Final Report:

Patterson Creek Enhancement Project

Implemented by:

Siskiyou Resource Conservation District

Funded By:

USFWS- Klamath River Restoration Act

Project # 2001-HR-01

Agreement # 113333-1-J002

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Abstract:
The Siskiyou Resource Conservation District (RCD) is a special district ran by a board of property owners who are working to address resource issues use within the Scott River watershed. Agriculture within Scott Valley has focused on beef cattle, wheat and alfalfa production. For over a decade, the Siskiyou RCD and the Scott River Watershed Council (SRWC) have worked together to develop and implement numerous projects that conserve the use of resources as well as improve management of property and livestock in Scott Valley.

The Patterson Creek Enhancement Project focused on a reach within Patterson Creek, a tributary to the Scott River. The reach has year-round flows that become very low in the summer but remain cool. The project reach currently has good conditions but could be significantly improved and protected with the installation of several components. Prior to implementation of the project, the reach had good riparian establishment and diversity, but management practices of an existing diversion had created an erosion site that had eroded through the riparian area and was unraveling the stream bank. The previous diversion method was to push up a gravel dam to divert water. The diversion operated for irrigation purposes until early July when flows decreased to the point that irrigation was not possible. From early July through the fall, the diversion was used to provide water for livestock. This required diverting most all of the remaining flows out of the stream. This diversion was one of two unscreened diversion in the project reach.

The Patterson Creek Enhancement Project was a multi-discipline enhancement project that will provide long-term benefit and protection for the project reach of Patterson Creek. The effort was funded by the USFWS, NRCS and CDFG. Significant in-kind labor was provided by participating property owners. The project focused on improving water quality and quantity by installing an efficient livestock watering system that eliminated the need to divert 1 cubic foot per second (cfs) of surface flow from Patterson Creek for the purpose of watering livestock. The project also improved in-stream habitat conditions in Paterson Creek by limiting bank erosion over 220 feet using large boulders and tress with root wads to enhance in-stream conditions. A vortex weir was also installed to create a plunge pool and as well as grade control. This was done to reduce the amount of in-stream activity that previously occurred in order to divert water. Two fish screens were installed on diversions off of Patterson Creek within the project reach to complete the project. Finally, 4/10 of an acre of riparian planting occurred within the project reach near the bank stabilization work. The project is an excellent example of using a comprehensive approach to address impacts and improve management. This report focuses on the project phases funded by the USFWS. Phases funded by the USFWS include the installation of the alternative stock watering system and the bank stabilization/in-stream enhancement components of the project.

Introduction:

The Siskiyou Resource Conservation District (RCD) is a special district run by a board of property owners who are working to address resource issues within the Scott River watershed. The current issue related to resource use revolves around anadromous fisheries and watershed health. The populations of anadromous fisheries have generally declined throughout the Pacific Northwest during the past several decades. Academia has found that water quality could be one of the limiting factors related to declining salmonid populations. The North Coast Regional Water Quality Control Board (NCRWQCB) has listed the Scott River has having two non-point source water quality impairments: excessive sediment and temperature levels at certain periods of the year. The NCRWQCB feels that insufficient flows have been one of the factors leading to high water temperatures during the late summer and early fall. Increased water quality is a goal of the Scott River Watershed Council (SRWC) and the Siskiyou RCD.

Project Area: The project area lies within the Valley floor of Scott Valley. The valley floor is largely rural and is dominated by agriculture. Agriculture within Scott Valley has focused on beef cattle, wheat and alfalfa production. For over a decade, the Siskiyou RCD and the Scott River Watershed Council (SRWC) have worked together to develop and implement numerous projects that conserve the use of resources as well as improve management of property and livestock in Scott Valley. Patterson Creek is a significant tributary to the Scott River. Patterson Creek goes dry below the alluvial fan (located at the base of the valley floor), during the summer and fall months, except for the project reach. The project reach is approximately 1.2 miles long and begins .6 miles below the HWY 3 Bridge.

