IV. Conservation Actions

A. CRMP Formation and Information Development Process

One of the most influential events regarding restoration activities on Pine Creek was the formation of the CRMP group in 1987. While efforts at restoring Pine Creek and riparian associated values occurred through the years, it was the ideas clearly thought out amongst many that produced the successful projects beginning in 1987. It was the ELRD that hosted the first meetings, field tours, and began planning and implementation of projects. The process the first CRMP group set was modeled after other working groups that were in practice at the time. Group consensus was anticipated during meetings and work group functions, however, debate persisted for years on whether or not consensus was a valid method to get results that were best for the resource due to protection of individual interests. What would be said for overall feeling regarding consensus on most projects? Some are no-brainer easy ones that all agree to, but other projects or strategies, such as grazing management, are sometimes hotly contested.

It is likely because of this process that many of the improvements seen today have occurred. The coordinated effort led to numerous inputs and studies by knowledgeable individuals both locally and nationally. Not surprisingly, just as the first CRMP members speculated, the chronic problems in the watershed that each study identified were of the grazing practices within the watershed – many that were in conflict with resource protection. Pre-CRMP era grazing practices led to a lack of vegetative cover on streambanks and in the upland areas, as well as to decrease flows through Pine Creek valley downstream to Eagle Lake. Factors affecting the vegetation and flows are complicated and sometimes poorly understood. While grazing is just one disturbance, it's effects have been long term and far-reaching.

Written in the inaugural statement of the CRMP group, the goal of seeing the Eagle Lake rainbow trout re-establish a presence in Pine Creek has driven numerous projects and studies. Questions asked through the first few years of the CRMP process were related to barriers to fish passage, habitat quality for spawning trout, and habitat conditions of the lower segment of Pine Creek, which was typically thought of as a "migration corridor" since little rearing or spawning habitat would be available from Highway 44 downstream to the lake. It was through these early questions that projects related to culvert removal and replacement, improved cattle distribution, and realignment of the creek occurred.

Within the CRMP group process came more focused, smaller groups that tended to more specific needs. These became known as Technical Review Teams (TRT), where individuals with either more expertise or those with a strong interest tackled issues and projects to accomplish goals. TRT's were formed for grazing allotments, fish-specific issues, and the "Splitter TRT" which was focused on the Highway 44 area of channel reconfiguration. All TRT groups reported back to the main CRMP group at yearly meetings, or more often if time and projects dictated. What once were annual meetings of the CRMP have become rare, and it would behoove the process to continue again with an annual meeting of this varied group. However, the CRMP group needs to have a well-defined purpose and opportunity to contribute to land management and/or fisheries management decisions. TRT's have continued to work together when necessary.

Are the processes put in place through CRMP involvement working or have the strategies been successful? Certainly one could expect a wide range of answers from the variety of members through the years. From the perspective of one grazing permittee, changes in grazing management (livestock distribution, timing of use, and end of season utilization) have been positive and have contributed to an upward trend in riparian condition. Improvements that have resulted in the success of his management have been fences and water developments coupled with a short duration grazing regime. He has been mostly satisfied with the ability to work with the Forest Service to continue to adapt and monitor strategies in place. Future suggestions to improve his success included a recommendation for more conifer thinning.

B. Past Watershed/Riparian/Aquatic Studies; Objectives and Key Findings/Recommendations

Establishment of the CRMP process resulted in a need to assess and understand present conditions. To that end, a series of documents were prepared to look at a multitude of conditions within the watershed and report on status and recommend improvements or changes to present management. The first report to come out was prepared by LNF hydrologist Steve Young in 1989, followed in 1991 by Platts and Jensen, Jones and Stokes in 1992, and a field trip with the CRMP group and subsequent summary by the National Riparian Service Team in 1998. Each of the reports offer a view of the parameters discussed at that particular point in time, and some benchmarks were established. Generally categorized, Young's report offered the widest coverage on historical uses, present conditions from headwaters to mouth at Eagle Lake, and gave recommendations in a wide variety of areas. Platts and Jensen's report was very focused on stream channel conditions (particularly the effects of livestock grazing), fishery management concerns specifically for the ELRT, and they made recommendations for stream restoration actions and changes to livestock management. Jones and Stokes were contracted specifically after the Platts and Jensen report to assess stream conditions and recommend corrective actions as related to fish passage concerns in Pine Creek Valley, from Camp 10 to Bogard Campground. The objectives for the NRST were to provide training to CRMP participants in evaluating Proper Functioning Condition of streams and wetlands, as well as to provide a sense of how the restorative actions of the previous decade worked.

