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Staff Report

on

Recommendation to Remove Pine Creek from the 303(d) List

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1. EXECUTIVE SUMMARY

This document will provide background and supporting evidence to recommend removing Pine Creek from the 303(d) list. Central to the question of water quality impairment is the Eagle Lake Trout (ELT). ELT is a unique subspecies of rainbow trout (Oncohrynchus mykiss aquilarium) native to the Eagle Lake watershed in Lassen County. Pine Creek, the largest tributary of the lake, was historically the main spawning stream for ELT. Recently, the trout has attracted the attention of government agencies, fisheries biologists and the public, as the results of approximately one hundred and fifty years of human impact upon the watershed which have left the fish with reduced habitat and no access to their natural spawning area.

The spawning habitat has been adversely affected by human activities including: logging operations and associated road network; livestock grazing; and stream channelization. These problems led to alterations in habitat suitability indices (HSI). The Environmental Protection Agency (EPA) has designated the following parameters as vital to the life cycle of a self sustaining population of fish: temperature, turbidity, velocity, depth, cover, pool/riffle ratio, riparian vegetation, bank stability and siltation (EPA Water Quality Standards Handbook: Second Edition 1994). As of 1997, the fish did not spawn naturally; they were collected in a trap at the Pine Creek estuary and spawned out in hatcheries. This artificial propagation has occurred for almost fifty years, but has allowed large numbers of trout to be stocked each year. It is expected that, following recent completion of a project to restore access to spawning areas, the ELT will be able to spawn naturally. Additionally, numerous projects have been implemented to reduce sedimentation to Pine Creek from land use activities. In the spring of 2000, 50 ELT were tagged with radio transmitters to verify and monitor access to spawning grounds. Another 40 will be tagged in the spring of 2001.

It was these habitat problems that led to the listing of Pine Creek as a "water quality limited segment" under Section 303(d) of the Clean Water Act. For listed water bodies, the State of California must either develop Total Maximum Daily Loads (TMDLs) or provide evidence that control actions are in place to justify delisting. The Lahontan Region Water Quality Control Board (LRWQCB) has collected evidence which supports delisting, rather than development of a TMDL.

There are three agencies which hold the primary responsibility and authority for the land use and resource management of the Eagle Lake Basin: US Forest Service - Eagle Lake Ranger District (USFS), California Department of Fish and Game (CDFG) and US Bureau of Land Management (BLM). The land holdings are split as follows:

Agency	Acres
USFS	40,280
BLM	29,140
Private and County Jurisdiction	57,375

In 1987, the Eagle Lake Ranger District assessed the Pine Creek Watershed and requested additional input from other agencies and individuals. A Coordinated Resource Management Planning Group was formed with representatives from: USFS, CDFG, National Resource Conservation Service (NRCS), LRWQCB, BLM, University of California Cooperative Extension Service, Ducks Unlimited, Eagle Lake Audubon Society, Honey Lake Valley Resource Conservation District, California Trout, private landowners, and grazing permittees with allotments along Pine Creek.

Since 1991, the Pine Creek Coordinated Resource Management Planning Group (CRMP) has been working to create and implement restoration programs for the Pine Creek watershed. Some Technical Review Teams (TRT) have been created to focus on specific areas.

In 1994, two petitions were presented to the US Fish and Wildlife Service (USFWS) to list ELT as a threatened or endangered species on the grounds that it did not have a self-sustaining population. The National Forest Management Act of 1976 requires that "fish and wildlife habitat be managed to where it would sustain a viable population of existing native and non-native vertebrate species" (Miller and Flores, 1998, pg. 4). In order to be officially listed, it had to meet certain criteria according to the Endangered Species Act. The following findings had to be made: ELT habitat had experienced modification; this modification contributed to species decline; disease is a concern because the species is maintained through hatchery operation; concern that existing regulations are inadequate; and/or there are other manmade/natural factors impeding a natural habitat.

The USFWS decided that the petition presented insufficient information regarding fish numbers and did not address recovery efforts being undertaken by the CRMP group. Because numerous goals had been accomplished on habitat restoration, the trout was not found to warrant listing but "will remain a species of concern to the Service." (USFWS News Release, 1995).

