classes, areas of expertise, and native plant recommendations.

f. Provide Fire Prevention and Fuels Management educational exhibits of the Cow Creek Fire Safe Council and the Shasta County Fire Safe Council at local events. (Project underway)

Objective EO-3: Promote, provide and facilitate watershed management education and outreach opportunities for area school children.

a. Promote, support and encourage watershed management educational activities in community schools within the Cow Creek Watershed. (Project underway)

b. In partnership with willing landowners, WSRCD, and local schools, create a watershed management curriculum, which will encourage conservation of natural resources and preservation of the economic well-being of Cow Creek Watershed residents. Curriculum could include water monitoring, native plant propagation and importance of riparian areas.

H. Plan Participants

The *Cow Creek Watershed Management Plan* was developed using a consensus approach in seven meetings of a formal Technical Advisory Committee and through feedback from two community meetings, with final approval by the Cow Creek Watershed Management Group and the Board of Directors. The Board of Directors for the Cow Creek Watershed Management Group represents a cross-section of landowners and residents in the watershed. The board members were:

Representing Residential Landowners:
Bruce Farrell
Susan Goodwin, Vice President
Brent Hathaway, Fiscal Officer
Dennis Heiman

Representing Agricultural Landowners:
Virginia Strawn, Secretary
Bruce Wendt
Bob Harris, President
Shannon Wooten

Representing Forest Landowners:
Jan Caster
Len Lindstrand, Jr.
Lois Kaufman
Vacant

Directors at Large:
William Farrell
William Saffell
Bob Moller

The Technical Advisory Committee members were:

Bob Bailey – Natural Resources Conservation Service
Mike Berry – CA Dept. of Fish and Game
Bob Carey – W. M. Beaty & Associates
Beth Doolittle-Norby – Regional Water Quality Control Board
Gary Desselle - Western Shasta Resource Conservation District
Bob Harris – Cow Creek Watershed Management Group
Mike Harris - Western Shasta Resource Conservation District
Dennis Heiman – Regional Water Quality Control Board and Cow Creek Watershed Management Group
Aric Lester – CA Dept. of Water Resources
Len Lindstrand, Jr. – W.M. Beaty & Assoc.
Tricia Parker – U. S. Fish & Wildlife Service
Harry Rectenwald – CA Dept. of Fish & Game
Kathleen Schori – CA Dept. of Forestry & Fire Protection
Mary Schroeder – Western Shasta Resource Conservation District
Valerie Shaffer – Western Shasta Resource Conservation District
Fraser Sime – CA Dept. of Water Resources
Jack Williamson – U. S. Fish & Wildlife Service

APPENDIX to the Cow Creek Watershed Management Plan

Prepared By:
Western Shasta Resource Conservation District
and the Cow Creek Watershed Management Group
March 2005

Funded through a grant from the U.S. Fish and Wildlife Service Central Valley Project Restoration Funds

Table of Contents

I. Introduction

The Implementation Strategy sections in the body of this management plan define the selected activities to be implemented in the watershed as grant or other funds become available to the CCWMG. The Action Options shown in the Appendix are now of historical interest only, as they have served their purpose of providing a source of activity options for the planning process. Other activity sources used in the planning process include planning and assessments completed since the baseline assessment (December 2001) as well as studies, goals and objectives of county, state and federal agencies that participate in the watershed management of Cow Creek.

This appendix contains the complete list of priority action options presented in the Cow Creek Watershed Assessment, November 2001. These options were developed during the assessment to provide a starting point for the development of the Cow Creek Watershed Management Plan and are included herein for better understanding of this plan.

II. Background

The Cow Creek Watershed Management Group (CCWMG) is a nonprofit organization formed by citizens within the Cow Creek Watershed. The group began meeting in October 1999 under the guidance of an Interim Board of Directors. Initially, there were several organizational questions and concerns that needed to be addressed before the task of applying for grants and facilitating improvements within the watershed could be accomplished. After determining the major concerns for the watershed, the group made the decision to become a 5013C (nonprofit) organization.

A key issue to many landowners who participate in watershed groups is to be aware of their property or water rights as changes are made within the watershed by government agencies. A watershed group such as the Cow Creek WMG allows for landowners to be involved at the local level and partner with agencies to carry out monitoring, on-the -ground activity and education.

III. Project Participants

A. Cow Creek Watershed Management Group

Vision Statement

A healthy economy in a healthy ecosystem.

Mission Statement

The mission of the Cow Creek Watershed Management Group is to use the resources in the Cow Creek Watershed in a way to meet the needs of today without infringing on the needs of future generations.

Desired Outcomes

Conservation: To maintain and enhance the water quality, fisheries, wildlife, and wildlife habitat of the watershed, and promote removal of undesirable invasive exotic vegetation.

Safety: To promote a safer watershed, including flood management and fuel reduction for fire safety.

Economy: To promote a healthy, diverse, resource-based local economy, including livestock and timber industries, beekeeping, and other agriculture activity, through encouragement of effective management of water, agricultural land, grazing land and timberland.

Lifestyle: To preserve the rural character of the watershed by advocating local land use planning, encouraging retention of open space, and promoting good neighborly relations.

Education: To educate the community about the value of wise watershed management through watershed assessment and management programs, community forums, watershed programs in the schools, and the creation of a Cow Creek Watershed Resource Center.

Community: To encourage the community to understand, support, and become involved in the goals and activities of the Cow Creek Watershed Management Group.

Resources: To fund continuing watershed management activities by obtaining grants, commitments from long tem funding sources, cost sharing and individual initiatives.

The Cow Creek Watershed Management Group Board of Directors

The Cow Creek Watershed Management Group is led by a 15-member Board of Directors, all who live within the watershed and bring a unique mix education and experience to the group. The 2004 Cow Creek Board of Directors are:

Representing Residential Landowners

Bruce Farrell
Susan Goodwin, Vice President
Brent Hathaway, Fiscal Officer
Dennis Heiman

Representing Agricultural Landowners
Virginia Strawn, Secretary
Bruce Wendt
Bob Harris, President
Shannon Wooten

Representing Forest Landowners
Jan Caster
Len Lindstrand, Jr.
Lois Kaufman
Steve Henson

Directors at Large
Jim Rickert
William Saffell
Bob Moller

Cow Creek Watershed Management Group Membership

The Cow Creek Watershed Management Group is always looking for new members! If you live within the Cow Creek Watershed, you can become a voting member of the CCWMG with a $25 contribution. If you do not live in the watershed but would like to support the group's efforts, you can become an associate member with a contribution of $15. To be placed on a mailing list and receive meeting notices and updates on group activities, email the Cow Creek Watershed Coordinator, James Moller, at James@WesternShastaRCD.org, or call him at 365-7332 ext. 209.

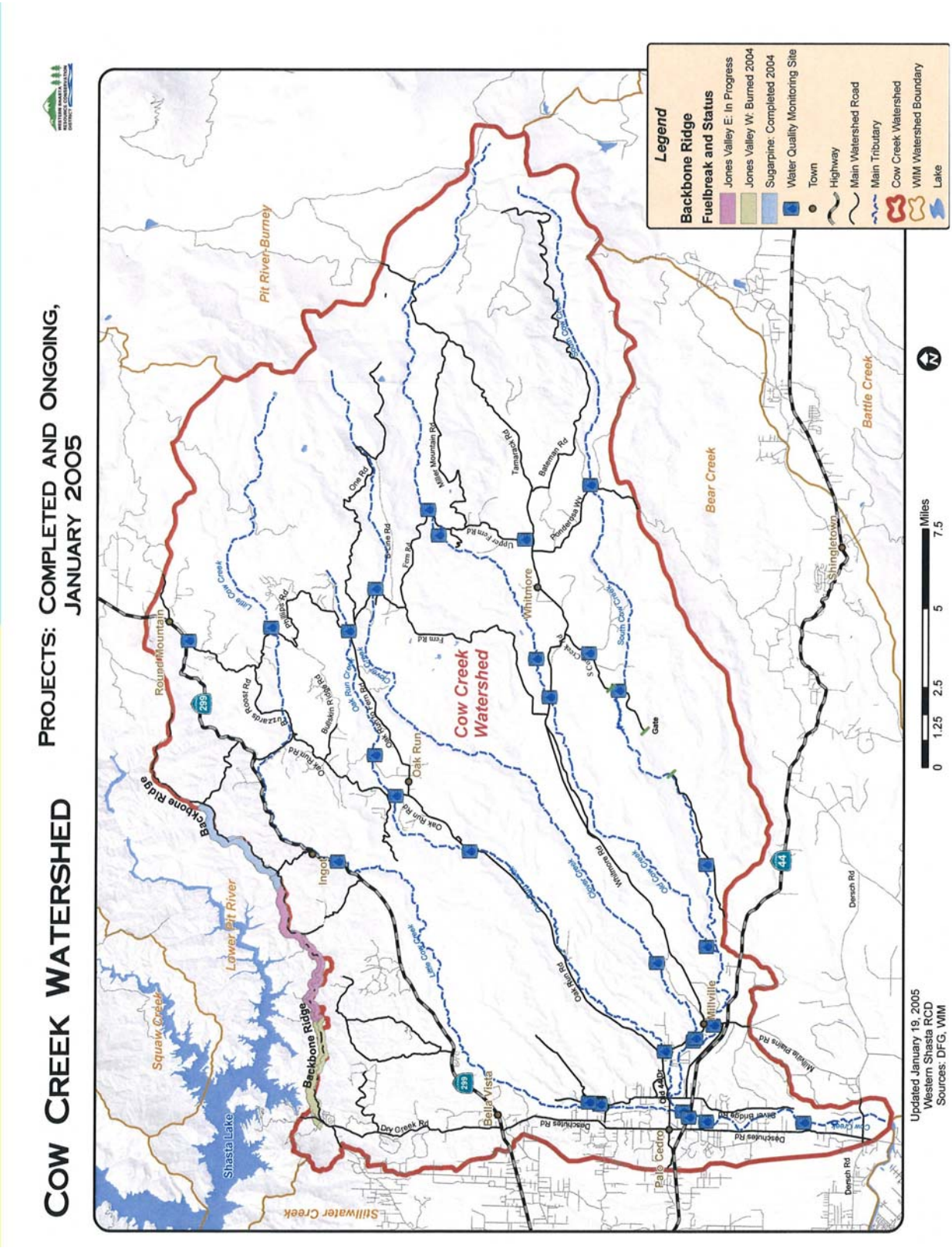
B. Technical Advisory Committee (TAC)

Bob Bailey	NRCS
Mike Berry	DFG
Bob Carey	WM Beaty & Associates
Beth Doolittle-Norby	SWRCB
Gary Desselle	WSRCD
Bob Harris	CCWMG
Mike Harris	WSRCD
Dennis Heiman	SWRCB / CCWMG
Aric Lester	DWR
Len Lindstrand, Jr.	WM Beaty & Associates
Tricia Parker	USFWS
Harry Rectenwald	DFG
Kathleen Schori	CDF
Mary Schroeder	WSRCD
Valerie Shaffer	WSRCD
Fraser Sime	DWR
Jack Williamson	USFWS

C. Cow Creek Watershed Management Plan Contributors

Dave Ault	CDF
Jan Caster	SPI
Barbara Davis	WSRCD / CCWMG
Craig Dowling	
Eda Eggeman	DFG
Bruce Farrell	CCWMG
Larry Ferero	UC Coop Extension
Todd Golder	NRCS
Susan Goodwin	CCWMG
Mike Grifantini	Roseburg Resources
Morgan Hannaford	Shasta College
Rick Hartley	CDF
Brent Hathaway	CCWMG
Loni Henderson	Millville Elementary
Jamie Holmes	Millville Elementary
Lois Kaufman	CCWMG
Bob Moller	CCWMG
James Moller	WSRCD
Mary Pfieffer	Shasta County Agriculture
Virginia Strawn	CCWMG
Fred Tulley	CDF
Paul Uncapher	Enplan
Bill Walker	
Bruce Wendt	CCWMG
Doug Wenham	CDF
Bob Williams	CCWMG
Monte Wooden	CDF
Shannon Wooten	CCWMG