The project reach possesses areas of excellent riparian condition that has been protected from livestock grazing through the Riparian CRP program administered by the NRCS. During the summer, the reach has cool year round summer flows. Sub-surface flows enter the project reach in the riparian area, and flow for about 1 mile, and then go subsurface again. The summer/fall flow volume through the reach is small, only several cubic feet per second, but it supports hundreds of juvenile Salmonids and is a valuable refugia. Prior to implementation of the project, the reach had good riparian establishment and diversity, but management practices of an existing diversion had created an erosion site that had eroded through the riparian area and was unraveling the stream bank. The previous diversion method was to push up a gravel dam to divert water. The diversion operated for irrigation purposes until early July when flows decreased to the point that irrigation was not possible. From early July through the fall, the diversion was used to provide water for livestock. This required diverting most all of the remaining flows out of the stream. This diversion was one of two unscreened diversion in the project reach.

Patterson Creek has been modified from the headwaters to the confluence with the Big Slough. Modifications include a major fire in the uplands that was immediately followed by the1955 flood, and several channel straightening programs. Even so, there are several reaches that provide quality habitat conditions for anadromous fish.

Issues Within Project Reach:

Several habitat issues needed to be addressed within the project reach. Two unscreened diversions diverted surface flow out of the project reach for irrigation. The two diversions were screened with funding from the California Department of Fish and Game and Bureau of Reclamation. The diversion users will maintain the screen for the life of the structure.

During the summer months and early fall, stream flows are too low to irrigate with yet there is enough flow to water livestock. Watering livestock with a surface flow diversion system designed for irrigation is inefficient but has been the historical practice that is provided for in the adjudication. The RCD realized the potential to increase in-stream flows in the summer by replacing the diversion's secondary use of watering livestock with an alternative system. By replacing the diversion with an alternative livestock watering system, in-stream flows could be doubled in volume during extreme low flow periods. An alternative livestock watering system does not replace the existing irrigation system, as the flood irrigation system is a good example of proper flood irrigation.

At least one cubic foot per second (CFS) was being taken out of Patterson Creek during the summer and fall solely for watering livestock. One cubic feet per second is over 680,000 gallons of water. On average there is 400-600 cattle on the diversion user's property in the summer. Each cow drinks up to 20 gallons per day for a total livestock requirement of 10,000 gallons (500 cattle X 20 gallons) per day. The diversion provides 68 times more flow then is required. Although one cubic foot per second (cfs) does not seem like a lot of water, in this situation (cold water) it provides significant benefit to the in-stream conditions during low flow. Only 1-2 cfs remain in the stream during minimum flow and it supports hundreds of anadromous juveniles. As the screens are installed, more fish will be occupying the same reach. The added flow will help support the increased numbers of fish saved by the screens and increase the holding capacity of the reach.

The third issue is the erosion of a stream bank that is damaging the multi-level riparian area. The riparian area had been reduced to a very thin width. High flows broke through the site's thin riparian band and began unraveling a well-vegetated meander. The erosion was occurring on the outside of a meander which provided an excellent opportunity to use the velocity of the stream to develop lateral scour pools and improve in-stream cover while limiting erosion and restoring riparian conditions. Large boulders and trees with root wads will provide both bank stabilization and in-stream enhancement.

Description of work funded by USFWS:

Alternative Livestock Watering System:

An alternative livestock watering system is an efficient watering system that utilizes pumped groundwater rather then surface water. The alternative livestock watering system transfers water directly to the watering troughs and no loss occurs. The RCD works with the landowner to design the livestock watering system. The intension of the watering system in this project is to replace the need to divert surface flows from Patterson Creek. The system would allow surface flow to remain in the stream, using groundwater as the watering source.

