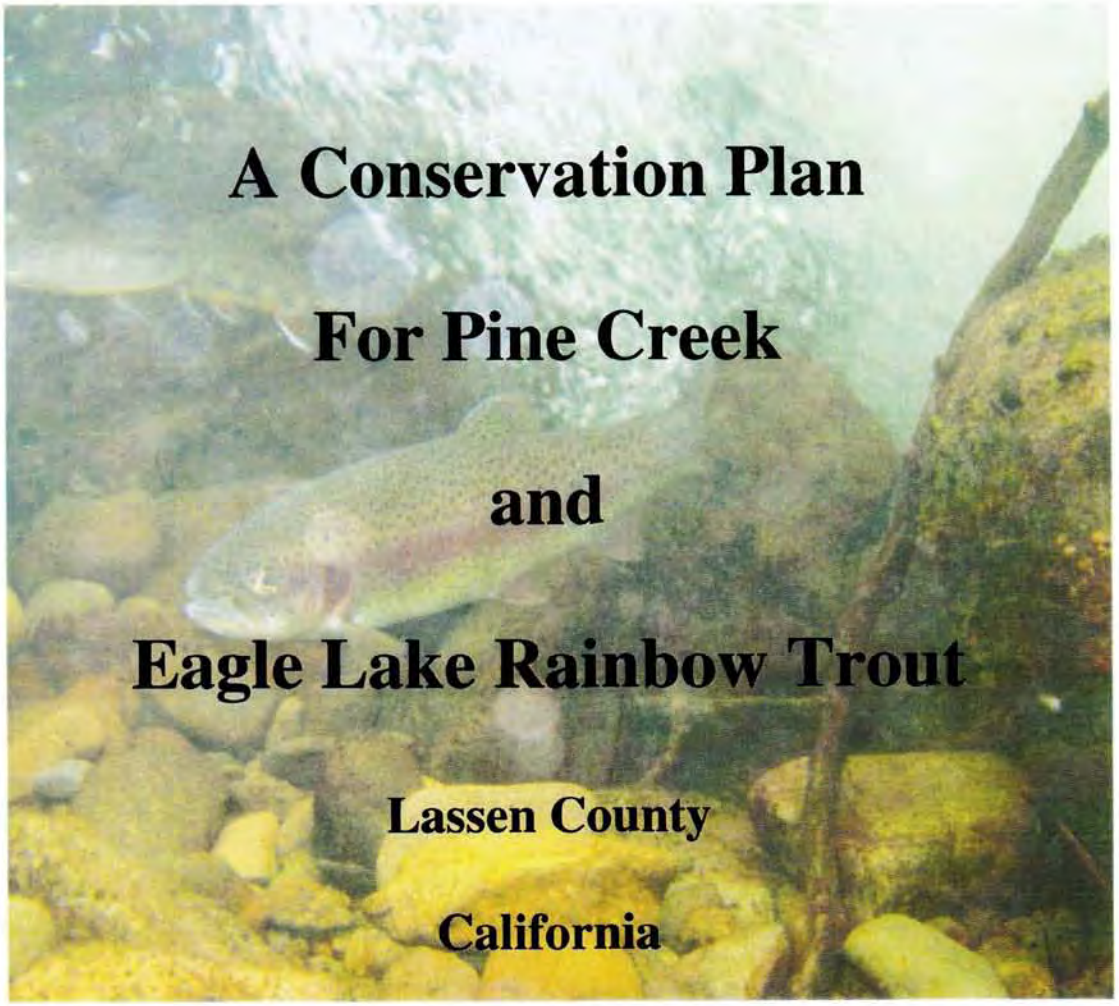

A Conservation Plan

For Pine Creek

and

Eagle Lake Rainbow Trout

Lassen County

California

TERESA PUSTEJOVSKY

Under Contract with Honey Lake Valley Resource Conservation District

Funded by Lassen County Resource Advisory Council