Today, the key points of the reports are valuable in determining the progress the group has made. While **Appendix 2** shows each of the respective reports goals and objectives, recommendations, and accomplishments, a few pertinent points have been extracted and are included as follows:

From Platts and Jensen (1991):

- Poorly managed livestock have adversely impacted streamside vegetation and stream channels, thus accelerating runoff. Cut and fill for construction of RR grades further accelerated drainage of the valley-bottom. As runoff accelerated, channels incised and enlarged, draining alluvial aquifers.

- Land uses have altered Pine Creek hydrology (and primary tributaries). Livestock grazing, construction of grades for railroad logging, and ditching have accelerated the rate that surface water is removed from the Pine Creek basin.

- Cause and effect findings are: Grazing has depleted riparian vegetation along streambanks, leading to bank erosion & channel enlargement. Enlarged channels lead to increased stream discharge and velocity, exacerbating erosion and draining alluvial groundwater tables. Net effect: acceleration of drainage and shortening of the flow period.

- ELRT were on the verge of extinction. Combined factors included deterioration of Pine Creek as spawning and rearing stream. (Pine Creek developed a barrier at mouth due to lower lake levels/dry conditions).

- Historically, there was heavy poaching of spawning ELRT.

- Decrease in Eagle Lake water quality due to irrigation drawdown of the lake in the 1920's and 1930's. Drought conditions coincided with irrigation drawdown to cause drastic declines in lake levels.

- Condition of Pine Creek (in 1991): 6% good, 29 % fair, 31% poor, 34% very poor. Overall, conditions rated out as poor.

- CRMP working to implement a course of action for recovery of the Pine Creek stream/riparian ecosystem.

- West of Hwy 44: Most of stream/riparian habitat is in critical state, beyond which deterioration will lead to long-term loss of the resource. Area should be protected to preserve habitat for ELRT and enhance perennial flow below the highway. Where fine sediment has been eliminated (state 4), doubt restoration will occur in a lifetime. Suggest restoration practices be applied from the headwaters down. Streams high in the watershed and closer to spring sources will respond more rapidly and serve to regulate flows, enhancing the potential for restoration of areas lower in the watershed. Potential for restoration to (states 5 & 6) will be largely determined by the effectiveness of restoration to extend snowmelt runoff from areas higher in the watershed. Assuming more consistent flow to valleys, and livestock in stream bottoms controlled, potential for achieving condition similar to states 5 & 6 is high.

From Jones and Stokes (1992):

- Willows or other woody riparian species were probably not dominant immediately adjacent to Pine Creek (within the valley) in the past.
- Soil profiles do not reveal substantially wetter conditions in the past, indicating that the pulse of flow in Pine Creek occurred from April through June.
- Upstream of Highway 44, groundwater releases into Pine Creek may have been important during the latter part of the flood hydrographs (May and June) for fish passage.
- Abandoned railroad grades downstream of Highway 44 change the hydraulics in Pine Creek, but don't hinder fish passage.
- From the abandoned railroad grade (downstream of active grade) to Camp 10, streambank vegetation is sparse and located on streambars. This reach is the least stable, with active bank erosion, headcutting, and lateral migration of Pine Creek.
- The reach of Pine Creek from Camp 10 to the abandoned railroad grade at the lower end of Logan Springs appears to be very stable, with a rocky channel bottom.
- Upstream of Highway 44, the stream channel has degraded, with bank erosion and a widened channel. This is likely due to trampling and vegetative removal by livestock. The north channel, downstream of the concrete splitter, has active bank erosion due to livestock use in some places, but overall, has good horizontal and vertical stability.

From National Riparian Service Team (1999, from a site visit in September 1998):

- Riparian-wetland plants have become established in many areas of Pine Creek, but changes to channel shape will take longer due to low sediment yields. Vegetation will be the key in sediment capture, and will take years for channel recovery.
- Improving the functional condition of the riparian areas upstream of Highway 44 will lead to more spring runoff, better infiltration, and floodplain storage for summertime release.
- Expect ELRT to "exhibit a high degree of 'pioneering' behavior in seeking suitable spawning/rearing habitats" as currently evidenced by their behavior every spring at the fish trap.
- Concerning grazing practices in place in 1998, "All the riparian areas that we looked at appear to be recovering under the current management regimes."