A typical alternative livestock watering system is designed and installed during the winter when stock water is plentiful and no irrigation will be taking place. Much of this system was constructed during the summer of 2001, because there was no irrigation water to contend with due to the drought. This project began with developing estimates and options to get electricity delivered to the site. The best option was to carry power from a neighboring property. Delivery of power to the proposed pump site was largely paid for by the property owner. A small well (6” casing) was drilled near existing corrals, which is a good central location. The well was 60 feet deep. A two-horse power submersible pump was installed in the well. The pump size was selected based on the number of troughs and the distance between pump and trough. The submersible pump is accompanied by a large pressure tank, and a pressure sensor. The system is similar in design system installed in homes. The pump system is inside an insulated pump house with a concrete foundation.

Water is transported through buried schedule 40 PVC pipe ranging in size from 3/4" to 1 1/2" in diameter. Pipe diameter is determined by a sliding scale that considers change in elevation, length of run and desired flow volume at source. Friction draw down inside the pipe is a major loss of pressure and flow volume over a long distance. The desired diameter of pipe is buried 24"-30" deep. Over 5,800 feet of pipe was used in this livestock watering system. There are three separate runs that can be operated separately, depending on management and livestock watering needs. The PVC pipe is buried with a Ditch-Witch trencher that the RCD rents.

Troughs are also supplied by the RCD. The number of troughs and size depends on the number of livestock using the system and the management style related to cost/ benefit. The flow to the troughs is activated by a float valve, which conserves water and power by eliminating the need for continuous flow. Eight tanks ranging in size from 75 gallons to 800 gallons were used in this system.

The system has been operating since the spring of 2002. The system is working well, and the cattle prefer the clean, fresh water in the tanks rather then the surface water that is warmer and carrying debris. There are several management changes that need to be considered and added to the management of the property due to the stock water systems. When livestock are present, the tanks need to be operating. The weight of the water

protects the tank and pipefittings from damage as curious cattle will push on the tank or use it as a scratching post. When livestock will not be present, the system should be shut off. It is important to turn the system off in the winter when livestock are not present to protect the system from freeze damage. The tanks need to be drained and the plug removed to protect the float and tank valve from frost damage.

A dependable system is rather expensive to purchase and install. Cost is the limiting factor that has, and will continue to prohibit landowners from personally installing groundwater fed systems. Continued financial assistance focusing on installing off-site systems will undoubtedly contribute to improved water quality within the Scott River watershed. The Siskiyou RCD is confident long-term water quality has been gained by this phase of the project and other efficient livestock watering systems that have been installed by the RCD.

In-stream work:

The USFWS also funded much of the in-stream work that occurred in the project reach. Severe erosion had occurred on the outside meander of Patterson Creek. The erosion had broken through the thin riparian area was unraveling the stream bank. The length of bank affected was increasing as more riparian area was being lost to erosion. The erosion was occurring just above the take out of the upper diversion in the project reach. An improper diversion method by the previous property owner had also encouraged the erosion. The previous diversion user had installed a large gravel berm up the center of the channel for approximately 200 feet. This action split the channel and focused more flow against the eroding bank.

In order to correct the problem and provide a better diversion method, the RCD developed a three-step process, which would provide a base for good stream management, fish passage and restoration. To arrest the erosion, the RCD proposed to install large toe rock and trees with root wads along the full length of the bank erosion. Prior to the bank stabilization/in-stream work, the natural meander of the stream bank needed to be reconstructed. Over the 220 linear feet of bank, an average 20-25 feet of stream bank width needed to be replaced where the erosion had created a pocket. The RCD used the material from the berm located in the center of the stream and material generated from the development of the toe trench to rebuild the bank to the original active channel width.