At Recommendation of Pine Creek Coordinated Resources Management Planning Group

June 2007

Acknowledgements

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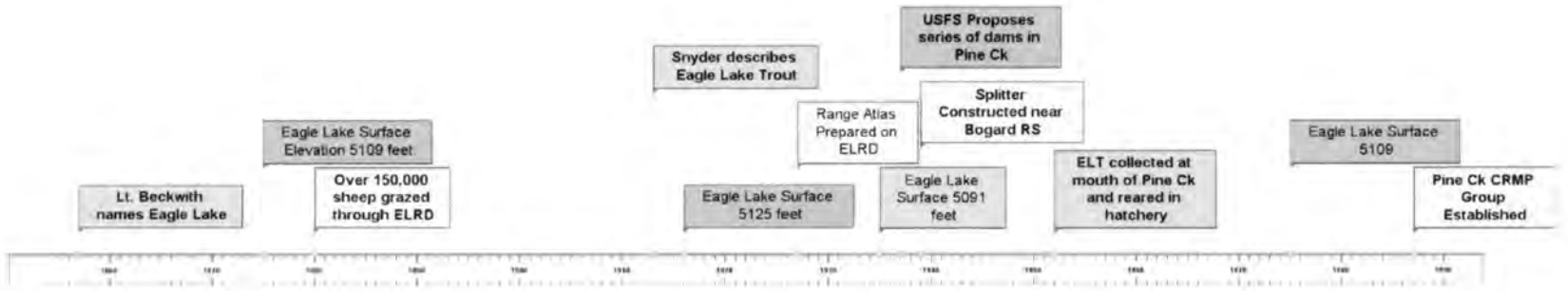
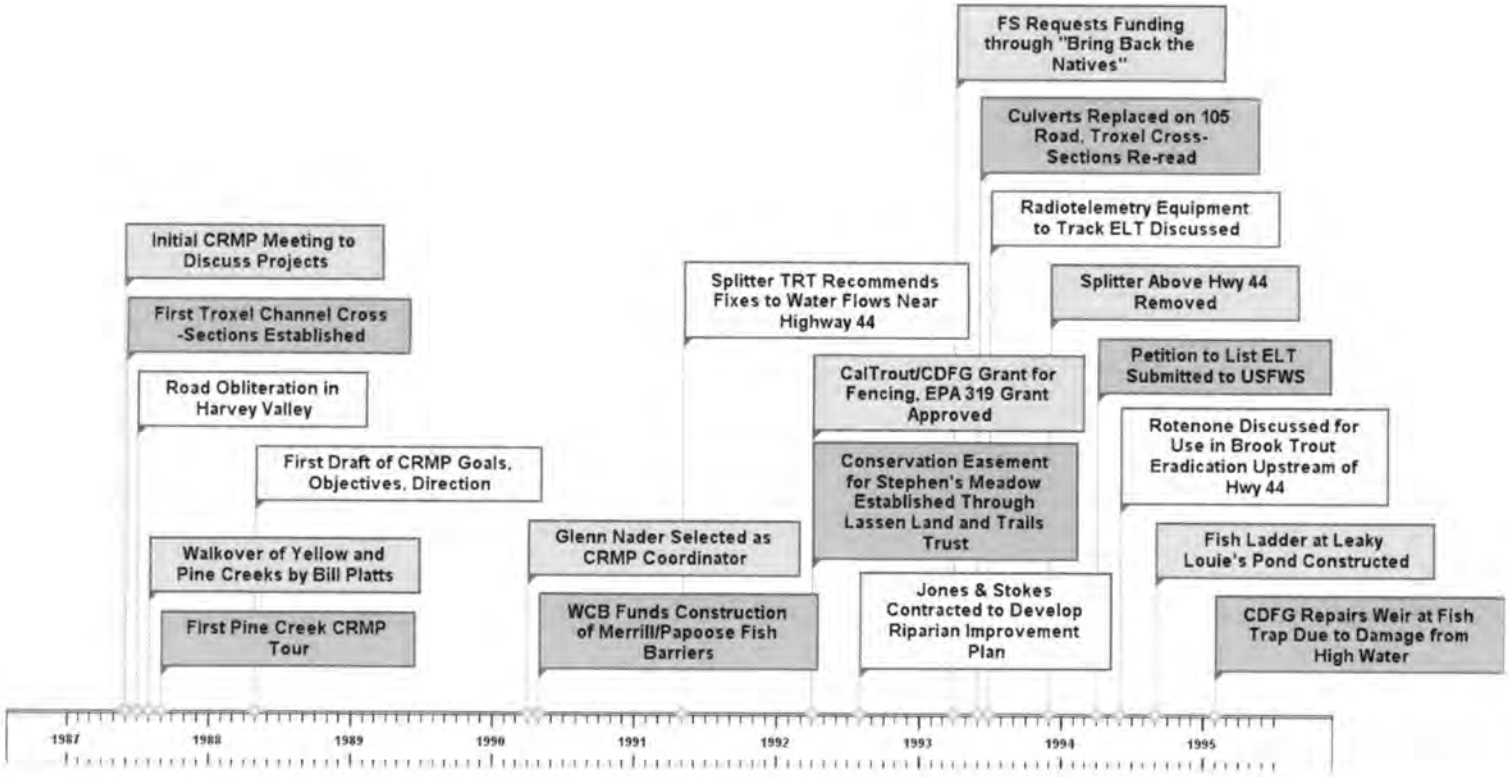
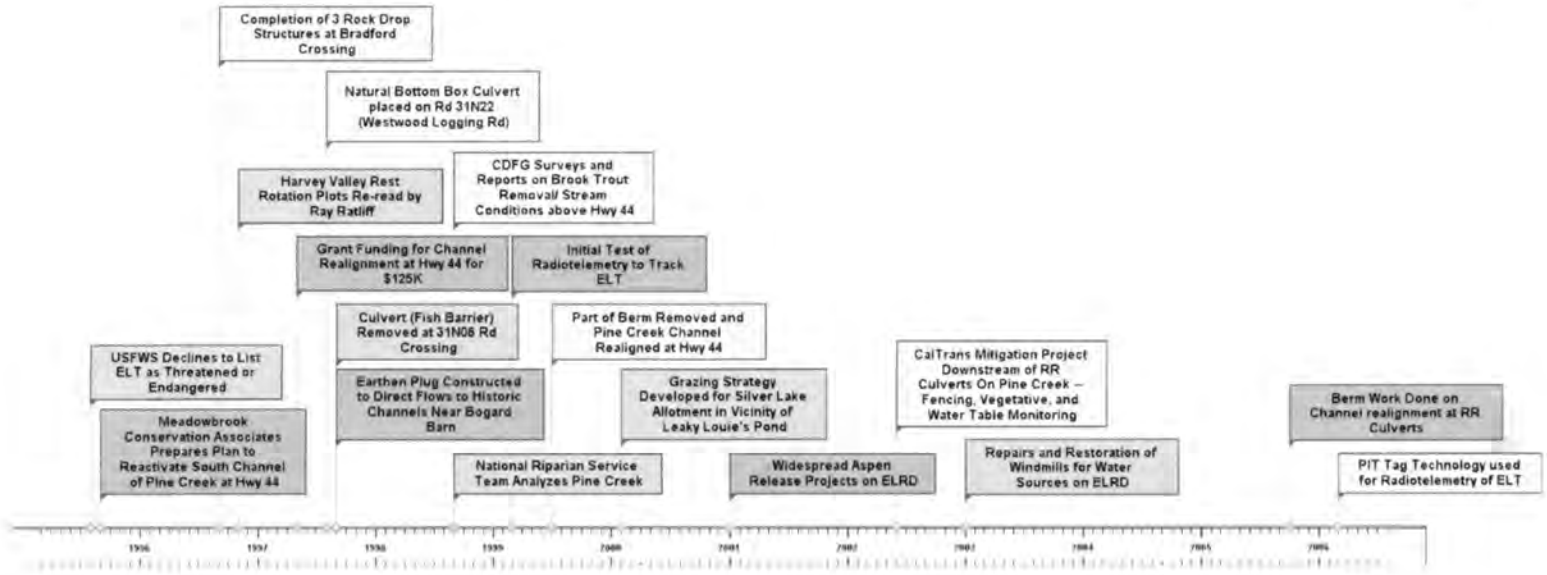
A Sampling of Pre-CRMP Era Events 1850 -1987