This report summarizes the information about the Pine Creek habitat problems and the work of the CRMP group. It was prepared initially to support delisting Pine Creek in the 1999-2000 review cycle for the LRWQCB"s Section 303(d) list. The report has been updated in light of the review cycle delay, and will be submitted to EPA in lieu of the Pine Creek TMDL commitment.

2. WATERSHED CONDITIONS

2a. LAND USES

This section reports on habitat alterations that have taken place within the Pine Creek watershed, in order to provide insight into the needs of the ELT's historical spawning habitat. The circumstances which contributed to the decline of the resource are a combination of: logging practices and associated impacts, livestock grazing, stream channelization, road/railroad grades construction, over-fishing, stocking of exotic species and barriers to fish that do not provide access to spawning habitat. In addition, it is suspected that current climatic conditions have not favored perennial flow of the river (Platts and Jensen 1991 summary pg. i). The alterations in natural habitat conditions brought about near extinction of the ELT in the 1950s. In 1949, the CDFG created a fish trap at the mouth of Pine Creek. The structure was rebuilt in 1956 and remains in use today, operating with the Crystal Lake, Mt. Shasta and Darrah Springs hatcheries. Each year, numerous hatchery-raised trout are stocked into the lake. In 1999, a critical migration barrier was removed, allowing ELT to pass under Highway 44.

Grazing

Grazing has mainly impacted the valley floors along the main channel and tributary streams, causing an overall effect of: vegetation loss, accelerated erosion, increased drainage and possible shortening of the flow period. The depleted riparian vegetation along stream banks has added to bank erosion and widening of stream channels. As channels enlarged, both stream flow and sediment levels increase. Rangeland erosion has been suspected to be a source of nutrient and sediment loading of Pine Creek into the lake. Through the efforts of the CRMP group, grazing has been limited. Presently, a set number of cattle are permitted to graze specific areas, alternate watering sources have been developed, and riparian zone exclusionary fencing has been constructed.

Timber Harvesting

The main effect of timber harvesting is the creation of roads and railroad grades that occupy the valleys. Since the establishment of the Lassen National Forest in 1905, timber has been harvested from the Pine Creek Watershed. In the 1930s and 1940s, large scale logging operations occurred using a network of railroad grades running in and around the valley bottoms. Ditches were created along the rail line to both drain the roadbed and obtain fill for the grade, changing the natural hydrology of the area. In the case of Little Harvey Valley, the outlet was dropped "by six to eight feet...to facilitate railroad logging and construction" (Young 1989 pg. 5). The existing network of dirt roads has historically drawn upon Pine Creek for water during the summer for dust control. Because of the CRMP group, wells have been created for this purpose.

Roads and Railroads

By the 1920s, digging and filling for grades for various modes of transportation was further affecting the area. "Railroad lines were 'turn-piked' across the valley bottoms, using drag lines and buckets to scoop dirt from one side of the line to build the raised railroad grades... When the rail lines either crossed or paralleled Pine Creek or its tributaries in the watershed's major valleys, their hydrologic effect was to lead runoff downstream, to drain the valleys, and to lower local water tables" (ibid.). State Highway 44 and two railroad grades were built directly through the largest meadow in the 1940s. In all likelihood, gravel used to create the fill for the state highway was also taken from a borrow pit from the immediate area

(interview with Larry Moore of Cal Trans 5/1/98). Other railroad grades were created in Little Harvey Valley, Chaps Flat, and McCoy Flat.

All the old railroad grades and borrow pits are no longer utilized, except for the railroad line that crosses the upper end of Pine Creek Valley, just east of Highway 44. In the mid-1970's, Western Pacific Railroad replaced several trestle sections with fill and culverts which has altered flood flows. State Highway 44 has also created a major barrier to fish passage, preventing access to historical spawning grounds. Channelization created two "superditches" alongside the railroad and the highway in order to divert water to the culverts. A superditch refers to a straight run of river designed to maintain super critical flow (straight, smooth, and constant slope). The diversion channel has since incised and is contributing to extensive deterioration of stream and riparian habitat. It is also a major barrier to fish passage, providing no access to historical spawning grounds.