IV. Map of Projects Completed or In Process



V. Priority Projects

Water Quality and Quantity

#	OBJECTIVE
WQ-1	**Objective: Implement focused monitoring on key water quality parameters to define baseline conditions and assess the need for improved management practices and/or rehabilitation.**
a.	Implement fecal coliform bacteria (E. coli) monitoring aimed at defining existing bacteria concentrations both seasonally and spatially. (Project underway)
b.	Identify potential sources of elevated bacteria concentrations (i.e. irrigation tailwater discharges, septic systems, urban/residential runoff, and rangeland runoff).
c.	Implement temperature monitoring aimed at defining the existing temperature regime both seasonally and spatially. (Project underway)
d.	Identify potential sources of temperature increases in the watershed.
WQ-2	**Develop and implement a continuing, long-term watershed monitoring program to allow water quality/quantity decisions to be made on a data driven, scientific basis.**
a.	Establish current water quality/quantity conditions, which can be compared against past and future information. (Project underway)
b.	Evaluate water quality/quantity stressors where existing conditions do not meet state and federal water quality objectives and are not protective of identified beneficial uses.
c.	Track long term changes and trends in water quality/quantity that are expected to result from improved management practices, stream improvement projects, and community education. Parameters to be tracked would include flow, temperature, bacteria, fish and macroinvertebrate populations, riparian and aquatic habitat conditions, and sediment/turbidity.
WQ-3	**Develop a Monitoring Coordination Strategy to coordinate CCWMG ambient water quality/quantity monitoring with other monitoring efforts in order to maximize overall knowledge of Cow Creek Watershed conditions.**
a.	Water quality and stream condition monitoring by private timber.
b.	Studies by UC Cooperative Extension relating to water quality.
c.	Monitoring of water quality done for the Regional Water Quality Control Board's Irrigated Land Waiver program.
d.	Monitoring for various purposes by schools, individuals and local.

WQ-4 **Establish a process and a center for data storage, data storage, data analysis, and public distribution of water quality and quantity and other watershed monitoring information.**

WQ-5 **Assist in implementing Best Management Practice (BMP) projects in order to demonstrate and evaluate their effectiveness to improve water quality in the Cow Creek Watershed. Projects include:**

a. Irrigation tail-water management (project awarded)
b. Control of drainage and discharge from confined animal facilities.
c. Road surface stabilization and drainage improvement.
d. Proper use of home and garden pesticides and fertilizers.
e. Improved irrigation efficiency.
f. Instream flow augmentation.
g. Conservation easements protecting riparian corridors and large land holdings.
h. Septic system rehabilitation.
i. Improved livestock grazing management practices, including fencing to protect creeks and riparian zones and off-creek watering sources.

WQ-6 **Assist in implementing Best Management Practice (BMP) projects in order to demonstrate and evaluate their effectiveness to increase water quality within the Cow Creek Watershed.**

a. Improved irrigation efficiency.
b. Ditch lining and piping (Project underway).
c. Vegetation removal along ditches.
d. Dedication of unwanted/unneeded water rights.
e. Purchase of water by public and private entities from willing sellers.
f. Use of ground water in lower reaches instead of creek water for irrigation.
g. Reduction of overstocked forest stands and excess vegetation.
h. Removal of unused diversions.
i. Stream channel improvements leading to seasonal water storage in floodplains, wet meadows, and marshes.

Fisheries

#	OBJECTIVE
F-1	**Establish baseline data and a continuing comprehensive monitoring program for anadromous fish populations, enabling biologists to verify abundance/distribution of existing populations, evaluate stressors and track future population trends.**
a.	Collect baseline data via rotary screw traps, snorkel and spawner surveys. Also monitor temperature and flow as they relate to fish abundance (also see Water Quality and Quantity).
b.	Compile reports that include annual run size estimates and timing for fall and late-fall Chinook salmon and steelhead. Map spatial and temporal distribution of each population relative to temperature and flow.
F-2	**Rank diversions by impact on fisheries and develop a program to financially assist landowners to install screens and ladders.**
a.	Conduct a diversion characteristics inventory. Data will include the capacity of diversions in cubic feet per second, location, need and presence/absence of screen and/or ladder. Rank unscreened diversions by impact.
b.	Conduct a screen and/or ladder demonstration project on a few diversions and monitor the results. (Project underway)
F-3	**Rank pumps by impact on fisheries and develop programs for screening pump intakes.**
a.	Conduct a pump intake inventory similar to the strategy described in 3.2.
b.	Conduct a fish screen demonstration project on a few pumps and monitor the results. (Project underway)
F-4	**Implement actions to increase instream flow, particularly during the fall and spring migration periods (see Water Quality and Quantity Section 3.6)**

Botanical and Wildlife Resources

#	OBJECTIVE
BW-1	**Conduct vegetation inventories to better understand existing conditions and trends.**
a.	Inventory and trend data on detrimental non-native plant species and noxious weeds.
b.	Inventory and trend data on brush and ladder fuel density and invasion into coniferous forests.
BW-2	**Increase knowledge of the sensitive botanical and wildlife species in the watershed.**
a.	Develop comprehensive monitoring programs for populations of sensitive plant and wildlife species to monitor trends over time.
BW-3	**Protect existing riparian corridors and encourage the rehabilitation of degraded riparian corridors.**
a.	Conduct a riparian health and habitat assessment inventory including a mapping and inventory program to identify riparian communities and areas where native communities could be re-established.
b.	Conduct long-term monitoring to measure the improvements and changes over time as a result of management plan implementation.
c.	Rehabilitate riparian habitat with projects that are adaptively integrated with other goals of the management plan.
d.	Develop a list of best management practices to increase riparian health and encourage landowner implementation.
e.	Encourage the use of conservation easements as a method of conserving valuable wildlife resources and critical habitats.
BW-4	**Quantify, locate, and develop management strategies for non-native plant and animal species.**
a.	Assess current levels of detrimental non-native plants and animals, including population assessments to establish locations and trends useful for management.
b.	Develop management strategies for either eradication or control of identified detrimental non-native species.
c.	Develop a strategic plan for preventing other detrimental non-native species from entering or leaving the watershed.

d. Develop a list of best management practices to reduce detrimental non-native species from entering and colonizing the watershed and encourage landowner implementation.

BW-5 Conserve existing oak woodlands and support projects that enhance oak woodland health.

a. Develop a program to educate landowners in the lower watershed on oak woodland regeneration and conservation issues. (Project underway)

b. Assist interested landowners in obtaining cost share opportunities for oak conservation on their property.

BW-6 Utilize fuel management to increase wildlife habitat quantity and quality.

a. Educate landowners on the benefits of a prescribed fire program that will enhance forage, benefit wildlife by establishing early successional vegetation and reduce potential effects caused by wildlife. (Project underway)

Fire Prevention & Fuels Management

#	OBJECTIVE
FP-1	**Develop a watershed fuels inventory, map vegetation cover types and the distribution of these types within the watershed, including vegetation relative to slope, aspect, elevation and land use.**
FP-2	**Implement shaded fuelbreak and community fuel reduction projects using a mixture of equipment and handwork, utilizing commercial timber harvest, biomass harvest, chippers, masticators, and other ground-based equipment.**

S	Shaded Fuelbreak Projects:
a.	Oak Run Road Fuelbreak
b.	Oak Run to Fern to Whitmore Road Fuelbreak
c.	Fern Road East Fuelbreak
d.	Phillips Road Fuelbreak
e.	Buzzards Roost Road Fuelbreak
f.	Bateman Road Fuelbreak
g.	Ponderosa Way Fuelbreak
h.	Tamarack Road Fuelbreak
i.	Whitmore Road Fuelbreak
j.	Highway 299 Fuelbreak

k. Backbone Ridge Defensible Fuel Profile Zone

C Community Fuel Reduction Projects:

a. Round Mountain Community Fuel Reduction Project
b. Oak Run Community Fuel Reduction Project
c. Whitmore Community Fuel Reduction Project
d. Millville Community Fuel Reduction Project
e. Bella Vista Community Fuel Reduction Project
f. Jones Valley Community Fuel Reduction Project

FP-3 Encourage the use of landscape level fuel reduction projects to modify fire behavior and intensity and make large fire events easier to control.

a. Encourage the use of controlled burning and biomass as methods of reducing the fuel load throughout the watershed. (Project underway)
b. Encourage landowner participation in programs such as the CDF Vegetation Management Program for cost-effective solutions to landscape level fuel reduction. (Project underway.)

c. Use landscape-level projects to set priorities for fuelbreaks and community fuel reduction projects.

FP-4 Continue educating the community on the importance of fuels reduction, the construction and maintenance of fuelbreaks, and landscape-level fuel treatment zones.

a. See the Education section of this plan for details.

FP-5 Facilitate community implementation discussions at local community locations.

a. The need for public education and support for fire safe clearance around structures, for fuel reduction work in general, and for regulatory relief of smoke management and forest practice rules. (Project underway)
b. The relative importance of fuelbreaks, community fuel reduction projects, and landscape level fuel treatment zones.
c. Fuel treatment methods, combinations, limitations for differing vegetation cover types, and the importance of maintenance following treatment.

d. Display and use the Fire Safe Trailer to stimulate conversation centering on Fire Prevention and Fuels Management. (Project underway)

e. Fire history.

f. Fire weather.

g. Landowner awareness of fuel reduction methods, including the use of thinning, grazing, and the proper use of herbicides by trained personnel, hand clearing, mechanical clearing, mastication, and prescribed fire.

FP-6 Maintain existing fuelbreaks for long-term benefit and protection of investments.

a. Educate and encourage private landowners with completed fuel reduction work on their property to continue with the necessary maintenance and upkeep, and improve neighborhood fuel reduction coordination and cooperation.

b. Develop a maintenance schedule for implemented fuel reduction projects, including mapping of all existing fuel reduction projects and recent fires, compiling the dates each project was completed, and periodic visual surveys to check existing conditions of each fuelbreak project.

Education and Outreach

 # Objective

EO-1 Promote awareness of and increase participation in CCWMG by showing the relationship between CCWMG projects and the resulting benefits to Cow Creek watershed residents, businesses and industries.

a. Develop public outreach programs to educate Cow Creek watershed residents about the efforts of the CCWMG to maintain and improve Cow Creek watershed health. (Project underway)

b. Increase posting of Cow Creek watershed maps and signage throughout the watershed and particularly near CCWMG projects.

EO-2 Promote, provide and facilitate watershed management education and outreach opportunities.

a. Facilitate classroom, field workshops and exhibits at community events to educate Cow Creek watershed landowners and residents about Best Management Practices in relation to common land use practices, including:

Fire safety (Project underway)

Proper septic system design, use and testing
Noxious weed identification and control (Project underway)
Proper use of fertilizers and pesticides
Management of impervious surface runoff and other hazardous runoff to creeks.
Water conservation.
Fish passage needs (Project underway)

b. Connect landowners with WSRCD, NRCS and UC Extension Service for assistance with project design and development, farm and ranch plans and grant writing.

c. Assemble an agency database. (Project underway)

d. Develop an agency contact information directory with guidelines that inform landowners which practices require permits.

e. Develop a library of information containing web site addresses, UC Extension Service brochures, classes, areas of expertise, and native plant recommendations.

f. Provide Fire Prevention and Fuels Management educational exhibits of the Cow Creek Fire Safe council and the Shasta County Fire Safe council at local events. (Project underway)

EO-3 Promote, provide, and facilitate watershed management education and outreach opportunities for area school children.

a. Promote, support, and encourage watershed management educational activities in community schools within the Cow Creek watershed. (Project underway)

b. In partnership with willing landowners, WSRCD, and local schools, create a watershed management curriculum which will encourage conservation of natural resources and preservation of the economic well-being of Cow Creek watershed residents. Curriculum could include water monitoring, native plant propagation, and the importance of riparian areas.