A Sampling of CRMP Era Events 1987-1995



A Sampling of CRMP Era Events 1996-2006



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I. Introduction

Pine Creek is situated in northeastern California within the boundaries of Lassen National Forest. It has a total length of approximately 39 miles, of which only 7 miles are considered perennial (Young 1989). During spring runoff, Pine Creek ultimately drains into Eagle Lake, a large and highly alkaline water body similar to many of the high desert lakes within the Great Basin of northeastern California and northwestern Nevada. Eagle Lake is known for providing excellent angling opportunities for Eagle Lake rainbow trout (*Oncorhynchus mykiss aquilarum*), a subspecies of rainbow trout endemic only to the Eagle Lake Basin. Historically, Eagle Lake rainbow trout (ELRT) migrated upstream to perennial flowing headwaters of Pine Creek, which is thought to be the main spawning tributary. Migration upstream depended upon sufficient flows, temperatures, and timing of the runoff in the lowermost 20 miles of intermittent stream so that ELRT could ascend the stream to spawn, rear, and eventually return to Eagle Lake.

Due to many activities within the watershed beginning with the westward expansion of settlers in the mid to late 1800's, Pine Creek was degraded to a point where upstream migration of ELRT was greatly diminished. Channels of Pine Creek were eroded, channelized, or otherwise degraded by railroad logging, overgrazing of livestock, and through road construction for numerous human activities within the area. In addition to effects to the habitat, humans also harvested ELRT during the springtime spawning run in the 1870's through the 1880's to sell in markets in Susanville (Purdy 2003). Exotic brook trout were planted in the creek from 1940 through 1975 (notes in California Department of Fish & Game files), the result of which was presumably displacement of a stream dwelling population of ELRT. In the 1920's, Eagle Lake was affected by construction of the Bly Tunnel and the associated diversion of water for irrigation. Along with a severe drought, the combination of the water diversion and drought rapidly lowered lake levels and reduced fish access to Pine Creek (Moyle 1995). Through the 1930's, the numbers of trout returning to Pine Creek were severely limited, and in 1950, the California Department of Fish and Game (CDFG) captured a few ELRT, spawned them, and produced 600 trout used for broodstock. More trout were captured upstream in Pine Creek in 1956 and 1957, with fertilized eggs shipped to CDFG's Darrah Springs hatchery to be raised to catchable size for an eventual planting into Eagle Lake. By 1959, the present location of the trapping and spawning facility at the mouth of Pine Creek and Eagle Lake near Spalding was developed, beginning the process of artificially propagating fish for sport and species recovery that still occurs today. Approximately 2 million eggs from the spawning run are fertilized and water hardened for shipment to other hatcheries within the state, and 200,000 catchables are stocked back into the lake each year in the spring and fall (CDFG 2005).