C. Watershed, Riparian, and Aquatic Habitat Restoration

(See **Appendix 3** for summary of projects, **Appendix 5** for few aerial photos)

Because of the great interest generated in ecological recovery of the Pine Creek system, numerous opportunities arose to restore natural flow patterns, improve water retention, encourage riparian vegetation through improved grazing practices, and where deemed appropriate, build structures to foster quicker recovery of stream channels. Most actions taken tied back to the original goals outlined in the first statement of the CRMP group, then further refined from more specific reports and studies listed numerous times above (Platts and Jensen (1991), Jones and Stokes (1992), Young (1989), and NRST (1999). The following categories of projects may in some cases have an item listed that may have also been placed in another similar category, as some projects were for more than one purpose.

1. Restoration of Natural Flow Patterns

Some of the structural alterations to the drainages within the Pine Creek watershed were caused by railroad grade construction in the 1930's and 1940's (Young 1989), the remnants of which are still in place from the vicinity of Highway 44 downstream to the McCoy Flat area. While the rail lines were generally placed along the outer edges of the valleys and flats to avoid watercourses or wet ground, inevitably a turnpike for crossing streams or meadows had to occur. In order to prevent wicking and saturation of the grades for the rail lines, raised grades were constructed using on-site soil, leaving behind ditches to drain water away from the rail lines as rapidly as possible. This also left behind "borrow" sites that are still visible adjacent to the Burlington Northern Railroad (BNRR) line near Highway 44.

While the raised grades and ditching of the stream achieved the objective of preventing washout of the lines, it also placed higher water velocities in a now more constricted channel, significantly altering the natural flow patterns in valley bottoms. Notes from the first Splitter TRT meeting in 1991 noted:

> *"The combination of stream channelization and overgrazing have resulted in the loss of riparian vegetation, channel downcutting, bank erosion, and reduction in natural flooding in the aquifer recharge area. As a result, high spring flows are less likely to be held in place long enough for adequate annual aquifer recharge. The highway and railroad grades currently provide some damming effects, which may help in aquifer recharge, however."*

And continuing:

> *"The old county road and railroad grades and present highway and railroad grades impose rigidity upon an alluvial floodplain system which would otherwise be inherently changing."*

Flood flows that once spread valley-wide were restricted to a stream-width cut, causing downcutting of the valleys to previously unattained depths. Once rail lines were abandoned, the grades were left behind to naturally erode, or to continue to be used as a road for vehicle traffic through the valleys. While some grades have been obliterated and/or widened to allow for more natural stream or water movement, some still constrict the formerly wide floodplains, as evidenced in the middle of Pine Creek valley.

The earliest note recognizing the issues of remnant railroad grades contributing to unnatural flow patterns is indicated in the ELRD files in 1987. Recommendations were to obliterate sections of the old grades through Harvey Valley (forest road 32N02, a distance of 3 miles), and this was accomplished in 1988. Much of the old grade is still visible through Harvey Valley, although most of its length has been flattened and spread to match the existing landscape. The other obliteration was of a road into Harvey Station, and enough of the grade was left behind to cause constriction across Harvey Valley Creek. This last remnant was removed in 1998 to allow for wider and more natural movement of the stream across the flat valley.

In 1992, Jones and Stokes prepared a report detailing fish passage problems and recommendations for repair. Their report looked closely at abandoned railroad grades approximately 3 miles downstream of Highway 44, the 105 Road culverts, the Camp 10 Road culverts, and the Logan Springs abandoned grades. They recommended leaving the abandoned grades in place as the benefits of ponding and attenuating peak flows may benefit fish passage. Reconnection of historic channels would be an acceptable compromise, i.e., "punching" holes through the grades in strategic places to allow stream flow continuity. Recommendations on the pre-existing culverts on the 105 and Camp 10 Roads were to leave the culverts in place, as the amount of fish passage days (days of excessive flow or velocity) weren't an issue. Culverts at each of these locations, however, were replaced in 1994 through cooperative effort between LNF and Lassen County. At each site, a larger culvert placed below the streambed is now functioning as a low flow, natural bottom passage.

Figure 10. 105 Road Culverts. Left, 1976, looking downstream, Antelope Mt. in background. Right, 2005, looking upstream. Note largest culvert on far right showing low flow, below grade channel.

Figure 11. Camp 10 Road Culverts. Left 1976, looking downstream. Right, 2005, looking downstream. Note largest culvert on far right showing low flow, below grade channel.