The Fishing Industry

Historically, the ELT has been a valuable fish. In the 1870s and 1880s, massive quantities of ELT were caught on their spring spawning run, and up to 600 pounds at a time were taken by wagon to be sold in Susanville (Miller and Flores 1998, pg. 1). The trout is still caught today and is currently becoming a world famous trophy fish, especially prized for its rapid growth and size. Each year, approximately 160,000 Eagle Lake Trout are stocked into the lake from various hatcheries (CDFG records). In recent years, eggs have been successfully spawned across the United States and around the world. Opening weekend of fishing season - Saturday, May 23, 1998 - was reported to be "one of the best in memory" as there were numerous sizable fish (Lassen County Times 1998). The local economy is provided with an estimated 10 million-dollar annual fishery income (Miller and Flores 1998, pg. 3 and USFS EA pg. 25).

In addition to the ELT, Brook trout is another sport fish. It is unable to survive in the highly alkaline waters of Eagle Lake, but lives in perennial reaches (historical spawning grounds) of Pine Creek. When ELT begin their spring spawning runs, Brook trout are already several inches in size, having spawned in autumn. These fish compete with ELT for resources and space in the spawning habitat.

2b. HYDROLOGIC INVENTORY

The principal tributary stream to Eagle Lake is Pine Creek, which flows into Delta Bay near Half Moon Beach and Sandy Beach on the northwestern side of the lake. The creek drains approximately half of the entire watershed, contributing 75%-85% of the water flow. Several other short, intermittent streams flow into the lake, the largest of which are Merrill Creek and Papoose Creek on the southern end. Most small tributaries are ephemeral, small stream channels in Harvey Valley, Burgess Meadow and Shoestring Draw end in Harvey Valley and do not contribute significantly to Pine Creek. The surface flow contribution to Pine Creek originates from an area much smaller than the topographic basin. Estimates of the size of the topographic watershed vary: 228 square miles (Raymond Vail and Associates (RVA), 1979, vol. 4, pg. 5 and Young 1989 pg. 1) and 222.1 square miles (Platts and Jensen 1991, pg. 4). This report will use an average of 225 square miles.

Pine Creek encompasses an elevation difference of 3,147 feet, beginning at Triangle Lake in the Caribou wilderness of the Sierra Nevada Mountains. From here it flows to Eagle Lake. Estimates vary on the distance: 39.6 miles (Platts and Jensen 1991, pg. 4) and 43 miles (USFS Environmental Assessment (EA) 1995 pg. 20). The area of trout habitat specifically being dealt with is the lower 31.35 miles starting at elevation 6,400 feet and ending at Eagle Lake, approximately 5,100 feet (ibid. pg. 7).

The river flows intermittently through the watershed to terminate in Eagle Lake, flowing most consistently from March to Mid-June. Records indicate a flow average of 120 days per year, though it has ranged from 0 to 242 (Platts and Jensen 1991 pg. 13). Ten to twenty percent of the stream is perennial; portions upstream of State Highway 44 and near the headwaters. Downstream reaches of Pine Creek are intermittent flowing from March to June, mostly as result of snow pack run-off. In summer, the channel dwindles into separated, isolated pool. There is morphological evidence which supports that Pine Creek has flowed perennially in the past (ibid. summary pg. i), though it is unlikely

that this has happened in recorded time of the area. Extensive wetlands may have covered portions of the current sagebrush meadow valley bottoms in the Harvey Valley, Little Harvey Valley, Champs Flat and McCoy Flat allotments.

The United States Geologic Survey (USGS) has stream flow data available for two stations on Pine Creek. Station 10359250, functioning from 1951 to 1978, was about 1.5 miles north of the Bogard Campground and Highway 44. It measured perennial flow from the drainage of the upper 24.8 square miles of the watershed. Average flow was measured at 7 cubic feet per second (cfs.) (ibid. pg. 13). The USGS calculated flood frequencies for Pine Creek near Bogard are: 80 cfs. for 2 year, 185 cfs. for 10 year and 220cfs for 100 year (Jones & Stokes Associates (JSA) 1992 section 2 pg. 4). Station 10359300 was near the CDFG fish trap, about one mile upstream from the mouth of Pine Creek at Eagle Lake. This has measured the flow of the drainage of the entire 226 square mile watershed from 1961 to 1982. Because this is an intermittent portion of the creek, gauged flow ranged from 0 to 150 cfs. (Platts and Jensen 1991 pg. 13). The USGS determined flood frequencies at this station are: 400 cfs. for 2 year, 1200 cfs. for 10 year and 1650cfs for 100 year (JSA 1992, section 2 pg. 4).