In 1987, a collaborative effort that included local interested individuals, groups, government agencies, timber companies, and livestock operators was formed to coordinate efforts to improve hydrologic conditions in Pine Creek, restore the stream/riparian ecosystem, and to restore a natural Eagle Lake rainbow trout fishery in Pine Creek. Known as the Pine Creek Coordinated Resources Management Planning

group, or CRMP, efforts began in earnest to restore habitat while maintaining a "working" forest. To accomplish this, the CRMP developed these initial goals in 1987:

- Improve vegetative cover in the Pine Creek watershed.
- Improve the streambank stability of Pine Creek
- Raise the streambed and watertable in the drainage and spread out peak flows of Pine Creek
- Restore the natural Eagle Lake trout fishery in Pine Creek
- Improve wildlife habitat along Pine Creek
- Reduce nutrient and sediment loading into Eagle Lake from Pine Creek
- Maintain grazing and timber management
- Meet goals in a coordinated effort with all affected parties

Subsequent planning efforts to accomplish most of these goals have resulted in more than a decade of activities and projects that are still occurring at the present time.

A. Purpose

It is due to experiences with persons new to the CRMP process that this document was conceived, with the intent that the new participants interested in management of this watershed will be able to find the information and understand where the earlier members have tread. It will help the process to understand that usually the best intentions and techniques were employed at the time. It is hard to understand why some projects of the past were accomplished, especially when not all parties were privy to the conversations and thought processes of the group that designed or implemented said project. Trusting the recommendations and accomplishments of the CRMP group of the past will allow for continued collaboration of today.

The main objectives that will be pursued in this document include:

- A description of the history of events occurring on and along Pine Creek from any information of the past to present day, mainly focusing on those related to CRMP activities.
- A compilation, synthesis, and assessment of the restoration efforts within the Pine Creek watershed, with emphasis on the time period of CRMP activity from 1986 through 2007.
- A collaboration with CRMP members to review and update conservation goals.
- Identification of priority restoration actions for the Pine Creek ecosystem and Eagle Lake rainbow trout.
- Establishment of a repository for information regarding Pine Creek and Eagle Lake rainbow trout that can be easily accessed for future use.

II. General Description of the Pine Creek Watershed

An afternoon drive or plane flight along the course of Pine Creek would reveal a busy past. Evidence of modern human activities can be found in the form of roads, bridges, culverts, railroad grades, channelized streams, and areas of timber harvest activity. With relatively flat terrain in the lower half of the Pine Creek watershed, accessibility made these activities possible and successful. Human impacts on the watershed through introduction of livestock grazing, timber harvest, and planting of non-native species was widespread in the West, with some areas losing not only quality stream channel characteristics and stabilizing vegetation, but a loss of species as well. Pine Creek is a classic example of the effects of these activities.