Discussions amongst the CRMP group in the Fall of 1993 discussed whether to decommission or remove the 105 Road due to perceived fish passage issues as well as the grade causing an impediment to the natural flow of Pine Creek through this point in the valley. Group consensus was that the 105 Road and grade was serving the purpose of holding water behind it, and therefore did not recommend abandonment.

Notes from the earliest discussions of the CRMP group detailed the desire to send flows of Pine Creek through more than one channel through the railroad grade adjacent to Highway 44. Historically, two trestles were located along this stretch of rail through Pine Creek Valley (letter from UPRR to CRMP Coordinator 11/13/1993). Each of the trestles allowed more free-flowing conditions of the stream. When the southern trestle was replaced (date unknown), two 48" corrugated metal pipes were used to collect and pass flows draining the southern side of the valley. These culverts eventually were found to be inadequate during the New Years floods of 1997. High water backed up against the railroad grade and Highway 44, eventually overtopping the railroad grade and washing away the fill for a span of over 100 feet.

Figure 12. Union Pacific Railroad grade washout in the vicinity of County Rd 112 and Highway 44. January 1997.

The washout highlighted the need for further drainage needs across the valley. It was assumed at the time that a ditch constructed in the 1930's would pass flood flows from the vicinity of the highway with its ever-increasing traffic. Funneling all the braided channels of Pine Creek across the valley into few channels and culverts/trestles resulted in inadequate capacity of the culvert and backed up water in the natural channels to the point they overflowed their banks during high flows. One such event was reported to have caused an accident involving a rollover of a cement truck in the 1960's (CRMP notes 1994), leading to the creation of the present day "superditch" that until 1999 carried only one stream channel across Highway 44.

Prior to redirecting flows from the superditch in 1999, estimates from NRCS, Jones and Stokes, and Platts and Jensen put channel capacity above Highway 44 at 20 cfs. Young (1989) calculated the 100-year flood flows in this vicinity at 300 cfs, while a five-year event would peak at 150 cfs. From this information, one can assume flows would overtop channels with regularity since there are essentially just two channels now carrying flows in this area.

Accounts of how and why Pine Creek was diverted in the vicinity of Bogard barn are unwritten. Oral history tells us that the USFS had a station located in the meadow and during the spring runoff; wet conditions caused personnel to divert flows away from the improvements. A photo recently found in the files indicates that a structure that split the flows was installed on the mainstem of Pine Creek in 1939, near the confluence with Bogard Spring Creek. The splitter allowed flows to be diverted away from the station in the spring, and allowed a re-direction of the flows back into the channel in the late summer and fall to irrigate for livestock that were kept on the premises. Young (1989) stated that downcutting of the channel of 3-4 feet had occurred. Concurrently with rerouting flows of Pine Creek across Highway 44 and the railroad grade to replenish a formerly wet meadow area, Jones and Stokes (1992) recommended removal of the splitter and a reduction of the size of the south channel. Platts and Jensen (1991) recommended removal of the splitter with flows routed into the natural channel (but did not indicate whether North or South channel should be filled in). A response to Jones and Stokes' recommendation to remove the splitter was prepared by Don Blickenstaff of the Soil Conservation Service (now Natural Resources Conservation Service). He suggested that the south ditch should be filled in and to allow all flows to be routed down the north channel. His reasoning was that this area was naturally braided and that there are two channels upstream of the splitter and flows from the upper branch would naturally follow the southern route and keep that channel flowing. In December of 1993, the splitter was removed. Rubble from the blast was placed the following year into the north channel to armor banks. Coinciding with this removal of the splitter was a reduction in grazing pressure within the upper pasture from McKenzie Cow Camp road upstream.

Figure 13. Splitter structure slightly downstream of the confluence of Pine Creek and Bogard Spring Creek (1939).

Figure 13a. Splitter structure (1978) downstream of confluence of Pine Creek and Bogard Spring Creek.

Downstream of the splitter existed yet another ditch on the south side of the meadow. An earthen plug was installed at this location in 1997, directing flows into the braided middle channels of the meadow for approximately 1/4 mile until intercepted by road 31N19 (McKenzie Cow Camp road), then downstream in the southern branch of the stream.

Figure 14. Top, earthen plug (1997) installed to block ditch and send flows back in to historic channels in meadow. Bottom, Pine Creek channel in 2005 after being re-routed out of ditch near Bogard Barn. Notice vegetation and stable banks along stream channel after 8 years of flow and after 14 years of no grazing.