VI. Project Costs Estimates

Water Quality and Quantity

Objective WQ-1: Implement focused monitoring on key water quality parameters to define baseline conditions and assess the need for improved management practices and/or rehabilitation.

a. Implement fecal coliform bacteria (*E. coli*) monitoring aimed at defining existing bacteria concentrations both seasonally and spatially. (Project underway)

b. Identify potential sources of elevated bacteria concentrations (i.e. Irrigation tailwater discharges, septic systems, urban/residential runoff, and rangeland runoff).

c. Implement temperature monitoring aimed at defining the existing temperature regime both seasonally and spatially (project underway).

d. Identify potential sources of temperature increase in the watershed.

Objective WQ-.2: Develop and implement a continuing, long term watershed monitoring program to allow water quality/quantity decisions to be made on a data driven, scientific basis.

a. Establish current water quality/quantity conditions, which can be compared against past and future information (project underway).

b. Evaluate water quality/quantity stressors where existing conditions do not meet state and federal water quality objectives and are not protective of identified beneficial uses.

c. Track long term changes and trends in water quality/quantity that are expected to result from improved management practices, stream improvement projects, and community education. Parameters to be tracked would include flow, temperature, bacteria, fish and macroinvertebrate populations, riparian and aquatic habitat conditions, and sediment/turbidity.

Objective WQ-3: Develop a Monitoring Coordination Strategy to coordinate CCWMG ambient water quality/quantity monitoring with other monitoring efforts in order to maximize overall knowledge of Cow Creek Watershed conditions.

Opportunities for collaboration include:

1. water quality and stream condition monitoring by private timber companies, Latour State Forest and power generation companies;

2. studies by UC Cooperative Extension relating to water quality, fisheries, and range condition;

3. monitoring of water quality done for the Regional Water Quality Control Board's Irrigated Land Waiver program (project underway);

4. monitoring for various purposes by schools, individuals and local entities, and state/federal resource agencies (project underway)

Objective WQ-4: Establish a process and a center for data storage, data analysis, and public distribution of water quality and quantity and other watershed monitoring information.

Objective WQ-5: Assist in implementing Best Management Practice (BMP) projects in order to demonstrate and evaluate their effectiveness to improve water quality in the Cow Creek Watershed.

The following are possible Best Management Practice (BMP) projects designed to improve water quality:

1. irrigation tail-water management (project awarded);
2. control of drainage and discharge from confined animal facilities
3. road surface stabilization and drainage improvement
4. proper use of home and garden pesticides and fertilizers
5. improved irrigation efficiency
6. instream flow augmentation
7. conservation easements protecting riparian corridors and large land holdings (project underway)
8. septic system rehabilitation
9. improved livestock grazing management practices, including fencing to protect creeks and riparian zones and off-creek watering sources.
10. stream channel improvements which reduce bank erosion and enhance floodplain access and function

Objective WQ-6: Assist in implementing Best Management Practice (BMP) projects in order to demonstrate and evaluate their effectiveness to increase water quantity within the Cow Creek Watershed.

The following are possible BMP projects designed to enhance instream flow in Cow Creek Watershed:

1. improved irrigation efficiency
2. ditch lining and piping (project awarded)
3. vegetation removal along ditches
4. dedication of unwanted/unneeded water rights
5. purchase of water by public and private entities from willing sellers
6. use of ground water in lower reaches instead of creek water for irrigation
7. reduction of overstocked forest stands and excess vegetation
8. removal of unused diversions
9. stream channel improvements leading to seasonal water storage in floodplains, wet meadows, and marshes

SUMMARY OF PROJECTS

Assist in implementing Best Management Practices projects, education and pilot projects. Pilot projects include one educational seminar per project.

Type of Project	Low End Cost	High End Cost
Ditch Lining, Rock	$ 37,003	$ 70,505
Ditch Lining, Concrete	182,203	302,825
Road Rehabilitation	59,269	76,418
Piping/Drainage Control	36,003	46,325
Septic Tank/Leachfield/Waste-Water Disposal	25,220	35,625
Total	**$339,698**	**$531,698**

1. Education (per seminar)		Low	High
Project Manager	8 hrs $50-62/hr	400	500
Project Coordinator	24 hrs @ $30-37.50/hr	720	900
Two Agency Speakers	8 hrs $40-60/hr	320	480
Consultant Speaker	8 hrs $80-100/hr	640	800
Mileage	50 mi @$.50/mi	25	25
Brochures	100 ea $1.50-$2.00 ea	150	200
Flyers/mailings, postage	1500 ea $.67-$1.34 ea	1,005	2,010
Refreshments		250	350
Rent hall	8 hrs $50-$60/hr	400	480
	Total	**$4,230**	**$6,225**

2. Pilot Projects

Ditch Lining, Rock, one mile ditch, 4' wide			
Rock lining	5,280 lf $5-$10/lf	25,400	52,800
Erosion control 2' ea side	.5 acres $2,500-$6,000/acre	1,212	2,909
Engineering		2,761	5,571
Project coordinator	40 hrs $30-$37.50/hr	1,200	1,500
Watershed coordinator	24 hrs $50-$62.50/hr	1,200	1,500
	Total	**$32,773**	**$64,280**

Ditch Lining, Concrete, one mile ditch, 4' wide			
Concrete lining	5,280 lf $30-$50/lf	$158,400	$264,000
Erosion control 2' ea side	.5 acres $2,500-$6,000/acre	1,212	2,909
Engineering		15,961	26,691
Project coordinator	40 hrs $30-$37.50/hr	1,200	1,500
Watershed coordinator	24 hrs $50-$62.50/hr	1,200	1,500
	Total	**$177,973**	**$296,600**

Road Rehabilitation, one mile unpaved road to improve, 12' wide			
Grader rental	2 days$150-$187.50/day	2,400	3,000
Subgrade prep.base rock	63,360 sq.ft. $.70-$.88/sq.ft.	44,352	55,440
Erosion control 2' ea side	.5 acres $2,500-$6,000/acre	1,212	2,909
Engineering		4,675	5,844
Project coordinator	40 hrs $30-$37.50/hr	1,200	1,500
Watershed coordinator	24 hrs $50-$62.50/hr	1,200	1,500
	Total	**$55,039**	**$70,193**
Piping/Drainage Control, .25 miles piping to install, 4" PVC			
4" PVC installed	1,320 lf $20-$25/lf	26,400	33,000
Erosion control 2' ea side	.1 acres $2,500-$6,000/acre	303	727
Engineering		2,670	3,373
Project coordinator	40 hrs $30-$37.50/hr	1,200	1,500
Watershed coordinator	24 hrs $50-$62.50/hr	1,200	1,500
	Total	**$31,773**	**$40,100**
Septic Tank/Leachfield/Wastewater Disposal			
Septic tank, 5,000 gallon installed		6,650	8,313
Piping, 3" PVC installed	500 lf $10-$12.50/lf	5,000	6,250
Distribution box installed	1 $1,500-$1,875	1,500	1,875
Engineered disposal area	100 lf $12.50-$15.63/lf	1,250	1,563
Erosion control	1 acre $2,500-$6,000/acre	2,500	6,000
Engineering		1,690	2,400
Project coordinator	40 hrs $30-$37.50/hr	1,200	1,500
Watershed coordinator	24 hrs $50-$62.50/hr	1,200	1,500
	Total	**$20,990**	**$29,400**

Fisheries

Objective 3.1: Establish baseline data and a continuing comprehensive monitoring program for anadromous fish populations, enabling biologists to verify stressors and trends.

a. Collect baseline data via rotary screw traps, snorkel and spawner surveys. Also monitor temperature and flow as they relate to fish abundance (also see water quality/quantity).

Rotary Screw Traps

E.G. Solutions located in Corvallis, Oregon is the only licensed manufacturer of rotary screw traps in the United States. According to company representatives, orders may take several months to fill, since trapping devices are constructed on demand. Operating cost will vary depending upon such factors as the number of traps used, sampling protocol and weather conditions. Fisheries Biologist Dave Vogel (Natural Resources Scientist, Inc., Red Bluff, CA) stated that operating costs can run as high as $20,000/month; this assumes two field technicians working the traps 6 hours a day at a rate of $50/hour, seven days a week. In addition to equipment and personnel costs, the District would be required to obtain an Endangered Species Act Section 10(a)(1)(A) Research Permit from NOAA Fisheries (Attachment A).

Manufacturer	Screw Traps and Trailers	Individual Unit Cost
E.G. Solutions *P.O. Box 2437* *Corvallis, OR 97339* *(541) 752-7810 Sales* *(541) 913-4477 Parts* *egsolutions@hotmail.com* *www.screwtraps.com*	Option 1 5ft. Diameter Screw Trap Custom Trailer for 5ft. trap Option2 8ft. Diameter Screw Trap Custom Trailer for 8ft. trap Tethering cable & hardware	$14,000* $2,200* $17,100* $2,500* $200 **2004 pricing. Estimate an additional 5% for each year after.*

Snorkel Surveys

Until such time that the District identifies specific survey objectives and develops a detailed snorkel survey protocol, the exact costs cannot be determined. However, ENPLAN contacted two firms (see contact information listed below) that specialize in conducting fisheries related research. Both firms indicated that snorkel surveys generally cost $1,000/day; this assumes two field technicians working 10 hour days at a rate of $50/hour. Doug Demko (S.P. Cramer) stated that under ideal circumstances (i.e., adequate flow and convenient access), two snorkelers can survey approximately 8 miles of stream per day. Mr. Demko also stated that depending upon stream conditions and available funds, carcass and redd surveys can be conducted equally as effective on foot or by kayak.

Natural Resource Scientist, Inc. *Attn: Dave Vogel* *P.O. Box 1210* *Red Bluff, CA 96080-1210* *(530) 527-9587 ext.11* *(530) 527-6181 Fax* *information@resourcescientists.com* *www.resourcescientists.com*	*S.P. Cramer and Associates, Inc.* *Attn: Doug Demko* *3188 Wood Creek Drive* *Chico, CA 95928* *(530) 342-9262* *(530) 898-9582 Fax* *demko@spcramer.com* *www.spcramer.com*

Temperature Monitoring

Although there are many different types of electronic devices available to monitor underwater stream temperatures, ENPLAN selected two systems that were recommended by several fisheries biologists: the StowAway TidbiT and the HOBO Water Temp Pro (Attachment B). Both of these devices are sufficient for collecting water temperature data; however, each has slightly different capabilities, which may be better suited for the District's needs. Basic component of each system include:

1) Temperature data logger.
2) BoxCar Pro software for processing and analyzing data.
3) Base station used to communicate between the host computer and either the data logger or optic shuttle.
4) Optic shuttle used to retrieve data and re-launch data loggers in the field.

Temperature Data Loggers		
Manufacturer	Data Logger Systems	Individual Unit Cost
Onset Computer Corporation	*Option 1*	
P.O. Box 3450	StowAway TidbiT Temp Logger	$119
Pocasset, MA 02559-3450	Optic Base Station	$80
1-800-564-4377	BoxCar Pro 3.7 Software	$14
(508) 759-9100	Optic Shuttle	$199
onsales@cape.com		$412 Total
www.onsetcomp.com	*Option2*	
	HOBO Water Temp Pro*	$110
	BoxCar Pro 4.3 Software	$95
	Infrared Base Station	$60
	Protective Boot (optional)	$15
		$280 Total*
	** No shuttles available for this model, requires a notebook computer or a Palm PDA device to retrieve data in the field.*	**Cost does not include the price of notebook computer or Palm PDA device.*

Flow Monitoring

Stream flow data can be collected from any of existing USGS stations located within the watershed. Should the district decide that any of these stations is inadequate or additional stations are needed, engineering and construction costs can be determined at that time.

b. Compile reports that include annual run size estimates and timing for fall and late fall Chinook salmon and steelhead. Map spatial and temporal distribution of each population relative to temperature and flow.

Costs associated with compiling reports and mapping the salmonid population distribution cannot be determined at this time; these tasks would likely be included within the overall sampling program developed by the District.