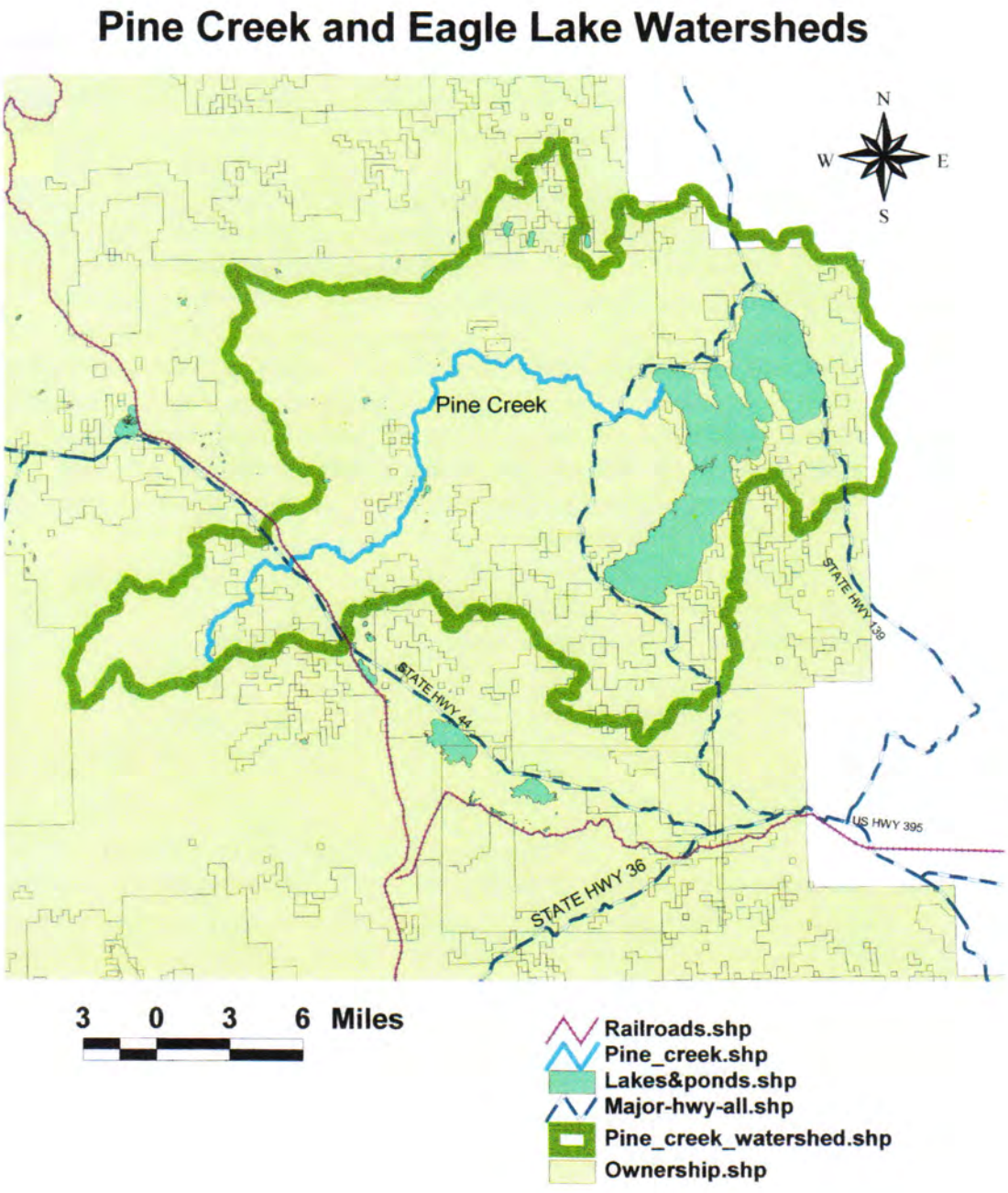
Fortunately, remedial measures have been undertaken over the past 60 years that have resulted in improving stream and watershed characteristics, and improving habitat for ELRT. The CDFG recognized an imminent loss of species in Eagle Lake and began an artificial propagation of ELRT. Loss of riparian characteristics throughout the Pine Creek watershed prompted many actions of stream restoration by the CRMP group beginning in 1988, and aspen stand improvements have been in progress since the late 1990's by the USFS. The trend to improve riparian conditions has been in practice for the past few decades, with numerous technical reports published with examples of improvements and the methods used to achieve desired conditions. The following attributes (USDI 1997) are important in understanding what makes riparian systems so valuable. A functional riparian system will:

- Dissipate stream energy from high water events
- Filter sediments and develop floodplains
- Recharge groundwater
- Grow vegetation with enough root mass to stabilize streambanks
- Have diverse channel characteristics for fish and wildlife habitat that will support greater biodiversity

While it is easy to focus on the human influences on the land, ignoring the effect that climate has had on the watershed would perhaps be missing an opportunity to produce effective change. Climate has certainly played a large role in changing the streams and riparian areas of the intermountain west. Long-term dry and wet cycles within the last 10,000 years have created shifts from desert shrub-dominated environments to woodlands and vice-versa (Wigand et al 1995, Chambers et al 2004). Chambers (2004) stated:

> *"Although the degradation of riparian areas often has been attributed largely to anthropogenic disturbance, in arid and semiarid regions both past and present climate strongly influence geomorphic and fluvial processes and, thus, riparian vegetation."*

As further data become available through other studies that piece together the past climatic conditions, a clearer picture of the natural range and rates of changes within the system with regards to streamflow and vegetation may be known.



A. Landscape Setting

Pine Creek watershed comprises 228 square miles of land with surface flows that ultimately drain into Eagle Lake. Of the area within the watershed, a large percentage of the acres have been managed extensively for timber production and for summer/fall livestock grazing due to the terrain. Characterized by rolling hills and broad valleys, the accessibility of the timber and ease of pushing livestock through left a mark on the landscape that is still seen today in the forms of altered drainage patterns and vegetative shifts in plant communities. Coupled with a dramatic decrease in naturally burned acreage, the landscape has undergone an adjustment to denser timber stands and fewer fine fuels that use to carry fire from area to area. The result is a vegetative community ill adapted to natural or other disturbances, and one that may show evidence of a compromised riparian system.