2. Fish Passage

Identified as a potential fish barrier in 1989 by Young, a pair of culverts on forest road 32N22 were removed and replaced with a concrete box culvert with a natural bottom in 1997, using funding from the Knutson-Vandenburg (KV) Act for the Cone Timber Sale. The culverts, with their increased capacity, now handle higher flows and constantly maintain a low flow channel for fish passage.

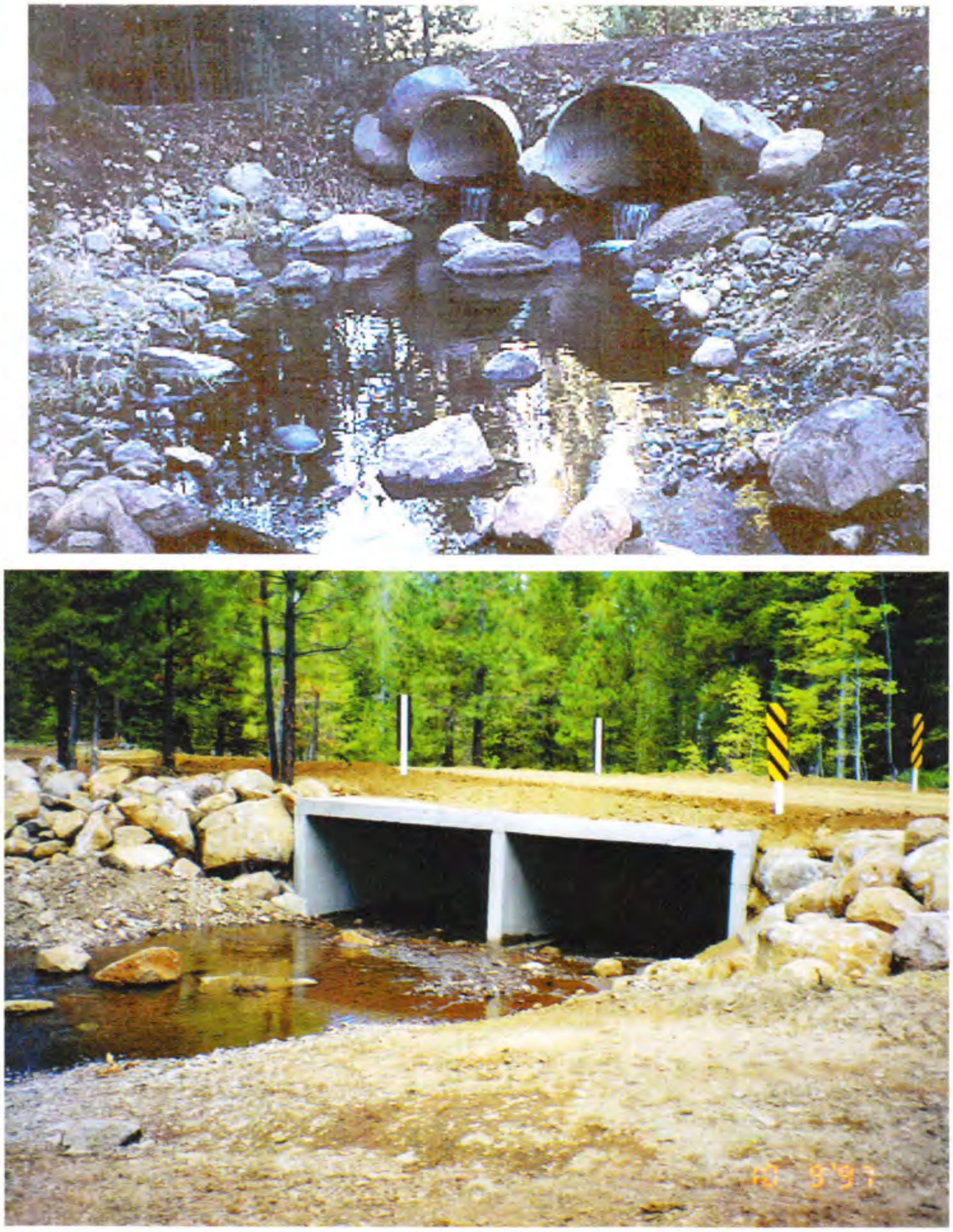

Figure 15. Top, corrugated metal pipe culverts in the early 1990's. Bottom, concrete box culverts to allow for fish migration and pass higher stream flows, 1997.