In 1992, Jones & Stokes Associates Inc. was contracted to prepare a hydrologic report evaluating threats to fish passage. The reach area was entirely in the Pine Creek Valley, extending from approximately one mile north of Bogard Campground (near USGS gauging station 10359250) to one mile south of two abandoned railroad grades. The following structures were evaluated with respect to fish passage: Splitter structure; USFS road; State Highway 44 (including north, south, middle culverts, ditch #1 and ditch #2); Union Pacific Railroad (UPRR) crossing; Railroad Grade #1; County Road 105; Camp Ten crossing and Railroad grades numbers 2a and 2b.

Little is known about ELT behavior in its natural environment. The JSA report "determined that use of the fish passage criteria developed for Steelhead trout would provide the most accurate assessment of fish passage on Pine Creek" (JSA 1992, section 3 pg. 2). Based on research of information in other scientific studies JSA used the following parameters for evaluating fish passage: overall flow measurements, minimum depth at 0.6 feet and Alaskan Curve for swimming capability with respect to flow velocity. Though many conclusions were made, the most important recommendations were: removal of the splitter structure and re-structuring of ditches #2 and #1. Detailed information can be found in JSA 1992 report: "Fish Passage Criteria" section 3, pgs. 2-4 and "Hydrologic and Fisheries Restoration section 7, pgs. 1-7.

2c. PHYSICAL INVENTORY

This section explains some general physical characteristics of Pine Creek in order to establish the existing and desired habitat parameters. The referenced work serves as a reference for evaluating improvements done by the CRMP group. The following parameters are considered: velocity, depth, cover, pool/riffle ratio, riparian vegetation, bank stability and siltation. Some of these parameters have been frequently surveyed in other reports; this document will reference information from different sources. There will be a primary focus on the USFS 1995 EA.

Additional morphology has been done by students from the University of California at Chico and Davis, under the direction of Dr. Peter B. Moyle Research has primarily focused on fish populations in Pine Creek, but reports include habitat parameter measurements from 1986, 1988, 1990 and 1994 (see references or biological inventory for further information).

In 1990 a USFS survey was conducted along the lower portion of Pine Creek, beginning at 31.5 miles from Eagle Lake and ending at the mouth. The goal was to inventory the area according to USFS Region 5 Fisheries Habitat Assessment methodology. This following information, adapted from the USFS 1995 EA, represents an overall survey of Pine Creek: Pool:riffle:flatwater ratio - 20:15:65, Average pool frequency: 118 feet, Dominant pool type: lateral scour, log formed, Average stream shade: 19% -69 %, (overall 49%) Stream substrate composition average: 11 % boulders, 26 % cobble, 42 % gravels, 13 % sand and 8 % fines.

Specifically, five valley bottoms conditions are described in Platts 1991. Three of these are re-described in the 1995 USFS EA, using 24 smaller reaches to better describe the area. Also, Platts's description of an ideal valley bottom was utilized as the desired valley bottom for Pine Creek. The three main valley bottom types are: fluvial/V-shaped, alluvial/graded, and alluvial/non-graded. Each will be discussed. The following information is adapted from the Platts 1991 and Forest Service 1995.

"Fluvial /V-Shaped"
Reaches 2-4, 11, 13, 15, 21b and 24
This valley type is found in the downstream half of Silver Lake, approximately half of Harvey Valley, and almost all of the downstream portion of North Eagle Lake.
The following describes the desired condition. "Streambanks should be stable and overhanging. Levees and floodplains should extend across the valley-bottom. Soils may vary, ranging from bouldery loam to gravelly loam with dark colored surface horizons. High quality pools should be common and associated with boulder drops or fallen aspen and pine. Willows with sedge and/or mesic grass understory should be common along the stream channels. Aspen communities associated with conifers, including lodgepole pine, and mesic grass understory should be common on higher and drier positions along the flanks of the valley bottom..." (USFS EA 1995 pg. 21).

The following describes the existing condition: "Platts has described three condition states of Pine Creek Channel: eroded banks, over-broadened, and blown-out, with the latter considered most deteriorated. Nearly 60 percent of this [valley bottom] is in the "blown-out" stage where the stream channel is characterized as an over-broadened "dished-out" channel resulting from the elimination of overhanging vegetation and banks. Conditions are such that unstable sediments are eroded and washed out of the valley bottom during high flow periods. Stream flows are ephemeral and riparian vegetation is absent" (ibid.).