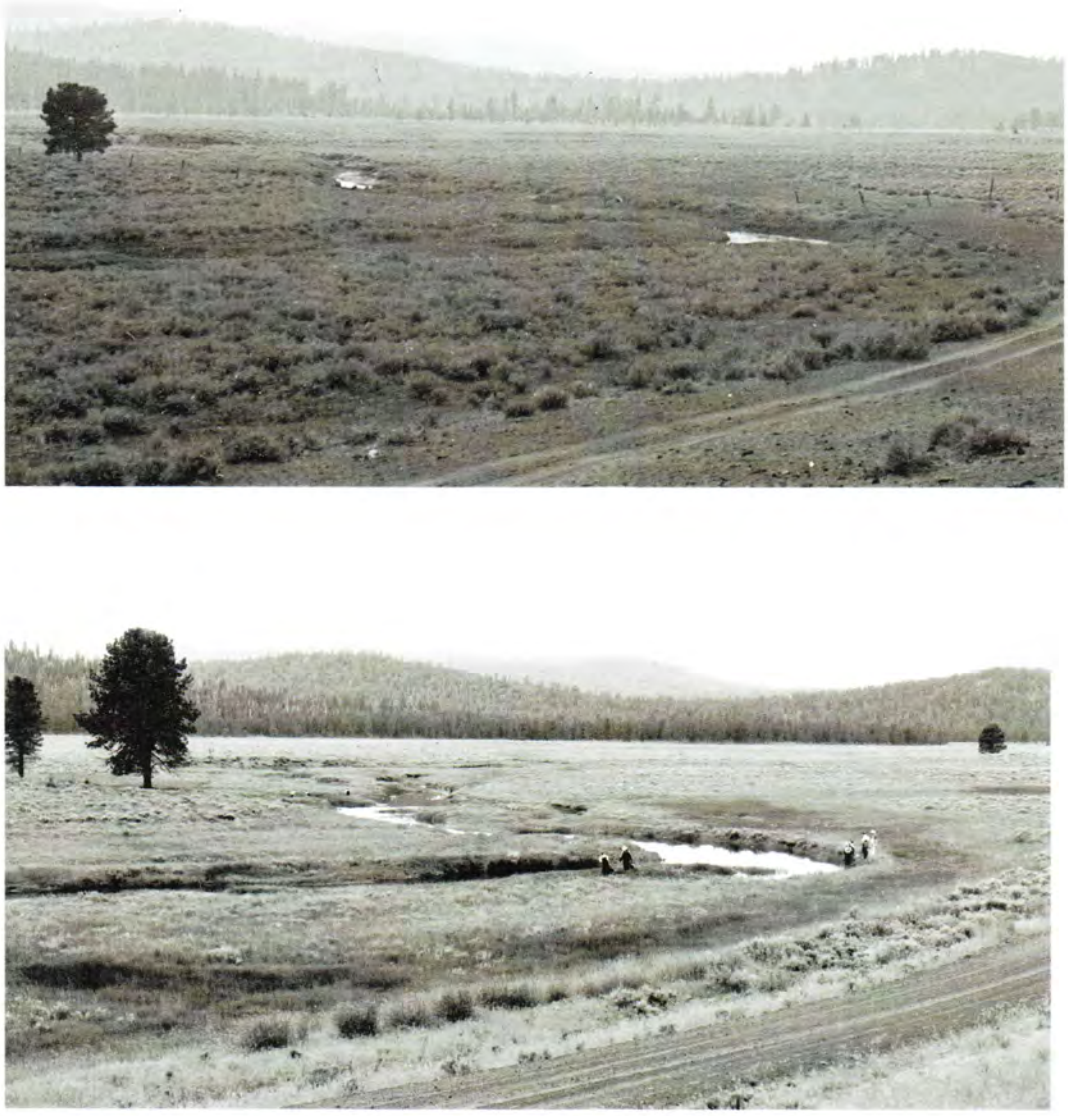


Figure 1. McCoy section of Pine Creek. Top, 1936, bottom, 1998.

Elevation change along Pine Creek from the headwaters at Triangle Lake to its mouth at Eagle Lake amounts only to 2,100 feet in drop (7,200 to 5,100 feet) for its 39 mile length. The result of this is an average drop of 75 feet per mile, or a gradient of 1.4%. The steepest sections of creek can be found at the headwaters above the perennial portion of Pine Creek, where a series of springs deliver the initial perennial flow to the system. Flat valleys are numerous, especially below Highway 44. Pine Creek Valley and Champs Flat are the two largest expanses of low gradient sections, with Pine Creek Valley dropping 2 feet per mile, and Champs Flat dropping 37 feet per mile.