A known fish barrier on 31N08 was removed in 1997, along with closure of the road crossing. Initially estimated to cost a minimal amount, with the spoils sent to the railroad grade for berm work, costs rose substantially when extremely large boulders were found buried in the road fill. The stream over-wintered in an unfinished state, and further work to remove the boulders and widen the stream occurred in 1998. Forest Service crews scheduled to spread pine needles on site as a means of erosion control instead mistakenly spread needles on the lower 32N22 culvert replacement site. While the obliteration of the 31N08 road did not get accomplished according to the standards set up with the engineering department, within one season the stream had cut a stable path within the existing channel, and willow and aspen have now colonized the edges of the stream.

Figure 16. Top, Pine Creek looking downstream after removal of culvert and road crossing, 10/1997. Bottom photo showing baffles on lower end of culvert in an attempt to provide for fish passage 1978.

In the fall of 1999, California's Department of Transportation (CalTrans) completed the replacement of culverts under Highway 44 across Pine Creek valley. Four culverts were replaced along the width of the valley where multiple channels convey Pine Creek flow and were sized according to current standards to pass a 100-year flood event. Two culverts along the south side of the valley were constructed with a natural bottom, with one side functioning as a low-flow channel.

Figure 17. Culvert under Highway 44 on mainstem of Pine Creek, upstream side. 11/05.

New culverts (not replacements) under the Burlington Northern railroad grade (formerly Union Pacific Railroad, sold in 1998) were placed in September of 1999. This project was done in conjunction with a re-direction of flows of Pine Creek immediately adjacent to Highway 44 (upstream and downstream). The replacement of the Highway 44 culverts coincided with the planning and implementation of CRMP actions to rehydrate and reactivate the southern branh of Pine Creek. Payment for construction came from an Environmental Enhancement and Mitigation grant (EEM) through CalTrans, as well as in-kind contribution from the railroad, and appropriated FS funds. Construction of berms was necessary to direct flows into the main channel of Pine Creek to prevent unnatural drainage into the ditches, as each side of the railroad grade had borrow ditches that were lower than natural stream bottom. The construction of berms and placement of culverts was accomplished in 1999, prior to releasing flows into this historic channel (southern side of the valley), as well as again in 2005 to shore up weak spots.

Figure 18. Concrete box culverts under BNRR line near Highway 44. Note left culvert installed on side and below grade to create fish passage channel.

Figure 19. Berms constructed and/or repaired in 2005 to prevent or reduce flows into borrow ditches alongside BNRR grade in Pine Creek Valley.