"Alluvial/Graded"
Reaches 7-9
This valley bottom type is found mostly in the upper and lower Pine Creek Valley, the historical spawning area for the ELT. This allotment has experienced much human impact and there are many barriers to fish passage.

Because no examples of the natural state exist, Platts' hypothesis is utilized as the desired condition, which is described as follows: "Drainage will follow shallow swales filled with marsh and wet meadow vegetation that release water slowly throughout the year. Wet meadow and marsh vegetation should probably make up a significant portion of the valley-bottom. The wetland vegetation should enhance on-site water storage, and impede snowmelt runoff and serve to extend the flow period. Mesic grass meadows should occur on the slightly higher and drier positions. (ibid. pg. 22).

The following describes the existing condition: "Platts described three condition states; natural, eroded channel, and dished-out, with the latter in the most deteriorated state. In this [valley bottom] 95 percent of the main stem is in the worst condition as described in the following. On-site water storage and retention of snowmelt have been reduced in these areas due to the elimination of wet meadow and marsh vegetation. Sagebrush has encroached into grassy meadows. Channels are "dished-out" with little vegetative cover and water retention capacity, which further accelerates snowmelt runoff" (ibid.).

In 1992 JSA made a study of the Pine Creek Valley with regards to man-made barriers to fish passage. A sinuosity of 1.5 is the used division value between meandering and straight channels. The sinuosity value of a channel is defined by the ratio between the thalweg length and down-valley distance.

"Alluvial\ Non-graded"
Reaches 1, 5-6, 12, 14, 16-20, 21a, 21c, and 22
This valley-bottom type is found in the upstream portion of Silver Lake, the extreme upper part of Pine Creek Valley, approximately half of Harvey Valley, all of Champs Flat, and the upstream portion of North Eagle Lake.

Because no examples of the natural state exist, Platts hypothesis is utilized as the desired condition, which is described as follows: "Gleyed soil horizons, formed under permanently saturated conditions, were observed within a foot of the surface along stream banks in Champs Flat and McCoy Flat. This indicates that stream channels were once graded, probably with wet meadow and marsh vegetation adjacent to the stream channel. Alluvial aquifers may have extended across most of the bottoms. Wet meadow and marsh vegetation probably made up a significant portion of the valley bottom. Wetland vegetation enhanced on-site water storage, impeded snowmelt runoff and served to extend the flow period. Mesic grass meadows probably occurred on slightly higher and drier positions" (ibid. pg. 23).

The existing condition is as follows: "Three condition states have been described; eroded banks, incised, and blown-out. Nearly 80 percent of the channel in this [valley bottom] is severely degraded or blown out characterized by the following. On-site water storage and retention of snowmelt have been reduced due to the reduction of wet meadows and marsh vegetation. Increased erosive potential and accelerated runoff has caused channel incision. Channels are broadened due to failure of dry stream banks." (ibid.).

3. BENEFICIAL USES

The following explains the beneficial uses and potential uses for "Perennial Stream" Pine Creek in the 637.31 HU No. "Antelope Mountain Hydrologic Subarea."

Municipal and Domestic Supply
Currently, Pine Creek is not utilized as a source of water for domestic purposes and it is not likely that it will be drawn upon, though this remains a possibility.

Agricultural Supply
Grazing is the predominant agricultural practice in Pine Creek, and has drawn on the creek for stock watering. Support of vegetation for range grazing is also considered. Overall impacts of livestock grazing are controversial and cited references reflect different viewpoints. Various reports referenced conclude that Pine Creek suffers from various problems, including livestock grazing. Grazing impacts on trout habitat, according to USFS 1995 EA, are described under physical inventory.

"Livestock grazing is the most important agricultural use in the Eagle Lake Basin and Planning Area." (Lassen County Plan 1982). The areas most heavily used for livestock grazing (including Pine Creek) are owned and/or managed by the USFS, BLM, private timber companies and private cattle ranches. Range management practices have been amended to support optimum levels of livestock grazing and improve the quality and extent of the ELT habitat.