Figure 2. Aerial view of Pine Creek Valley after New Years flooding in 1997.

Because Eagle Lake lies within a closed basin (no surface outlet), its level is dependent upon a balance of inflow from tributaries and sub-surface lake seepage along with evaporation through the typically hot summer months. Few tributaries provide substantial flows for any lengthy period of time. Pine Creek has by far the largest of the surface inflows at approximately 65% of total flows into the lake (Young 1989), but it has been known to flow into July only in very few years since recordkeeping began in 1961 at the present day fish trap near Spalding. Due to this nature of streamflow, it has become apparent that aquatic species needing to migrate upstream from Eagle Lake for most of or for a portion of their life history have found it difficult during many years to successfully navigate and/or survive in Pine Creek.

Historic accounts chronicle the mean surface elevation of Eagle Lake beginning in 1875, although in many years, no data were collected. Lake elevations have fluctuated widely over the past 150 years, in part due to wide swings in precipitation amounts, but also due to human and other natural causes including construction of the Bly irrigation tunnel and possibly geologic activity, as an earthquake in 1889 was reported to have dropped the lake elevation two feet (Purdy 1988).

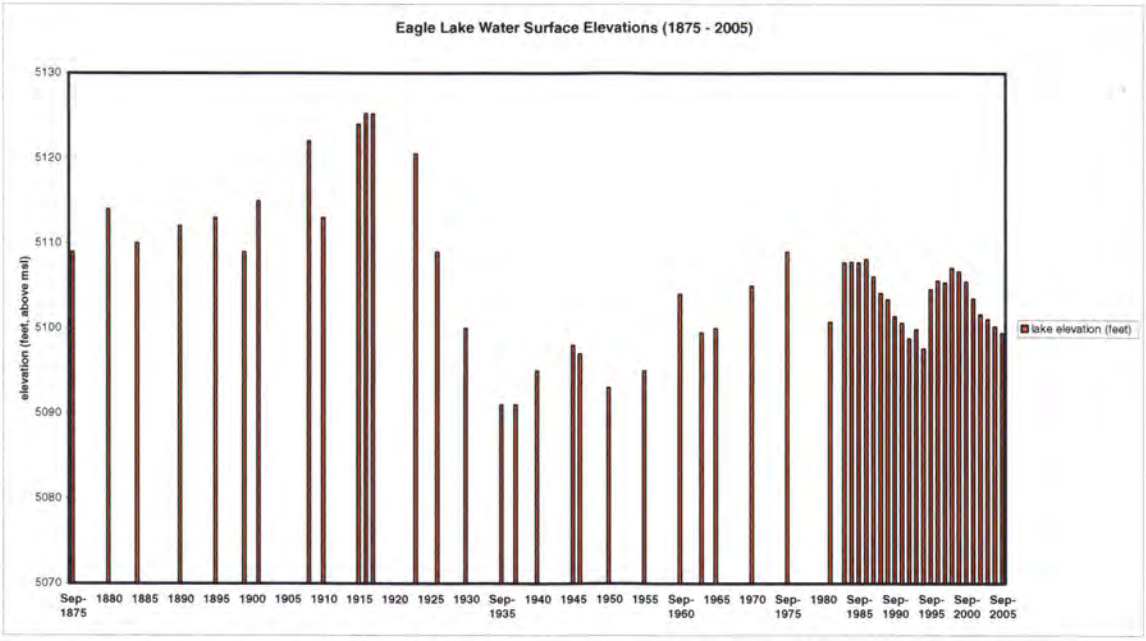


Figure 3. Surface elevations of Eagle Lake, Lassen County California. Where noted, month of data collection is included.

B. Land Uses

The majority of lands within the watershed (86%) are managed by Lassen National Forest, with the remaining 14% in private or other holdings (Platts 1991). Perennial stream length managed by LNF is 15 miles, and privately managed perennial stream miles amount to 3 miles. A total of 188 miles of intermittent streams are managed by LNF, while 24 miles are under private management (Platts 1991). These figures reflect the total stream miles within the Pine Creek basin.

1. Recreation

Recreational use along the mainstem of Pine Creek could be considered minimal during much of the year, with fishing occurring in choice locations upstream of Highway 44 for brook trout. In the fall, many hunters can be found within the valley seeking deer, antelope, coyote, and waterfowl. Due to the conditions of the roads between Highway 44 and downstream to County Road A1, use by automobiles is practically non-existent from the first heavy snowfall or rains through the spring thaw, generally from late November through May.