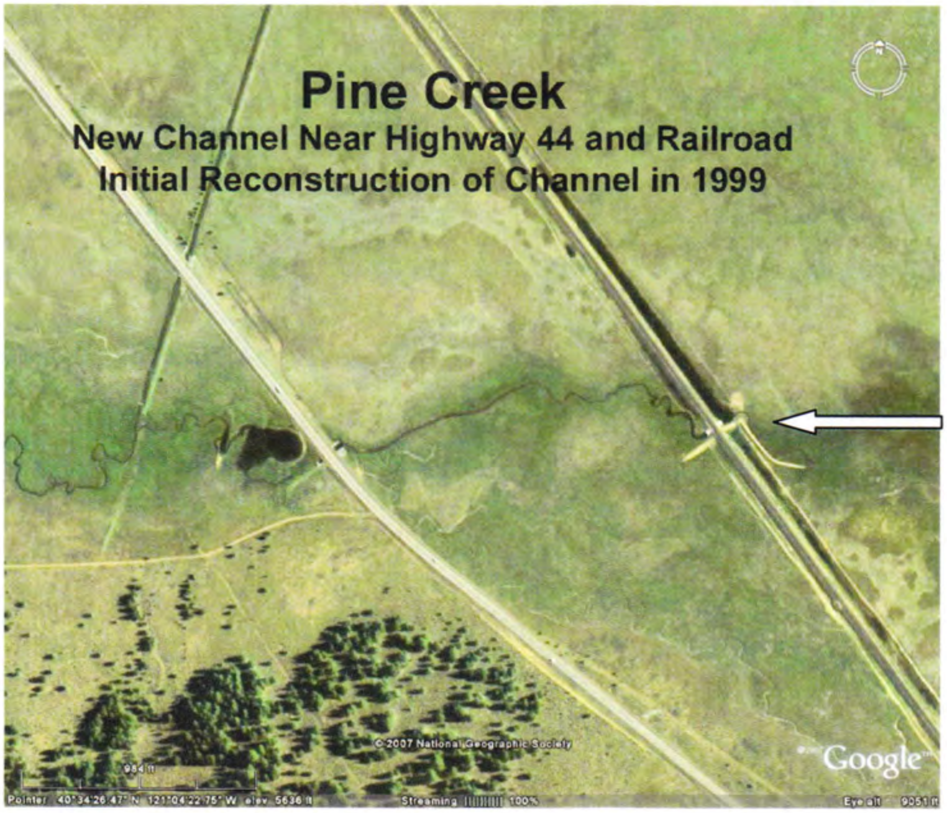

Figure 19a. Aerial images of, at top: reconstructed channel showing newly constructed berms downstream (see arrow), culvert at railroad grade, and berm removal upstream of the pond on Pine Creek, and bottom: channel as it existed from the 1950's through 1999, carrying only flood flow and draining alongside railroad line.

Included in this section is the discussion of the removal and, in some cases, consequent replacement of culverts with other road crossing structures. Primary road crossings of Pine Creek that have been obliterated, modified, or otherwise improved to allow for fish passage include two in Harvey Valley, Logan Springs, Bradford crossing, Million dollar bridge (road 33N07), and Pine Bridge campground (road 33N89A). Some of the poorly designed structures were washed out, while others remained in place for years causing chronic erosion or fish passage problems. Completely removed were the road crossings at Logan Springs, lower Harvey Valley crossing, and Pine Bridge campground. Bradford crossing, below the confluence of Harvey Valley Creek and Pine Creek, is now a hardened, concrete low water ford that is known to allow fish passage during spring runoff. A crossing of Harvey Valley Creek, within a quarter mile of its confluence with Pine Creek, and the crossing known as Million Dollar Bridge are still in place. Each of these structures provide for unrestricted fish passage, although Harvey Valley bridge is no longer necessary due to a disconnected road network. Various other low water crossings are used along Pine Creek, with Corbin crossing as the most commonly used on Road 33N93 downstream of McCoy Flat. Livestock operators in the past used a low water crossing at McCoy Flat, but it is fenced off to public access.

Figure 20. Left, culverts across Pine Creek from Harvey Valley Road crossing, 1976. Right, all road fill removed circa 1988, channel unimpeded and allows for fish passage, 2005.

Figure 21. Million dollar bridge in 1976, top, and 2005, bottom. Note vegetated banks and willow in foreground of recent photo.

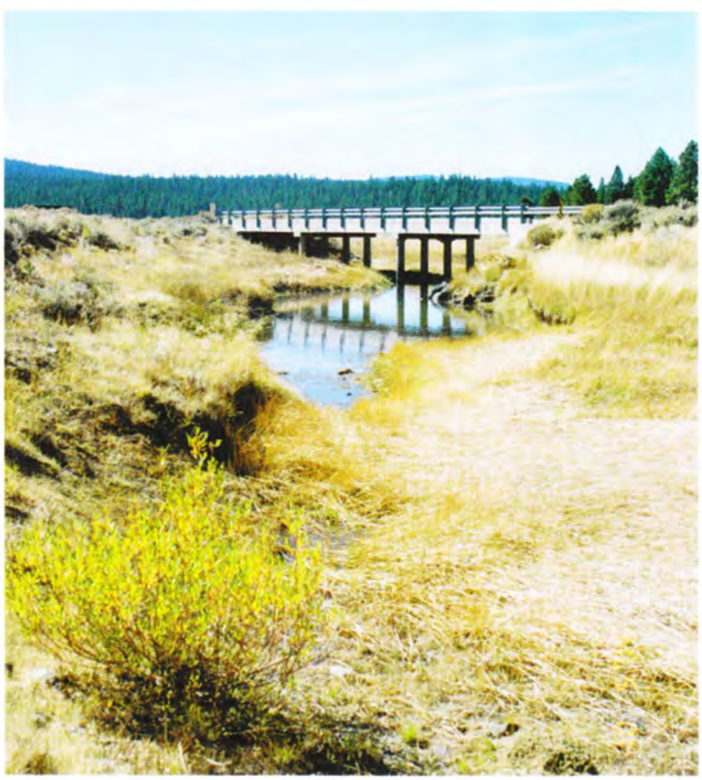

Figure 22. Logan Springs road obliteration completed circa 1988. Upper left, looking northwest across Pine Creek, 1976. Upper right, looking east across Pine Creek where old road once crossed, 2005. Lower left, looking southeast in 1993 prior to exclosure fencing. Lower right, looking southeast after two seasons of cattle exclusion, 1996.