Objective 3.2: Rank by impact, and develop a program to financially assist landowners to install screens and ladders on existing diversions.

a. Conduct a diversion characteristics inventory. Data will include the capacity of diversion in cubic feet per second, location and presence/ absence of screen and/or ladder. Rank unscreened diversions by impact of diversion.

Due to the similar nature of Objectives 3.2a and 3.3a, ENPLAN prepared a combined estimate based on the following assumptions:

1) Approximately 281 diversions, pump intakes and reservoirs are present in the Cow Creek watershed according to the Cow Creek Watershed Assessment.
2) Inventory will require advance notification and coordination of landowners.

3) One field technician can inventory an average of 5 diversions/ pumps per 8 hour day; therefore, all diversions could be inventoried in 56 days (approximately 450 hours).
4) Mileage reimbursements are estimated at $0.375/mile. Average daily travel is estimated to be 60 miles (round trip from WSRCD office to Oak Run Elementary School) and assumes 56 field days to complete inventory.
5) Office Administrator can enter inventory data into spread sheet at the rate of 10 diversions per hour; therefore requiring 28 hours to enter all diversion data.

Diversion and Pump Inventory

Task	Hourly Rate	Total Hours	Total
Prepare and distribute letter requesting landowner permission to inventory diversion/intake.	*35*	*16*	*$560*
Coordination with landowners	*35*	*56*	*$1,960*
Develop diversion inventory criteria	*50*	*16*	*$800*
Conduct inventory	*50*	*450*	*$22,500*
Data entry	*35*	*95*	*$980*
Materials			
Mileage/Travel	*--*	*--*	*$1,260*
Postage for letters	*--*	*--*	*$104*
Stationery and envelopes for letters	*--*	*--*	*$40*
TOTAL COST			***$28,204***

b. ***Conduct a screen and/or ladder demonstration project on a few diversions and monitor the results.***

By conducting an inventory of existing diversions and pumps within the watershed, the District will be able to identify property owners who are willing to participate in screen and ladder demonstration projects (Objectives 3.2b and 3.3b). Until such time, engineering, construction and monitoring costs cannot be determined. However, ENPLAN has identified an organization experienced with assisting landowners in developing such a project; contact information is presented below.

Family Water Alliance
Attn: Susan Sutton
P.O. Box 365
Maxwell, CA 95955
(530) 438-2026
fwa@frontiernet.net
www.familywateralliance.com

Objective 3.3: Rank by impact and develop programs for screening pump intakes.

a. ***Conduct a pump intake inventory. Develop a similar strategy to the strategy described for 3.2 (above) and tailor it to pump intakes.***

Refer to discussion for Objective 3.2a.

b. Conduct a fish screen demonstration project on a few unscreened pumps and monitor the results.

Refer to discussion for Objective 3.2b.

Objective 3.4: Investigate measures to increase flows.

a. Investigate opportunities to increase irrigation efficiency (also see Water Quality and Quantity 3.6).

This objective can be combined with 3.4j.

b. Manage vegetation to improve water supply and timing (also see Water Quality and Quantity 3.6).

This objective can be combined with 3.4j.

c. Purchase water or water rights from willing sellers.

According to Ken Emanuel, Environmental Scientist with the State Water Resources Control Board (SWRCB), water rights cannot be sold to an entity unless that entity purchases the land to which the rights are connected. For example, if the Cow Creek Watershed Management Group (CCWMG) wants to acquire the riparian water rights from a property owner whose land abuts Cow Creek, the CCWMG would need to purchase the land as well. However, the CCWMG could participate in a water transfer program with a local water district. In this situation, the water district would need to provide documentation to the SWRCB stating that they have excess water available for transfer. Once that documentation is verified, the water district could sell the excess water to the CCWMG. However, this process would need to be repeated annually in order to sell the excess water.

d. Remove diversions.

The costs associated with this objective will need to be analyzed on a case-by-case basis once the District has identified the diversions to be removed.

e. Provide alternate water sources during important periods (also see Water Quality and Quantity 3.6).

The costs associated with this objective will depend upon the scope of the program.

f. **Implement a conjunctive use (a combination of ground water and stream water) program.**

The costs associated with this objective will depend upon the scope of the program.

g. **Monitor ground water using ground water monitoring wells.**

The costs associated with this objective will depend upon a variety of factors including, but not limited to, the scope of the monitoring program, local geology, depth of well and the type of monitoring equipment used.

h. **Meet with representatives of the California Bay Delta Authority (CBDA), Environmental Water Program (EWP) to develop an understanding of the steps necessary for a EWP for Cow Creek.**

CALFED agencies are currently developing the EWP framework and the associated Pilot Water Acquisition Program. The pilot water acquisitions are targeted for the following streams: Butte Creek, Clear Creek, Deer Creek, Mill Creek and the Tuolumne River. The District will need to inquire with the EWP Program Manager, Campbell Ingram, as to how Cow Creek can be included in the program.

California Bay Delta Authority Contact
Campbell Ingram
EWP Program Manager
(916) 414-6727
campbell_ingram@fws.gov

i. **Provide information to water rights holders on water sales to public and private entities.**

The following estimate is for costs associated with the District organizing and hosting a one-day workshop on water rights. The following assumptions were incorporated into the estimate:

1) 450 notices are mailed out to land owners and/or water right holders in watershed.
2) Attendance of two guest speakers with expertise in water rights issues.
3) Mileage reimbursements are estimated at $0.375/mile. Travel is estimated to be 90 miles for one District vehicle and two guest speakers; round trip distance from WSRCD office to Millville Grange Hall is 30 miles.
4) The rental fees and security deposit for the Millville Grange Hall in Palo Cedro are $275 and $300 respectively; however, the

owners have made the venue available free of charge in the past.

5)

Task	Hourly Rate	Total Hours	Total
Prepare and distribute a letter notifying landowners of the workshop.	*35*	*16*	*$560*
Develop, organize and staff workshop (Assuming 2 WSRCD staff)	*35*	*50*	*$1750*
Guest Speaker #1	*50*	*6*	*$300*
Guest Speaker #2	*50*	*6*	*$300*
Materials			
Postage for letters	*--*	*--*	*$170*
Stationery and envelopes for letters	*--*	*--*	*$40*
Millville Grange Hall			*$575*
Mileage/Travel	*--*	*--*	*$35*
Refreshments	*--*	*--*	*$300*
TOTAL COST			***$4,030***

j. Conduct workshops on irrigation efficiency for potential to increase water quantity.

See objective 3.4i; costs associated with holding a one-day workshop are assumed to be relatively the same.

k. Test irrigation efficiency using the Irrigation Mobile Lab.

The Tehama County Resource Conservation District (TCRCD) currently has an Irrigation Mobile Lab (IML) available to evaluate irrigation systems for growers in Tehama, Shasta, Glenn, Lassen and Butte Counties. IML services are provided free of charge to the grower; however, each evaluation costs the TCRCD approximately $1500 in labor and materials. According to Scott Spinner, IML Project Manager for the TCRCD, depending upon the demand for this service, the TCRCD should be able to accommodate the landowners in the Cow Creek watershed. However, ENPLAN has provided the equipment list and estimated costs (Attachment B) should the WSRCD want to initiate its own IML program to supplement the services offered by the TCRCD. The information included in Attachment C was provided by the TCRCD and reflects 2002 pricing.

l. Educate landowners in water conservation technology.

This objective can be combined with 3.4j.

m. Conduct minimum flow studies for upstream and downstream fish passage.

The costs associated with this objective will depend upon the scope of the study.

n. Coordinate the distribution and sharing of information on the results of water quality and quantity studies.

The costs associated with this objective will depend upon the scope of the water quality and quantity studies and the manner in which the information is distributed. The most cost effective way of achieving this objective may be to make the information available on the District's Watershed Information Model (WIM) website, thereby reducing the amount of time and materials needed to duplicate and distribute the studies.

o. Coordinate the distribution and sharing of information on the results of biological studies.

Refer to discussion for objective 3.4n.

Botanical and Wildlife Resources

	BOTANICAL AND WILDLIFE RESOURCES	COST ESTIMATE
BW-A	**Detrimental Non-native Plant & Noxious Weed Inventory -** A 10-acre noxious weed rehab project in a riparian area. Includes planting riparian vegetation, installing an irrigation system, with no significant earthwork. Includes the purchase of a set of stereo-paired color infrared photos of the entire Cow Creek Watershed with one set of 9"x 9" contact prints and scanned digital images. A survey will be sent to 1,500 landowners along the riparian corridor to help define the most degraded and high priority project. Budget includes conducting riparian rehabilitation site assessment, design the project and prepare bid documents, acquire environmental permits, implementing project, maintaining irrigation, weeding, etc. for 3 years. Staff time includes a botanist, photo interpreter, GIS technician, watershed coordinator, project coordinator, clerical, office supplies, postage, and consultant time.	$110,324
BW-B	**Brush Density Inventory in Foothill Grasslands -** Tasks include conducting an Inventory of foothill grasslands and survey landowners to calculate the known locations of detrimental non-native plants and noxious weeds in the grasslands, purchasing a set of stereo-paired color infrared photos of the entire watershed with one set of 9" x 9" contact prints and scanned digital images(if not purchased through another grant, conducting a one-on-one survey by the coordinator with individual landowners, field reconnaissance, drafting a survey of species located, meeting with a Technical Advisory Committee, arranging for Temporary Entry Permits, inventorying the plants, mapping identifiable noxious plants from aerial photos, compiling data into a GIS database, preparing a draft report and printing 100 copies of a final report.	$112,883
BW-C	**Brush and Ladder Fuel Density Inventory in Coniferous Forests -** Through the use of aerial photography, tasks include conducting an inventory the brush and ladder fuel density in the coniferous forests in the watershed, purchasing a set of stereo-paired color infrared photos of the entire watershed with one set of 9" x 9" contact prints and scanned digital images (if not purchased through another grant), field reconnaissance, creating maps, arranging Temporary Entry Permits, ground truthing, compiling data into a GIS database, preparing a draft report and 100 copies of a final report with maps. (The $57,000 cost of aerial photos can be reduced by ~50% by eliminating non-conifer forest areas.)	$112,240
BW-D	**Riparian Vegetation Inventory -** Through the use of aerial photography, tasks include conducting an inventory of the riparian vegetation in the watershed, purchasing a set of stereo-paired color infrared photos of the entire watershed with one set of 9" x 9" contact prints and scanned digital images (if not purchased through another grant), field reconnaissance, creating maps, arranging Temporary Entry Permits, ground truthing, compiling data into a GIS database, preparing a draft report and 100 copies of a final report with maps.	$118,023