"The quantity of nitrogen and phosphorus from the metabolic wastes of this number of animals is undoubtedly large. It is unlikely, however, that any appreciable amount of nitrogen or phosphorus that is deposited on the land reaches surface streams, ground water or the lake itself...the nutrients that enter the soil are probably taken up very rapidly by range vegetation... (LRWQCB, 1981)

Ground Water Recharge
Pine Creek contributes to the groundwater supply and replenishment within the Eagle Lake watershed. Estimates of groundwater inflow range from 23 percent to 53 percent and averages at 28.5 percent of total inflow into Eagle Lake (RVA vol 4 pg. 26). Calculations based on acreage indicate that Pine Creek can not be adequately supplying of all this groundwater recharge. Other sources are speculated to be Madeline Plains and Grasshopper Valley (ibid. pg. 27).

Freshwater Replenishment
Pine Creek is received by Eagle Lake, and is the biggest source of total fresh water surface inflow, contributing somewhere between 75 percent and 85 percent (Young 1988 pg. 1). Recent estimates calculate approximately 85 percent (Cooperative Approach to ELT enhancement 1994). Since Eagle Lake is a closed basin, water quality of Pine Creek should be considered. Eagle Lake is Section 303 (d) listed for eutrophication (organic enrichment and low DO). Prior to listing, Eagle Lake suffered a fish kill due to low DO.

Water Contact Recreation
Though it is perennial, Pine Creek is fit for use as a swimming hole in certain areas, and white water activities, for instance, could potentially take place during spring flows. Further improved flows could open it up to more of these possibilities.

Non –contact Water Recreation
Hiking, picnicking, mountain biking take place in the watershed. There are numerous campgrounds.

Commercial and Sport fishing
No commercial harvesting takes place, but the ELT sport fishing industry provides the local economy with about 10 million dollars (Miller and Flores 1998 p.3).

Cold Freshwater Habitat
Pine Creek is a source of freshwater that could support a cold water fishery of ELT. Currently, it provides habitat to many native species that are considered part of cold water ecosystems, but are not considered in this report.

Wildlife Habitat
Pine Creek is crucial because it provides a habitat of riparian vegetation that is a source of food for wildlife. Native pronghorn and mule deer have been known to graze in the meadows and other animals use it as a resting area before continuing a migratory journey.

Preservation of Biological Habitats of Special Significance
Though this area is not officially designated as a refuge or sanctuary, the ELT is a species of special significance that is promoted as a candidate for Endangered Species listing. Pine Creek could be considered as supporting the beneficial use of a natural spawning habitat.

Rare, Threatened or Endangered Species
Pine Creek supports the habitat of many species. The American peregrine falcon and the bald eagle are both listed as federally endangered species. The USFS has listed some species as Region 5 Sensitive Species. A petition was presented the ELT for listing as an endangered species, but was denied.

Migration of Aquatic Organisms
The ELT is the only aquatic life known to migrate from the lake into Pine Creek. There are other smaller creeks that flow into the lake, but Pine Creek provides the only suitable amount of flow and upstream spawning habitat.

Spawning, Reproduction and Development
The perennial reaches of Pine Creek are the only suitable spawning habitat, as there are no other substantial sources of freshwater for the fish to migrate to, and year round water is necessary for the juvenile fish to over-winter in. Riparian vegetation should be restored for fish habitat and for the numerous terrestrial arthropods that the trout rely on for food.

4. IMPROVEMENTS

In 1985, the CRMP group was created to address the management of the Pine Creek watershed (delineated from the Eagle Lake watershed). In 1994, the goal of restoring a natural ELT fishery in Pine Creek was added. In 1991, the CRMP group created several technical review teams to focus on specific areas: Splitter, Champs Valley, Harvey Flat, Silver Lake, Lower Pine Creek, Upper Pine Creek, and North Eagle Lake.

Several grants have enabled the CRMP group to commission private consulting firms and conduct more studies. White Horse Associates (Platts and Jensen) were hired to evaluate Pine Creek and form recommendations for improvement. Jones and Stokes Associates were hired to create a hydrologic report of fish passage problems and potential solutions in the Pine Creek Valley. In 1995 the "Pine Creek

Riparian and Fish Improvement Project" Environmental Assessment was published by the USFS in cooperation with the CRMP group. It evaluated the activities, general environment within the Pine Creek watershed, and progress of restoration.