Use is concentrated through campsite location. Bogard Campground is within a couple of miles of Highway 44, and although easily accessible, occupancy rates are low. This could be due to few amenities provided there, its proximity to the creek (insect problems), or lack of destination activities such as view sites or a large body of water on which to recreate. In the mid to late 1990's, the USFS removed approximately 8 sites due to high water damage from the creek. Pine Creek overtopped its banks that year

from debris jams that caused lateral movement into the campground. Water continues to spread year-round through the campground area.

Another site that receives summer and fall use is an unimproved camping area near Stephens Meadow. In recent years, the CDFG has been planting ELRT in this location, and brook trout are heavily fished by anglers. Deer hunters are a main user in the fall, although no piped water, tables, or restrooms are available. Similarly, camps downstream near County Road A1 have no amenities, and are used sporadically through the season, especially early in the year when water is still present in the creek.

During the spring runoff when ELRT are blocked at the fish trap near Spalding while attempting to migrate upstream, visitors to Eagle Lake park at the facility and photograph, film, or watch as the trout attempt to ascend the concrete barrier. In 1998, the Forest Service erected a kiosk with interpretive panels informing the public of the status of the stream and fish. Further plans have been made to improve the site that currently supports the fish trapping facility and a cabin for CDFG employees. A restroom facility, pad for a site host, improved trails, and improved parking are currently planned and funded.

2. Timber

Accounting of timber harvest volume from Lassen National Forest began in 1909, with peak production occurring in the 1970's and 1980's (USDA 2005). Railroad logging was the method of choice in the removal of timber from Pine Creek Valley and Harvey Valley in the 1930's and 1940's (Young 1989). Harvest of timber has changed through the years, with thinning from below the most common prescription now followed, leaving some of the largest trees behind (USDA 2005). Entry into streamside management zones is occurring through prescribed plans, where treatments are designed to improve conditions for aspen, a riparian dependent species. Young (1989) pointed out that due to volcanic soils and very flat gradients, coupled with rapid infiltration rates of surface water, movement of soil from harvested stands was unlikely to occur to any measurable degree. The main impact from timber harvest was attributed to road building, and railroad grade construction, two activities that today are very closely monitored or in the case of railroads, simply no longer occur.

3. Grazing

In the mid 1800's, livestock producers found vast expanses of forage in the forests that were readily available for grazing in the summer months. This allowed stock operators an advantage of cooler summer temperatures, and was along the route between the Sacramento Valley and the Rocky Mountain states (USDA 2005). Numbers of livestock were much higher than today, and were largely unchecked during the earliest years before the establishment of the Forest Reserve system in 1905.

After the establishment of the Forest Service, areas of the watershed were set aside in allotments, and had a permitted number of animals set per year and season. Although

this brought some degree of order and structure to grazing practices, areas that were preferred by livestock (such as valleys and riparian zones) still experienced highly concentrated grazing use.

Records exist at the Eagle Lake Ranger District of the Lassen National Forest (LNF) that chronicle the type of grazing, animal that grazed (sheep, goats, and cattle), numbers of animals, and their season of use. An atlas of grazing use and range condition is in excellent shape and gives thorough details of the allotments as they existed in 1927. However, many of the following years, up to the 1990's, have very little to no information in the files.

From this history, it appears that perhaps the greatest single influence on the watershed in the past 150 years has been livestock grazing. Over the last two decades, no topic of discussion about Pine Creek has been more extensively chronicled or written about than its degraded watersheds and riparian areas and associated impacts from historic grazing practices (Platts 1987, Young 1989, EPA 1990, Moyle et al 1995, USDA 1995, NRST 1998, USDA 2005). Interestingly, the first CRMP notes made less mention of fish or wildlife concerns than of poor riparian conditions as related to decreased vegetation (CRMP notes 9/22/1987).

Discussions with some of the earliest members of the CRMP group yielded not only a desire to improve ecological conditions along Pine Creek, but to allow timber interests and livestock operators to continue with their livelihood (Mohoric pers. comm. 2005). Since the inception of the CRMP process in 1987, there has been very active participation from grazing permittees. Consequently, the majority of restoration activities within riparian areas have been implemented to better manage livestock grazing. These changes came about specifically after many discussions regarding the need to improve cattle distribution to better use upland range and to reduce concentration in and around the stream and/or riparian areas. Range management within the Pine Creek watershed has undergone numerous changes at the allotment scale incorporating rotational grazing schemes, riparian pastures, and grazing exclosures that provide complete rest.

The present grazing strategies along Pine Creek were developed largely through the technical review teams (TRT's) established within the CRMP process. These strategies were formally set in place upon completion of the Environmental Assessment for the "Pine Creek Riparian and Fish Passage Improvement Project" in 1995 (Pine Creek EA). These strategies are discussed in detail beginning in section IV. C. 4., as well as in **Appendix 1**.