BW-E	**Riparian Health Habitat Assessment -** Through the use of aerial photography followed by on-the-ground confirmations, determine the health of the riparian vegetation in the watershed. This includes purchasing a set of stereo-paired color infrared photos of the entire watershed with one set of 9" x 9" contact prints and scanned digital images (if not purchased through another grant), field reconnaissance, creating maps, arranging Temporary Entry Permits, ground truthing, compiling data into a GIS database, preparing a draft report and 100 copies of a final report with maps.	$115,634
BW-F	**Long-term Riparian Habitat Monitoring -** Tasks include developing a draft ranking system to evaluate riparian habitat potential and existing riparian health, meeting with a Technical Advisory Committee to revise and finalize the ranking system, mapping potential riparian habitat restoration areas using aerial photos, arranging access to private lands, signing Temporary Entry Permits, ground truthing the potential riparian habitat restoration areas identified, accessing the health of accessible existing riparian areas, compiling the data into a GIS database, preparing a draft report and 100 copies of the final report with maps.	Initially $15,240 Annual $60,443
BW-G	**Riparian Habitat Rehabilitation Projects -** Tasks include site assessments to locate the site for a 10-acre riparian rehabilitation project ($100,000), designing the project, creating a bid document, obtaining environmental permits, developing a draft riparian watershed monitoring plan, meeting with a Technical Advisory Committee to revise the monitoring plan, arranging access to private land and signing of Temporary Entry Permits, maintaining the project site, collecting annual vegetation monitoring data following implementation of the rehabilitation project, analyzing data and producing a baseline report and annual report.	$213,054
BW-H	**Riparian Health Best Management Practices Development -** Tasks include developing a draft list of riparian health impairments and a draft list of Best Management Practices (BMPs) to address each impairment, meeting with a Technical Advisory Committee to revise and finalize a list of impairments and BMPs, fully developing all BMPs and producing a draft landowner riparian health BMP brochure, meeting with the Technical Advisory Committee to revise the landowner riparian health BMP brochure, printing 1,000 copies of the brochure, reaching out to landowners to adopt the BMPs, and further publicize the document.	$22,440
BW-I	**Detrimental Non-Native Species Assessment -** Tasks include developing a draft list of existing detrimental non-native plant and animal species to be assessed, meeting with a Technical Advisory Committee to revise and finalize the list of species, conducting surveys of landowners and managers about known locations and population estimates of the species, arranging access to private lands, signing Temporary Entry Permits, conducting the inventory on both private and public lands, mapping the locations and derive population estimates of species from the survey and inventory, compiling data into a GIS database, preparing a draft and final report.	$44,269
BW-J	**Long-term Riparian Habitat Monitoring -** Tasks include developing a draft riparian vegetation and avian monitoring plan on rehabilitated sites, meeting with a Technical Advisory Committee to revise and finalize the monitoring plan, arranging access to public and private lands, signing Temporary Entry Permits, collecting annual vegetation and avian monitoring data at riparian rehabilitation sites following implementation of the rehabilitation project, analyzing the data and producing baseline and then annual reports.	Initial $15,240 Annually $60,443

BW-K	**Strategic Plan to Prevent Detrimental Non-native Species Entry -** Tasks include developing a draft list of detrimental non-native plant and animal species to be included in the plan, meeting with a Technical Advisory Committee to revise and finalize the list of species, developing a draft long-term strategic plan, meeting with the Technical Advisory Committee to revise and finalize the plan.	$16,343
BW-L	**Detrimental Non-native Species Eradication and Control Strategy Development -** Tasks include developing draft management strategies to eradicate and/or control existing detrimental non-native species identified in BW-I, meeting with a Technical Advisory Committee to revise and finalize the management strategies, preparing a draft and final report.	$21,743

Botanical and Wildlife Resources - Cow Creek WMP

Objective 3.1a (Detrimental Non-native Plant & Noxious Weed Inventory)

CONSULTANT

Item	Amount	Detail
Botanist	$ 8,400.00	$75.00/hr X 112 hrs = $8,400
Aerial Photos	$ 57,000.00	Stereo-paired color infrared photos of the entire watershed with I set of 9" x 9" contact prints and scanned digital images
Photo Interpreter	$ 5,400.00	$45/hr X 120 hrs = $5,400
GIS Technician	$ 5,400.00	$45/hr X 120 hrs = $5,400
Mileage / Travel	$ 250.00	500 miles @ $0.50 = $ 250
Printing/Photocopy/etc.	$ 2,000.00	100 copies of final report w/ maps @ $20.00 = $2,000
Consultant Subtotal	$ 78,450.00	
Project Management @ 10%	$ 7,845.00	
Consultant Total	$ 86,295.00	(does not include inventory @ $8.00/acre)

WESTERN SHASTA RESOURCE CONSERVATION DISTRICT

Item	Amount	Detail
Watershed Coordinator	$ 470.00	$23.50/hr X 20 hrs = $470
Project Coordinator	$ 3,280.00	$20.50/hr X 160 hrs = $3,280
Clerical	$ 1,200.00	$15.00/hr X 80 hrs = $600
Stationary Supplies / Postage	$ 2,250.00	Survey mailings 1,500 @ $1.50 each = $2,250
Professional Services (Consultant)	$ 86,295.00	
Subtotal	$ 93,495.00	
WSRCD Indirect Costs @ 18%	$ 16,829.10	
Total Project	**$110,324.10**	**(does not include private survey @ $9.44/acre including WSRCD indirect costs)**

TASKS	ENTITY	HOURS	MILEAGE
1. Watershed field reconnaissance	Consultant	24 hours (Botanist)	500
2. Obtain aerial photos	Consultant	N/A	N/A
3. Compile draft survey species list	Consultant	16 hours (Botanist)	N/A
4. Meet with TAC & revise survey species list	Consultant	12 hours (Botanist)	N/A
5. Conduct survey of landowners/managers about known locations of detrimental non-native plants & noxious weeds	WSRCD	100 hours (Clerical 80 / Watershed Coordinator 20)	N/A
6. Arrange access to private lands	WSRCD	80 hours (Project Coordinator)	N/A
7. Inventory of private lands	Consultant	$8/acre	included in hourly rate
8. Map identifiable noxious plants from aerial photos	Consultant	120 hours (Photo Interpreter)	N/A
9. Compile data into a GIS database	Consultant	120 hours (GIS Technician)	N/A
10. Report preparation	Consultant	60 hours (Botanist)	N/A
11. Project coordination	WSRCD	80 hours (Project Coordinator)	N/A

Note: The aerial photography cost is identical to the cost outlined in Objectives 3.1b, 3.1c and 3.1d. The cost can eliminated if funded through one of the other three objectives.

Note: Inventory per acre cost assumes a range of property sizes.

Botanical and Wildlife Resources - Cow Creek WMP

Objective 3.1b (Brush Density Inventory in Foothill Grasslands)

CONSULTANT

Item	Amount	Detail
Botanist	$ 6,600.00	$75.00/hr X 88 hrs = $6,600
Aerial Photos	$ 57,000.00	Stereo-paired color infrared photos of the entire watershed with I set of 9" x 9" contact prints and scanned digital images
Photo Interpreter	$ 10,260.00	$45/hr X 228 hrs = $10,260
GIS Technician	$ 7,200.00	$45/hr X 160 hrs = $7,200
Mileage / Travel	$ 925.00	1,850 miles @ $0.50 = $ 925
Printing/Photocopy/etc.	$ 2,000.00	100 copies of final report w/ maps @ $20.00 = $2,000
Consultant Subtotal	$ 83,985.00	
Project Management @ 10%	$ 8,398.50	
Consultant Total	$ 92,383.50	

WESTERN SHASTA RESOURCE CONSERVATION DISTRICT

Item	Amount	Detail
Project Coordinator	$ 3,280.00	$20.50/hr X 160 hrs = $3,280
Professional Services (Consultant)	$ 92,383.50	
Subtotal	$ 95,663.50	
WSRCD Indirect Costs @ 18%	$ 17,219.43	
Total Project	**$112,882.93**	

TASKS	ENTITY	HOURS	MILEAGE
1. Obtain aerial photography	Consultant	N/A	N/A
2. Watershed field reconnaissance	Consultant	16 hours (Botanist)	350
3. Map brush communities using aerial photos	Consultant	160 hours (Photo Interpreter)	N/A
4. Arrange access to private lands	WSRCD	80 hours (Project Coordinator)	N/A
5. Ground truthing	Consultant	80 hours (Photo Interpreter 68 / Botanist 12)	1,500
6. Compile data into a GIS database	Consultant	160 hours (GIS Technician)	N/A
7. Report preparation	Consultant	60 hours (Botanist)	N/A
8. Project coordination	WSRCD	80 hours (Project Coordinator)	N/A

Note: The aerial photography cost is identical to the cost outlined in Objectives 3.1a, 3.1c and 3.1d. The cost can eliminated if funded through one of the other three objectives.

Note: The photography cost can be reduced by approximately 50% by eliminating conifer forest communities of the watershed.

Botanical and Wildlife Resources - Cow Creek WMP

Objective 3.1c (Brush and Ladder Fuel Density Inventory in Coniferous Forests)

CONSULTANT

Item	Amount	Detail
Botanist	$ 6,600.00	$75.00/hr X 88 hrs = $6,600
Aerial Photos	$ 57,000.00	Stereo-paired color infrared photos of the entire watershed with I set of 9" x 9" contact prints and scanned digital images
Photo Interpreter	$ 10,260.00	$45/hr X 228 hrs = $10,260
GIS Technician	$ 7,200.00	$45/hr X 160 hrs = $7,200
Mileage / Travel	$ 1,200.00	2,400 miles @ $0.50 = $ 1,200
Printing/Photocopy/etc.	$ 2,000.00	100 copies of final report w/ maps @ $20.00 = $2,000
Consultant Subtotal	$ 84,260.00	
Project Management @ 10%	$ 8,426.00	
Consultant Total	$ 92,686.00	

WESTERN SHASTA RESOURCE CONSERVATION DISTRICT

Item	Amount	Detail
Project Coordinator	$ 3,280.00	$20.50/hr X 160 hrs = $3,280
Professional Services (Consultant)	$ 92,686.00	
Subtotal	$ 95,966.00	
WSRCD Indirect Costs @ 18%	$ 17,273.88	
Total Project	**$113,239.88**	

TASKS	ENTITY	HOURS	MILEAGE
1. Obtain aerial photography	Consultant	N/A	N/A
2. Watershed field reconnaissance	Consultant	32 hours (Photo Interpreter 16 / Botanist 16)	400
3. Map brush and ladder fuel densities using aerial photos	Consultant	160 hours (Photo Interpreter)	N/A
4. Arrange access to private lands	WSRCD	80 hours (Project Coordinator)	N/A
5. Ground truthing	Consultant	80 hours (Photo Interpreter 68 / Botanist 12)	2,000
6. Compile data into a GIS database	Consultant	160 hours (GIS Technician)	N/A
7. Report preparation	Consultant	60 hours (Botanist)	N/A
8. Project coordination	WSRCD	80 hours (Project Coordinator)	N/A
Note: The aerial photography cost is identical to the cost outlined in Objectives 3.1a, 3.1b and 3.1d. The cost can eliminated if funded through one of the other three objectives.			
Note: The photography cost can be reduced by approximately 50% by eliminating non-conifer forest communities of the watershed.			

Botanical and Wildlife Resources - Cow Creek WMP

Objective 3.1 d (Riparian Vegetation Inventory)

CONSULTANT

Item	Amount	Detail
Botanist	$ 8,400.00	$75.00/hr X 112 hrs = $8,400
Aerial Photos	$ 57,000.00	Stereo-paired color infrared photos of the entire watershed with I set of 9" x 9" contact prints and scanned digital images
Photo Interpreter	$ 12,420.00	$45/hr X 276 hrs = $12,420
GIS Technician	$ 7,200.00	$45/hr X 160 hrs = $7,200
Mileage / Travel	$ 925.00	1,850 miles @ $0.50 = $ 925
Printing/Photocopy/etc.	$ 2,000.00	100 copies of final report w/ maps @ $20.00 = $2,000
Consultant Subtotal	$ 87,945.00	
Project Management @ 10%	$ 8,794.50	
Consultant Total	$ 96,739.50	

WESTERN SHASTA RESOURCE CONSERVATION DISTRICT

Item	Amount	Detail
Project Coordinator	$ 3,280.00	$20.50/hr X 160 hrs = $3,280
Professional Services (Consultant)	$ 96,739.50	
Subtotal	$ 100,019.50	
WSRCD Indirect Costs @ 18%	$ 18,003.51	
Total Project	**$118,023.01**	

TASKS	ENTITY	HOURS	MILEAGE
1. Obtain aerial photography	Consultant	N/A	N/A
2. Watershed field reconnaissance	Consultant	32 hours (Photo Interpreter 16 / Botanist 16)	350
3. Develop riparian vegetation classification system	Consultant	16 hours (Botanist)	N/A
3. Map riparian vegetation using aerial photos	Consultant	200 hours (Photo Interpreter)	N/A
4. Arrange access to private lands	WSRCD	80 hours (Project Coordinator)	N/A
5. Ground truthing	Consultant	80 hours (Photo Interpreter 60 / Botanist 20)	1,500
6. Compile data into a GIS database	Consultant	160 hours (GIS Technician)	N/A
7. Report preparation	Consultant	60 hours (Botanist)	N/A
8. Project coordination	WSRCD	80 hours (Project Coordinator)	N/A

Note: The aerial photography cost is identical to the cost outlined in Objectives 3.1a, 3.1b and 3.1c. The cost can eliminated if funded through one of the other three objectives.