As of November 1997, over 40 restoration projects to address habitat dergradation have been completed, documented and monitored. Physical, biological and chemical inventories function as a reference for gauging the work of the CRMP group with respect to their own goals and the overall focus of restoring a natural ELT fishery and providing the species with the historical spawning habitat. Currently, the CRMP group conducts a yearly walking tour of areas within the Pine Creek watershed. These tours help determine progress of projects and areas which may need more attention in the future. Important work completed between 1997 and the present include:

CalTrans, while renovating State Highway 44 in the summer of 1999, agreed, at their cost, to replace the existing culverts with ones that provide fish passage and help restore Pine Creek to its natural channel. This work was successfully completed in the fall of 1999. Burlington Northern Railroad (formerly Union Pacific Railroad) crossed a section of channel which was also a barrier to fish passage. A ditch running along the grade of the railroad offered no shade, pools or habitat for terrestrial arthropods. Removal of the barrier and restoration of the channel was also completed in 1999.

In order to determine the successful passage and spawning of the ELT with these barriers removed, USFS and CDFG have organized a fish telemetry project. The tagging and monitoring of up to fifty fish has been completed prior to the 2000 spawning migration in order to understand passage into the perennial reaches of Pine Creek. It is planned that an additional 40 fish will be tagged next year, providing insight into potential fish passage barriers (Paul Chappell, Personal Communication, 1998 and 2000).

The USFS has set up numerous transect sites which are being monitored by photos. Depending on the site, the photo cycle varies from bi-annually to once every five years. These photos will document improvements over a long time span. (Teresa Pustejovsky, Personal Communication, 1988 and 2000). Through the efforts of the CRMP group, range management practices have been amended to support optimum levels of livestock grazing, improve the extent of the ELT habitat and encourage riparian vegetation. An updated report will be prepared by the CRMP committee to document the progress on project implementation and monitoring completed between 1997 and the present. This report is due to be completed in June of 2000 (David Lile, Personal Communication 2000)

5. CONTROLS:

Is Pine Creek meeting water quality standards? The standard in question is the support of beneficial uses, Specifically: Cold Freshwater Habitat; Spawning, Reproduction, and Development; and Migration of Aquatic Organisms. Pine Creek was listed on the quantitative basis that there was no ELT use of Pine Creek at that time. No conclusive numerical evidence has been analyzed to support delisting, therefore the answer to the question "Is Pine Creek meeting water quality standards?" is no. However, the nature of the impairment is cumulative over time (sediment contributions from land use) and is structural in nature (well described obstructions to fish passage). Both of these sources of impairment have been systematically removed according to an ongoing schedule fixed by the CRMP in response to USFWS's designation of ELT as a species of concern.

Are controls in place or firmly scheduled which will be sufficient to meet standards? Yes. Numerous agencies including CDFG, USFWS, USFS, and the CRMP intend to continue implementing improvements formalized in planning documents. LRWQCB intends to continue to be an active partner in the CRMP ensuring the protection of beneficial uses through full use of our regulatory authority.

Are the controls specific to the water body, the impairment and the pollutant? Yes. Continued implementation of CRMP sponsored projects include road closures, alternative livestock watering sources, riparian exclosure, fencing, changing grazing regulations, fish barrier removal, restoration, livestock control among others. These completed and proposed projects are formalized by agency commitments and

therefore represent controls. Each of them are appropriate to the impairment and specific to Pine Creek in design and implementation.

Is the stringency of the controls analytically supported? The effectiveness of each individual treatment has been thoroughly documented in published literature. Ultimately, the radio telemetry study will support or disprove the effectiveness of the removal of migration barriers. Successful spawning and rearing will prove the effectiveness of habitat improvements. Presently, a barrier still exists at the point where ELT are artificially spawned. If the radio-tagged fish are observed to be migrating, spawning and reproducing successfully, passage will be constructed around the trap, and the trout to reproduce naturally. Consistent with the evidence used for listing, the basis for delisting is sufficiently analytical.

6. RECOMMENDATION:

Regional Water Quality Control Board Staff recommend the removal of Pine Creek from the 303(d) list. This recommendation is based on the evidence summarized in this report and in the supporting documents and references.

7. REFERENCES AND SUPPORTING DOCUMENTS

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