Figure 23. Top, former road crossing of Pine Creek at Pine Bridge campground (Road 33N93A). Note vehicle tracks in foreground where users have bypassed the road block. Bottom, Corbin crossing (Road 33N93), a hardened location on natural streambottom and impassable to vehicle traffic during high spring runoff. Channel flows downstream from this location.

In 1951, the US Geological Survey (USGS) began collection of stream data upstream of the present day site of Bogard campground. A station was constructed alongside the stream channel and a concrete weir was poured across the stream channel to provide for a known gauge height and volume of water passing the site. Data were collected through 1978, and the station was left intact, minus the measuring instruments. It appears that the stream has downcut slightly in this location since a photo taken in 1979 (see figure 20). Notes from stream surveys of September 11, 1979 indicate:

*"Water tank 1/4 mile upstream from Bogard Campgrd. Undeveloped campsite. Concrete dam, **3' from top of dam to creek bottom**."*

At the present time, the depth from the bottom of the stream to the top of the dam is approximately 5.5'. CRMP participants raised concerns in 2002 that fish passage may be impeded, and upstream passage is certainly blocked for all fish during low summer flows. The structure, while seemingly forming a stable part of the stream bottom, is an unnatural and unnecessary feature within the channel. Plans were developed to remove the structure until it was learned that a monitoring project associated with aspen stand enhancement in close proximity to this site was already in progress. As part of a multi-year monitoring effort, changes to the stream bed, sediments, or water quality may affect the results of the study and the plan to remove the concrete weir are on hold for another 2-4 years (2008 at the earliest, Rickman pers. comm.).

Figure 24. Top, gaging station weir 1979 (note height of dam). Bottom, weir in 2005, showing erosion under concrete apron.

Fish TRT notes from 2004 indicated an interest in removal of the concrete weir. Relying on the following formula (CDFG 1998a) to indicate the ability of a salmonid to ascend an obstacle, calculations were made to assess this potential problem:

Pool Depth/1.25 = Jump Height
30"/1.25 = 24"

The actual jump height at the weir is 36", while the pool depth is 30". It would appear from the above formula that the jump is 12" too high. However, other measurements published of the jumping ability of fish, salmonids in particular, are: an 8-12" brook trout can ascend a 29" barrier from a 24" deep pool (Myrick et al 2004), a cutthroat or rainbow trout (adult, no length given) can ascend a 59" barrier from a 74" deep pool, while a juvenile rainbow or cutthroat (approximately 6") can ascend a 24" barrier from a 30" deep pool (Parker 2000). It is unknown at this time whether or not Eagle Lake trout can migrate past this barrier on Pine Creek. From the information listed above, one could make the case that the pool depth is not great enough to support the lift the trout would need to propel itself over the weir, but measurements of the pool depth during spring runoff conditions have not been calculated. It appears that the brook trout of the first example listed above could come close to leaping the barrier as it now exists and as measured during summer flows. In any case, the weir does look to be a complete barrier to upstream migration for smaller fishes during low flows. Of greater interest may be the drop in downstream elevation at the site. As measured in 1979, the drop from the top of the dam to the stream bottom was 30", and measured in 2004, was 66". The drop in elevation (based on photographs comparing the site in 1979 and in 2006) may be related to the road crossing below the weir site.

Of further interest in this situation of uncertainty about the status of the weir being a fish passage problem is that a single ELRT was found 1 km below Stephens Meadows in 1988 (no ELRT planted from 1976 through 1999), along with 2 others found at the 105 Road crossing in a pool. Each were aged at 2+ years, and it was thought by the authors of the report (Honma et al 1988) that these were likely the result of a successful spawn in 1986, when previous students (Monji et al 1986) found 6 young-of-the-year (length 1.1 – 2 inches) ELRT at the 105 Road crossing as well. A conclusion can be made that in 1986, at least one pair of ELRT were able to ascend the weir and spawn succesfully. King (1986) documented that during the very wet runoff of that year, ELRT had been able to pass over the concrete weir at the fish trap near Spalding. In 1998, a CDFG draft report on stream conditions made no mention of the gaging station weir being a fish barrier. It is not known when the plunge below the weir gained its present depth that may be posing the problem for fish passage.