Botanical and Wildlife Resources - Cow Creek WMP

Objective 3.3 a (Riparian Health Habitat Assessment)

CONSULTANT

Item	Amount	Detail
Wildlife Biologist	$ 22,780.00	$85.00/hr X 268 hrs = $22,780
GIS Technician	$ 3,600.00	$45/hr X 80 hrs = $3,600
Aerial Photos	$ 57,000.00	Stereo-paired color infared photos of the entire watershed with 1 set of 9" x 9" contact prints and scanned digital images.
Mileage / Travel	$ 725.00	1,500 miles @ $0.50 = $750
Printing/Photocopy/etc.	$ 2,000.00	100 copies of final report w/ maps @ $20.00 = $2,000
Consultant Subtotal	$ 86,105.00	
Project Management @ 10%	$ 8,610.50	
Consultant Total	$ 94,715.50	

WESTERN SHASTA RESOURCE CONSERVATION DISTRICT

Item	Amount	Detail
Project Coordinator	$ 3,280.00	$20.50/hr X 160 hrs = $3,280
Professional Services (Consultant)	$ 94,715.50	
Subtotal	$ 97,995.50	
WSRCD Indirect Costs @ 18%	$ 17,639.19	
Total Project	**$115,634.69**	

TASKS	ENTITY	HOURS	MILEAGE
1. Develop draft ranking system to evaluate riparian habitat potential and existing riparian health	Consultant	16 hours (Wildlife Biologist)	N/A
2. Meet with TAC & revise ranking system	Consultant	12 hours (Wildlife Biologist)	N/A
3. Map potential riparian habitat restoration areas using aerial photos	Consultant	60 hours (Wildlife Biologist)	N/A
4. Arrange access to private lands	WSRCD	80 hours (Project Coordinator)	N/A
5. Ground truthing of potential riparian habitat restoration areas identified in Task 1	Consultant	40 hours (Wildlife Biologist)	500
6. Assess the health of accessible existing riparian areas mapped in Objective 3.1d	Consultant	80 hours (Wildlife Biologist)	1,000
7. Compile data into a GIS database	Consultant	80 hours (GIS Technician)	N/A
8. Report preparation	Consultant	60 hours (Wildlife Biologist)	N/A
9. Project coordination	WSRCD	80 hours (Project Coordinator)	N/A

Note: Project tasks and costs assume that Objective 3.1d. (Riparian Vegetation Inventory) has been completed.

Botanical and Wildlife Resources - Cow Creek WMP

Objective 3.3 b (Long-term Riparian Habitat Monitoring)

CONSULTANT

One-time Costs

Item	Amount	Detail
Wildlife Biologist	$ 6,970.00	$85.00/hr X 82 hrs = $6,970
GIS Technician	$ 1,080.00	$45/hr X 24 hrs = $1,080
Mileage / Travel	$ 200.00	400 miles @ $0.50 = $200
Printing/Photocopy/etc.	$ 2,000.00	100 copies of final report w/ maps @ $20.00 = $2,000
Consultant Subtotal	$ 10,250.00	
Project Management @ 10%	$ 1,025.00	
Consultant Total	$ 11,275.00	

Annual Costs

Item	Amount	Detail
Wildlife Biologist (Vegetation Monitoring)	$ 14,875.00	$85.00/hr X 175 hrs = $13,125
Wildlife Biologist (Avian Monitoring)	$ 25,500.00	$85.00/hr X 300 hrs = $25,500
Mileage / Travel	$ 700.00	1,400 miles @ $0.50 = $700
Printing/Photocopy/etc.	$ 4,000.00	200 copies of final reports w/ maps @ $20.00 = $4,000
Consultant Subtotal	$ 45,075.00	
Project Management @ 10%	$ 4,507.50	
Consultant Total	$ 49,582.50	

WESTERN SHASTA RESOURCE CONSERVATION DISTRICT

One-time Costs

Item	Amount	Detail
Project Coordinator	$ 1,640.00	$20.50/hr X 80 hrs = $1,640
Professional Services (Consultant)	$ 11,275.00	
Subtotal	$ 12,915.00	
WSRCD Indirect Costs @ 18%	$ 2,324.70	
Total Project	**$ 15,239.70**	

Annual Costs

Item	Amount	Detail
Project Coordinator	$ 1,640.00	$20.50/hr X 80 hrs = $1,640
Professional Services (Consultant)	$ 49,582.50	
Subtotal	$ 51,222.50	
WSRCD Indirect Costs @ 18%	$ 9,220.05	
Total Project	**$ 60,442.55**	

TASKS	ENTITY	HOURS	MILEAGE
1. Develop draft riparian watershed monitoring plan	Consultant	86 hours (Wildlife Biologist 70 / GIS Technician 16)	400
2. Meet with TAC & revise riparian watershed monitoring plan	Consultant	20 hours (Wildlife Biologist 12 / GIS Technician 8)	N/A
3. Arrange access to private lands	WSRCD	80 hours (Watershed Coordinator)	N/A
4. Collect annual vegetation monitoring data at riparian rehabilitation sites following implementation of rehabilitation project. Analyze data and produce baseline report.	Consultant	175 hours (Wildlife Biologist)	400
5. Collect annual avian monitoring data at riparian rehabilitation sites following implementation of rehabilitation project. Analyze data and produce baseline report.	Consultant	300 hours (Wildlife Biologist)	1,000
6. Annual project coordination	WSRCD	80 hours (Watershed Coordinator)	N/A

Note: Project cost estimate and annual cost based on 1 rehabilitation project.

Note: Tasks 1, 2 & 3 are one time costs.

Note: Tasks 4, 5 & 6 are annual costs per rehabilitation project.

Botanical and Wildlife Resources - Cow Creek WMP

Objective 3.3 c (Riparian Habitat Rehabilitation Projects)

CONSULTANT

Item	Amount	Detail
Site Assessment	$ 7,500.00	$750/acre X 10 acres = $7,500
Design and Bid Documents	$ 20,000.00	$2,000/acre X 10 acres = $20,000
Environmental Permits	$ 15,000.00	$1,500/acre X 10 acres = $15,000
Consultant Total	$ 42,500.00	

CONTRACTOR

Item	Amount	Detail
Project Installation	$ 100,000.00	$10,000/acre X 10 acres = $100,000
Contingency @ 10%	$ 10,000.00	
Consultant Total	$ 110,000.00	

WESTERN SHASTA RESOURCE CONSERVATION DISTRICT

Item	Amount	Detail
Project Coordinator	$ 1,640.00	$20.50/hr X 80 hrs = $1,640
Project Maintenance	$ 10,000.00	$1,000/acre X 10 acres = $10,000
Professional Services (Consultant)	$ 42,500.00	
Professional Services (Contractor)	$ 110,000.00	
Subtotal	$ 164,140.00	
Project Management @ 10%	$ 16,414.00	
Subtotal	$ 180,554.00	
WSRCD Indirect Costs @ 18%	$ 32,499.72	
Total Project	**$213,053.72**	

TASKS	ENTITY	COST/ACRE	
1. Conduct riparian rehabilitation site assessment	Consultant	$750	
2. Design riparian rehabilitation project and prepare bid documents	Consultant	$2,000	
3. Aquire environmental permits	Consultant	$1,500	
4. Implement riparian rehabilitation project	Contractor	$10,000	
5. Maintain riparian rehabilitation project (irrigation, weeding, etc. for 3 years)	WSRCD	$1,000	

Note: Project tasks and costs are based on a 10 acre rehabilitation project involving planting riparian vegetation and installing an irrigation system with no significant earthwork.

Botanical and Wildlife Resources - Cow Creek WMP

Objective 3.3 d (Riparian Health Best Management Practices Development)

CONSULTANT

Item	Amount	Detail
Biologist/Botanist	$ 8,960.00	$80.00/hr X 112 hrs = $8,960
Graphic Artist	$ 2,160.00	$90.00/hr X 24 hrs = $2,160
Mileage / Travel	$ 50.00	100 miles @ $0.50 = $50
Printing/Photocopy/etc.	$ 5,000.00	1,000 copies of BMP brochure @ $5.00 = $5,000
Consultant Subtotal	$ 16,170.00	
Project Management @ 10%	$ 1,617.00	
Consultant Total	$ 17,787.00	

WESTERN SHASTA RESOURCE CONSERVATION DISTRICT

Item	Amount	Detail
Project Coordinator	$ 1,230.00	$20.50/hr X 60 hrs = $1,230
Professional Services (Consultant)	$ 17,787.00	
Subtotal	$ 19,017.00	
WSRCD Indirect Costs @ 18%	$ 3,423.06	
Total Project	**$ 22,440.06**	

TASKS	ENTITY	HOURS	MILEAGE
1. Develop draft list of riparian health impairments and a draft list of BMPs to address each impairment	Consultant	24 hours (Biologist/Botanist)	100
2. Meet with TAC & revise list of impairments and BMPs	Consultant	8 hours (Biologist/Botanist)	N/A
3. Fully develop all BMPs and produce draft landowner riparian health BMP brochure	Consultant	84 hours (Biologist/Botanist 60 / Graphic Artist 24)	N/A
4. Meet with TAC & revise landowner riparian health BMP brochure	Consultant	20 hours (Biologist/Botanist)	N/A
5. Encourage landowners to implement BMPs	WSRCD		
6. Project coordination	WSRCD	60 hours (Project Coordinator)	N/A

Note: WSRCD to complete Task 5 costs.

Botanical and Wildlife Resources - Cow Creek WMP		
Objective 3.4 a (Detrimental Non-native Species Assessment)		
Consultant		
Item	**Amount**	**Detail**
Botanist/Biologist	$ 20,160.00	$80.00/hr X 252 hrs = $20,160
GIS Technician	$ 5,400.00	$45/hr X 120 hrs = $5,400
Printing/Photocopy/etc.	$ 2,000.00	100 copies of final report w/ maps @ $20.00 = $2,000
Consultant Subtotal	$ 27,560.00	
Project Management @ 10%	$ 2,756.00	
Consultant Total	$ 30,316.00	(does not include inventory @ $16.00/acre)
Western Shasta Resource Conservation District		
Item	**Amount**	**Detail**
Watershed Coordinator	$ 470.00	$23.50/hr X 20 hrs = $470
Project Coordinator	$ 3,280.00	$20.50/hr X 160 hrs = $3,280
Clerical	$ 1,200.00	$15.00/hr X 80 hrs = $1,200
Stationary Supplies / Postage	$ 2,250.00	Survey mailings 1,500 @ $1.50 each = $2,250
Professional Services (Consultant)	$ 30,316.00	
Subtotal	$ 37,516.00	
WSRCD Indirect Costs @ 18%	$ 6,752.88	
Total Project	**$ 44,268.88**	**(does not include inventory @ $18.88/acre including WSRCD indirect costs)**

TASKS	ENTITY	HOURS	MILEAGE
1. Develop draft list of existing detrimental non-native plant and animal species to be assessed	Consultant	32 hours (Biologist/Botanist)	N/A
2. Meet with TAC & revise list of detrimental non-native species assessment list	Consultant	20 hours (Biologist/Botanist)	N/A
3. Conduct survey of landowners/managers about known locations and population estimates of detrimental non-native plant and animal species	WSRCD	100 hours (Clerical 80 / Watershed Coordinator 20)	N/A
4. Arrange access to private lands	WSRCD	80 hours (Project Coordinator)	N/A
5. Inventory of private and public lands	Consultant	$16/acre (Botanist & Wildlife Biologist)	included in hourly rate
6. Map known locations and derive population estimates of detrimental non-native plant and animal species from survey and inventory	Consultant	120 hours (Biologist/Botanist)	N/A
7. Compile data into a GIS database	Consultant	120 hours (GIS Technician)	N/A
8. Report preparation	Consultant	80 hours (Biologist/Botanist)	N/A
9. Project coordination	WSRCD	80 hours (Project Coordinator)	N/A