When the proper curvature of the channel was redeveloped, the berm had been removed and the toe trench was excavated. The site preparation was completed and ready for the placement of the large boulders and trees with root wads. Large boulders ranging in diameter from 3-5 feet were placed at an elevation that we estimated would scour out during high flows. Quarry rock (12-18” diameter rock) was placed on the bank above the toe rock. The quarry rock was brought up to an elevation 2’ above the bank full elevation. From the quarry rock, the bank was sloped back at about a 10 to 1 slope where it blended into field elevation. The flows over the winter of 2001 were low to moderate and the

scouring velocities were not enough to fully uncover the large boulders and root wads placed in the toe trench. We are confident scour will occur to desired level during a more significant winter. Juvenile fish are currently using the cover provided by in-stream work and there is currently a lot of cover and a good linear scour pool. We believe the in-stream habitat will only get better over time.

The final piece of in-stream work was the installation of a vortex weir located just below the diversion take out. The weir was installed to perform two functions: act as a grade control in order to limit the amount of in-stream activity required to diverted flows and generate a plunge pool in order to produce a location to return fish via a by-pass pipe from the fish screen. Since most fish screens are placed in the diversion, a by-pass pipe is installed so fish can be safely returned to the stream. The best scenario is to return the fish to a pool rather then a riffle so they have an opportunity collect themselves if they become disoriented in the by-pass pipe. We are very pleased with the function of the vortex weir. A nice pool has been scoured out below the weir and the diversion users have not had to move any gravel or install a tarp in the stream. As of early July, the diversion user and the stream were sharing the flow. Only about 4 cubic feet per second (cfs) were remaining in the stream and the diversion user was ready to switch over to the stock water system as irrigation value was becoming very limited with the low flows. When the diversion is shut off we estimate this will leave an additional two cfs in the stream as of mid July. The additional two cfs will double the flow volume in the project reach. This is very important as numerous juvenile Coho and steelhead are currently utilizing the project reach. The project reach is disconnected from flow on both ends and the juveniles will have to rear at this location through the summer. This is an excellent rearing site and the increased flows provided by the alternative livestock watering system will be welcome.

In order to restore the affected riparian area lost to erosion, 4/10 of an acre of riparian trees were planted near the in-stream work. Cuttings from black cottonwood, pacific willow and red willow were collected on site. The cuttings were placed in a trench dug by a backhoe. The trenches were excavated down to groundwater. Depending on location, trench depth varied from 3-7 feet. Cuttings were placed in the trench and back filled. Approximately 2 feet of the cutting was left above ground. The landowner is taking care of maintenance of the trees. The riparian area throughout the reach of the project area is previously fenced and much of it is under the Riparian CRP program administered by the Natural Resource Conservation Service (NRCS) As of July of 2002 the trees were becoming established and appeared to be doing well.

Conclusion:
As project coordinator for the RCD, I have been working in the Scott River Watershed for over seven years. I am confident this is the most functional comprehensive project the RCD has implemented. The alternative livestock watering system functions very well and is a quality product that meets every management need. The fish screens are also alternative designs that appear to have promise. The vortex weir and in-stream work are functioning well and will only improve over time. The property owners are very pleased with the product and are committed to maintaining the components. Each component of

the project depends on another and would provide very little benefit as stand alone projects. Combined, the project components address all the issues that impact the project reach. The icing on the cake is the high number of Coho juveniles utilizing the project reach and benefiting from the protection and enhancement efforts. I plan to take the examples learned here to many locations throughout the watershed, as this is truly a comprehensive project.

Appendix A: FINAL BUDGET

Patterson Creek Enhancement Project
Agreement # 11333-1-J002
RCD ref. # 84

Effective 10/1/00 - 12/31/02

	Estimated Budget	Revised Budget	Actual Total Cost
a. Salaries (including benefits)	**5,656.04**	4,191.43	4,191.43
b. Materials and Supplies	**12,102.00**	12,890.28	12,890.28
c. Operating Expenses	**6,625.00**	7,301.33	7,301.33
Subtotal	**24,383.04**	24,383.04	24,383.04
d. General and administrative (13% Overhead)	**3,324.96**	3,324.96	3,324.96
Total	**27,708.00**	27,708.00	27,708.00