Note: Inventory per acre cost assumes a range of property sizes

Botanical and Wildlife Resources - Cow Creek WMP

Objective 3.4 b (Detrimental Non-native Species Eradication/Control Strategy Development)

CONSULTANT

Item	Amount	Detail
Biologist/Botanist	$ 13,760.00	$80.00/hr X 172 hrs = $13,760
Printing/Photocopy/etc.	$ 1,500.00	100 copies of final report @ $15.00 = $1,500
Consultant Subtotal	$ 15,260.00	
Project Management @ 10%	$ 1,526.00	
Consultant Total	$ 16,786.00	

WESTERN SHASTA RESOURCE CONSERVATION DISTRICT

Item	Amount	Detail
Project Coordinator	$ 1,640.00	$20.50/hr X 80 hrs = $1,640
Professional Services (Consultant)	$ 16,786.00	
Subtotal	$ 18,426.00	
WSRCD Indirect Costs @ 18%	$ 3,316.68	
Total Project	**$ 21,742.68**	

TASKS	ENTITY	HOURS	MILEAGE
1. Develop draft management strategies to eradicate and/or control existing detrimental non-native species identified in Objective 3.4a	Consultant	100 hours (Biologist/Botanist)	N/A
2. Meet with TAC & revise non-native species eradication/control management strategies	Consultant	24 hours (Biologist/Botanist)	N/A
3. Report preparation	Consultant	48 hours (Biologist/Botanist)	N/A
4. Project coordination	WSRCD	80 hours (Project Coordinator)	N/A

Note: Project tasks and budget assumes that Objective 3.4a has been completed.

Botanical and Wildlife Resources - Cow Creek WMP

Objective 3.4 c (Strategic Plan to Prevent Detrimental Non-native Species Entry)

CONSULTANT

Item	Amount	Detail
Biologist/Botanist	$ 9,600.00	$80.00/hr X 120 hrs = $9,600
Printing/Photocopy/etc.	$ 1,500.00	100 copies of final strategic plan @ $15.00 = $1,500
Consultant Subtotal	$ 11,100.00	
Project Management @ 10%	$ 1,110.00	
Consultant Total	$ 12,210.00	

WESTERN SHASTA RESOURCE CONSERVATION DISTRICT

Item	Amount	Detail
Project Coordinator	$ 1,640.00	$20.50/hr X 80 hrs = $1,640
Professional Services (Consultant)	$ 12,210.00	
Subtotal	$ 13,850.00	
WSRCD Indirect Costs @ 18%	$ 2,493.00	
Total Project	**$ 16,343.00**	

TASKS	ENTITY	HOURS	MILEAGE
1. Develop draft list of detrimental non-native plant and animal species to be included in plan	Consultant	24 hours (Biologist/Botanist)	N/A
2. Meet with TAC & revise list of detrimental non-native species	Consultant	12 hours (Biologist/Botanist)	N/A
3. Develop draft strategic plan	Consultant	60 hours (Biologist/Botanist)	N/A
4. Meet with TAC & revise strategic plan	Consultant	24 hours (Biologist/Botanist)	N/A
5. Project coordination	WSRCD	80 hours (Project Coordinator)	N/A

Fire Prevention and Fuels Management

FP-1 Develop a watershed fuels inventory, map vegetation cover types and the Distribution of these types within the watershed, including vegetation Relative to slope, aspect, elevation, and land use.

FP-2 Implement shaded fuelbreak and community fuel reduction projects using a mixture of equipment and handwork, utilizing commercial timber harvest, biomass harvest, chippers, masticators, and other ground-based equipment.

NOTE: The difference between the high cost and low cost estimates are the Maximum variations in using WSRCD crews vs. CDF crews vs. masticators.

S(a) Oak Run Fuelbreak (611 acres) – an 18-mile long roadside shaded fuelbreak starting at the intersection of Highway 299 to a point south of Palo Cedro, 300-feet wide using the centerline of Oak Run Road. This fuelbreak will provide the start of a north-south fuelbreak that will begin to divide the Cow Creek watershed, helping to keep fire from spreading up the watershed into heavier fuels. This fuelbreak will be perpendicular to prevailing winds in most locations.
Low Cost Estimate: $546,845 High Cost Estimate: $1,318,538

S(b) Oak Run to Fern Road Fuelbreak (550 acres) – a 16.2 mile long roadside shaded fuelbreak starting at the intersection of Whitmore Road and running north and then west to the intersection of Oak Run Road, 300-feet wide from the centerline of Oak Run to Fern Road. This area is located in an area with little fuel reduction activities in the past and this will provide a critical first step in providing a strategic fuel reduction project and is perpendicular to prevailing winds.
Low Cost Estimate: $492,250 High Cost Estimate: $1,186,900

S(c) Fern Road East Fuelbreak (261 acres) – a 7.7-mile long roadside shaded fuelbreak starting at the intersection of Whitmore Road and running north and then west to the intersection of Oak Run to Fern Road, 300-feet wide using Fern Road East as the centerline. This project links to the Oak Run to Fern Road fuelbreak, providing a continuous fuelbreak from Highway 299 to Whitmore Road and is perpendicular to prevailing winds.
Low Cost Estimate: $233,595 High Cost Estimate: $563,238

S(d) Phillips Road Fuelbreak (248 acres) – a 7.3-mile long roadside shaded fuelbreak starting at the intersection of Buzzards Roost Road and running south to the intersection of Oak Run to Fern Road, 300-feet wide using Phillips Road as the centerline. This provides another north-south fuelbreak that is predominantly within mixed conifer forests and perpendicular to prevailing winds.
Low Cost Estimate: $221,960 High Cost Estimate: $535,184

S(e) Buzzards Roost Road Fuelbreak (204 acres) – a 6-mile long roadside shaded fuelbreak starting at the intersection of Highway 299 near Round Mountain and running

west to the intersection of Oak Run Road, 300-feet wide using Buzzards Roost Road as the centerline.
Low Cost Estimate: $182,580 **High Cost Estimate: $440,232**

S(f) Bateman Road Fuelbreak (424 acres) – a 12.5-mile long roadside shaded fuelbreak starting at the intersection of Tamarack Road east of Whitmore and running east to the Latour State Demonstration Forest and the head of the watershed, 300-feet wide using Bateman Road as the centerline. It provides an east-west fuelbreak through commercial timberlands that can have extremely active fire behavior and very high fire severity.
Low Cost Estimate: $379,480 **High Cost Estimate: $914,992**

S(g) Ponderosa Way Fuelbreak (187 acres) – a 5.5-mile long roadside shaded fuelbreak starting at the intersection of Whitmore Road and running south the ridgeline between South Cow Creek and Bear Creek, 300-feet wide using Ponderosa Way as the centerline. This maintains an existing and effective fuelbreak on the southern end of the watershed and provides a connecting link in the cross-watershed fuelbreak system, which is perpendicular to prevailing winds.
Low Cost Estimate: $167,365 **High Cost Estimate: $403,546**

S(h) Tamarack Road Fuelbreak (373 acres) – an 11-mile long roadside shaded fuelbreak starting at the intersection of Whitmore Road and Fern Road East and runs east to the ridgeline, 300' wide using Tamarack Road as the centerline. It develops a fuelbreak through the southeastern portion of the watershed, and ties into other proposed fuelbreaks, providing protection to forest resources in the upper watershed.
Low Cost Estimate: $333,835 **High Cost Estimate: $804,934**

S(i) Whitmore Road Fuelbreak (576 acres) – a 17-mile long roadside shaded fuelbreak starting at the community of Millville and running east to the intersection of Fern Road East and Tamarack Road, just east of the community of Whitmore, 300-feet wide using Whitmore Road as the centerline. This provides a significant east-west fuelbreak from Millville to Whitmore, effectively bisecting the southern 1/3 of the watershed.
Low Cost Estimate: $515,520 **High Cost Estimate: $1,243,008**

S(j) Highway 299 Fuelbreak (803 acres) (allows for a 35 foot road width) **–** a 25-mile east-west highway through the northern most portion of the watershed, providing a key location for fire suppression activities.
Low Cost Estimate: $718,685 **High Cost Estimate: $1,732,874**

C(a) Round Mountain Community Fuels Reduction – Fuels reduction activities around the Cedar Creek School, Mountain Community Center and Halcomb Cemetery.
2 ½ miles, 300 feet wide **5 miles, 300 feet wide**
Low Cost Estimate: $81,445 **High Cost Estimate: $392,756**

C(b) Oak Run Community Fuels Reduction – Fuels reduction activities around the Post Office, shopping center and the Oak Run School.

2 ½ miles, 300 feet wide	**5 miles, 300 feet wide**
Low Cost Estimate: $81,445	**High Cost Estimate: $392,756**

C(c) Whitmore Community Fuels Reduction – Fuels reduction activities around the Whitmore School, Post Office, store and volunteer fire department.

2 ½ miles, 300 feet wide	**5 miles, 300 feet wide**
Low Cost Estimate: $81,445	**High Cost Estimate: $392,756**

C(d) Millville Community Fuels Reduction - Fuels reduction activities around the volunteer fire department, Masonic Lodge, and Millville School.

2 ½ miles, 300 feet wide	**5 miles, 300 feet wide**
Low Cost Estimate: $81,445	**High Cost Estimate: $392,756**

C(e) Bella Vista Community Fuels Reduction – Fuels reduction activities around the Post Office and volunteer fire department.

2 ½ miles, 300 feet wide	**5 miles, 300 feet wide**
Low Cost Estimate: $81,445	**High Cost Estimate: $392,756**

C(f) Jones Valley Community Fuel Reduction – fuels reduction activities around the community of Jones Valley.

2 ½ miles, 300 feet wide	**5 miles, 300 feet wide**
Low Cost Estimate: $81,445	**High Cost Estimate: $392,756**

FERN ROAD EAST SHADED FUELBREAK

RCD	Rate (hourly)	Hours	Cost	Benefits	TOTAL
Project Manager	$ 22.00	356.0	$ 7,832.00	$2,506.24	$ 10,338.24
Project Coordinator	$ 19.00	534.0	$ 10,146.00	$3,246.72	$ 13,392.72
Lead Technician	$ 12.00	2990.4	$ 35,884.80	$11,483.14	$ 47,367.94
5 Laborers	$ 47.50	2848.0	$ 135,280.00	$43,289.60	$ 178,569.60
Secretary	$ 9.50	178.0	$ 1,691.00	$541.12	$ 2,232.12

Working days	Crew Days
RCD	356

CDF	Crew Cost	Crew Days	TOTAL
Inmates	$160/day	100	$ 16,000.00

CDF Expenses	Rate	Usage	Cost/Day	Crew Days	TOTAL
Burn Mix	$2/gal	10 gal/day	$20.00	100	$ 2,000.00

EXPENSES	Rate	Usage	Cost/Day	Crew Days	TOTAL
Field Supplies	NA	NA	$20.00	356	$ 7,120.00
Saw Gas	$3.50	4 gal/day	$14.00	356	$ 4,984.00
Bar Oil	$4.00	1.5 gal/day	$6.00	356	$ 2,136.00

TRAVEL	R.T. Miles	Rate	Miles/Day*	Crew Days	TOTAL
Mileage	75	$.375/mile	90.0	356	$ 11,534.40
Fuel					$ 2,136.00

MISC.	Est.# of Owners			Crew Days	TOTAL
Communication	NA			356	$ 745.12
Office Supplies	60			NA	$ 177.60
Postage	60			NA	$ 88.80
Chipper			$150/day	239	$ 35,778.00
Chipper Fuel		$15/day			$ 3,577.80
Permitting	CEQA=$25	ARCH=$125			$ 25.00
Other					

PROJECT TOTAL	$ 338,203.33
ADMIN. (18%)	$ 60,876.60
GRAND TOTAL	$ 399,079.93

* includes 20% over run for maint. and project mgmt. site visits

November 2004

PHILLIPS ROAD SHADED FUELBREAK

RCD	Rate (hourly)	Hours	Cost	Benefits	TOTAL
Project Manager	$ 22.00	315.0	$ 6,930.00	$2,217.60	$ 9,147.60
Project Coordinator	$ 19.00	472.5	$ 8,977.50	$2,872.80	$ 11,850.30
Lead Technician	$ 12.00	2646.0	$ 31,752.00	$10,160.64	$ 41,912.64
5 Laborers	$ 47.50	2520.0	$ 119,700.00	$38,304.00	$ 158,004.00
Secretary	$ 9.50	157.5	$ 1,496.25	$478.80	$ 1,975.05

Working days	Crew Days
RCD	315

CDF	Crew Cost	Crew Days	TOTAL
Inmates	$160/day	100	$ 16,000.00

CDF Expenses	Rate	Usage	Cost/Day	Crew Days	TOTAL
Burn Mix	$2/gal	10 gal/day	$20.00	100	$ 2,000.00

EXPENSES	Rate	Usage	Cost/Day	Crew Days	TOTAL
Field Supplies	NA	NA	$20.00	315	$ 6,300.00
Saw Gas	$3.50	4 gal/day	$14.00	315	$ 4,410.00
Bar Oil	$4.00	1.5 gal/day	$6.00	315	$ 1,890.00

TRAVEL	R.T. Miles	Rate	Miles/Day*	Crew Days	TOTAL
Mileage	92	$.375/mile	110.4	315	$ 12,519.36
Fuel					$ 2,318.40

MISC.	Est.# of Owners			Crew Days	TOTAL
Communication	NA			315	$ 659.30
Office Supplies	50			NA	$ 148.00
Postage	50			NA	$ 74.00
Chipper			$150/day	211	$ 31,657.50
Chipper Fuel		$15/day			$ 3,165.75
Permitting	CEQA=$25	ARCH=$125			$ 25.00
Other					

PROJECT TOTAL	$ 304,056.90
ADMIN. (18%)	$ 54,730.24
GRAND TOTAL	$ 358,787.14

* includes 20% over run for maint. and project mgmt. site visits

BUZZARD ROOST ROAD

6 MILE ROAD SEGMENT,
300 FOOT CORRIDOR CHIPPED BY WSRCD

RCD	Rate (hourly)	Hours	Cost	Benefits	TOTAL
Project Manager	$ 22.00	70.0	$ 1,540.00	$492.80	$ 2,032.80
Project Coordinator	$ 19.00	105.0	$ 1,995.00	$638.40	$ 2,633.40
Lead Technician	$ 12.00	588.0	$ 7,056.00	$2,257.92	$ 9,313.92
3 Laborers	$ 28.50	560.0	$ 15,960.00	$5,107.20	$ 21,067.20
Secretary	$ 9.50	35.0	$ 332.50	$106.40	$ 438.90

Working days	Crew Days
RCD	70

CDF	Crew Cost	Crew Days	TOTAL
Inmates	$160/day		$ -

CDF Expenses	Rate	Usage	Cost/Day	Crew Days	TOTAL
Burn Mix	$2/gal	10 gal/day	$20.00	0	$ -

EXPENSES	Rate	Usage	Cost/Day	Crew Days	TOTAL
Field Supplies	NA	NA	$25.00	70	$ 1,750.00
Saw Gas	$3.50	4 gal/day	$14.00	70	$ 980.00
Bar Oil	$4.00	1.5 gal/day	$6.00	70	$ 420.00

TRAVEL	R.T. Miles	Rate	Miles/Day*	Crew Days	TOTAL
Mileage	60	$.375/mile	72.0	70	$ 1,814.40
Fuel					$ 336.00

MISC.	Est.# of Owners			Crew Days	TOTAL
Communication	NA			70	$ 146.51
Office Supplies	10			NA	$ 29.60
Postage	10			NA	$ 14.80
Chipper			$150/day	47	$ 7,035.00
Chipper Fuel		$15/day			$ 703.50
Permitting	CEQA=$25	ARCH=$125			$ 25.00
Other					

PROJECT TOTAL	$ 48,741.03
ADMIN. (18%)	$ 8,773.39
GRAND TOTAL	$ 57,514.42

* includes 20% over run for maint. and project mgmt. site visits

Education and Outreach

EO-1 Promote awareness of and increase participation in CCWMG by showing the relationship between CCWMG projects and the resulting benefits to Cow Creek watershed residents, businesses, and industries.

a. Develop public outreach programs to educate Cow Creek watershed residents about the efforts of the CCWMG to maintain and improve Cow Creek watershed health.

Watershed Coordinator writes weekly newspaper articles on watershed issues; annual reports written and printed on the CCWMG mailed to residents of the watershed; information booth set up at 4 community events/year; handouts written and printed for distribution at community events; quarterly newsletters about projects written, printed and mailed to residents (est. 1200). Expenses estimated:

Watershed Coordinator	$47,002	($36,720 + taxes and benefits = $47,002)
Mileage reimbursement	2,025	
Supplies	8,000	
Postage	3,500	
Printing	6,000	
Booth & Displays	1,200	
Communication/phone	240	
Indirect	12,234	
Total	$80,201/year	

b. Increase posting of Cow Creek Watershed maps and signage throughout the watershed and particularly near CCWMG projects.

Labor	$ 3,952
Semi-annual laminated maps for display	550
Metal creek signs on posts	5,500
Mileage Reimbursement	577
Indirect	1,904
Total	$12,483/year

EO-2 Promote, provide and facilitate watershed management education and outreach opportunities.

a. Facilitate classroom, field workshops and exhibits at community events to educate Cow Creek Watershed landowners and residents about Best Management Practices in relation to common land use practices, including fire safety, proper septic system design, use and testing; noxious weed identification and control; proper use of fertilizers and pesticides; management of impervious surface runoff and other hazardous runoff to creeks; water conservation; fish passage needs.

b. Connect landowners with WSRCD, NRCS, and UC Extension Service for assistance with project design and development, farm and ranch plans.

c. Assemble an agency database.

d. Develop an agency contact information director with guidelines that inform landowners which practices require permits.

e. Develop a library of information containing web site addresses, UC Extension Service brochures, classes, areas of expertise, and native plant recommendations.

f. Provide fire prevention and fuels management educational exhibits of the Cow Creek Fire Safe Council and the Shasta County Fire Save council at local events.

Expenses estimated:

Watershed Coordinator	$47,002	($36,720 + taxes and benefits = $47,002)
Mileage reimbursement	2,025	
Supplies	8,000	
Postage	3,500	
Printing	6,000	
Booth & Displays	1,200	
Communication/phone	240	
Indirect	12,234	
Total	$80,201/year	

EO-3 Promote, provide and facilitate watershed management education and outreach opportunities for area school children.

a. Promote, support, and encourage watershed management educational activities in community schools within the Cow Creek Watershed.

b. In partnership with willing landowners, WSRCD, and local schools, create a watershed management curriculum which will encourage conservation of natural resources and preservation of the economic well-being of Cow Creek Watershed residents. Curriculum could include water monitoring, native plant propagation, and the importance of riparian areas.

Expenses estimated:

Labor	$ 3,952
Mileage reimbursement	577
Supplies	550
Professional Services	8,160
Printing	18,000
Indirect	5,623
Total	$ 36,862/year

VII. Potential Funding Sources

Water Quality and Quantity

California Department of Water Resources, Proposition 50 for Water Use Efficiency Grants
This program supports actions that improve in-stream flow and timing, water quantity and water quality that directly or indirectly provides benefits to the Bay-Delta. Funds are from the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002.

California Department of Water Resources, Proposition 40 for Urban Stream Restoration Projects.
This program supports actions that reduce property damage caused by flooding and bank erosion, projects that restore the natural value of streams, and promotes community stewardship. Funds are from the California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002.

State Water Resources Control Board
Prop 13, Costa-Machado Water Act of 2000 and the California Nonpoint Source Pollution Control Board.

The Integrated Regional Water Management (IRWM) Grant Program
Funded by Proposition 50, Chapter 8, provides about $380 million for competitive grants for projects to protect communities from drought, protect and improve water quality, and improve local water security by reducing dependence on imported water

USDA Natural Resource Conservation Service, Conservation Innovation Grants
For the implementation of new technologies and/or approaches to maintain, restore, or enhance water quality and/or quantity in watersheds with predominantly agricultural land uses while sustaining productivity.

U. S. Environmental Protection Agency, Assessment and Watershed Protection Program Grants.
For projects that promote the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution.

Fisheries

U. S. Fish and Wildlife Service, Anadromous Fisheries Restoration Program
Starting in FY 2001, the AFRP is functionally integrated with the CALFED Bay-Delta Program (CBDP) agencies (the California Department of Fish and Game, the U.S. Fish and Wildlife Service and NOAA Fisheries) through the California Bay-Delta Authority (CBDA) in the CALFED Ecosystem Restoration Program proposal solicitation processes (CALFED PSP).

NOAA – Five-Star Challenge Grants
Established by the EPA to work with partners for education through community-based wetlands restoration projects in watersheds across the U. S. Average project funding is $10,000 per project. Requires 100% match.

Wildlife Resources

U.S. Fish and Wildlife Service, North American Wetlands Conservation Act
Provides funding assistance to promote conservation of wetlands and associated habitats for migratory birds and other wildlife. Requires 50% match.

U. S. Fish and Wildlife Service, Cooperative conservation Initiative
Restoring natural resources and establishing or expanding wildlife habitat. Requires 50%match.

U.S. Fish and Wildlife Service, Neotropical Migratory Bird Conservation Fund
Ensuring neotropical bird conservation by supporting programs. Requires 75% match.

Fire Prevention and Fuels Management

California Department of Forestry and Fire Protection, Forest Stewardship Program
Cost share up to $50,000 with a 100% match. Projects must address pre-fire fuels management, forest and woodland health or wildlife and fisheries habitat.

California Department of Forestry and Fire Protection, Vegetation Management Program
Funding available up to 90%, cost share required. Development of a plan for the control of brush and other vegetation through the use of prescribed fire. 50-acre minimum project size is required and development of a vegetation management plan.

California Department of Forestry and Fire Protection, California Forest Improvement Program
Funding for 75% of project, up to $30,000 of project costs. Provides forestry, watershed and riparian protection and enhancement. Landowners must have a plan developed and the smallest acreage allowed is 20 acres.

Natural Resources Conservation Service, Environmental Quality Incentives Program
Funding up to 75% of the project costs with a maximum of $10,000/year. Provides assistance to agricultural producers having significant natural resource needs. Projects must have an approved conservation plan.

USDA Forest Service, National Association of State Foresters, State Fire Assistance Program
Amounts vary by project and available funding. Provides state agencies with assistance in delivering coordinated fire service as well as hazard assessments, fuel treatment projects and public education.

USDA Forest Service, Economic Action Programs
Amounts vary by project and available funding. Provides funding work with local communities to identify, develop, and expand economic opportunities related to traditionally underutilized wood products and to expand the utilization of wood removed through hazardous fuel reduction treatments.

USDA Forest Service, Community and Private Land Fire Assistance Program

California Fire Safe Council Grants Clearinghouse
Funds are from the National Fire Plan and Prop 40 grants, through the California Fire Alliance. Funds are for developing community fire plans, fuels reduction projects, development of fire safe councils, wildfire prevention education, demonstration projects, technology transfer, market assessments, small diameter utilization plans, and purchasing processing equipment

U. S. Fish and Wildlife Service, Jobs-In-The-Woods Program

USDA Forest Service, Secure Rural School and Community Self Determination Act of 2000
Title II and Title III programs handled by the Shasta County Board of Supervisors

Education and Outreach

Funding for education and outreach are made part of every grant application shown above.

VIII. Key Contacts

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