Step 4 - Reference Conditions

Introduction

Forest ecosystems are dynamic and constantly changing. Historic conditions are used to better understand how time influences watershed conditions. This step describes historic conditions and reference conditions. By comparing current conditions as described in **Step 3**, with past and reference conditions, the Team gains a better understanding of the processes and interactions taking place in the watershed and how management activities influence them. The time period varies by ecosystem features and data availability. Where actual data is lacking, descriptions of historical conditions are constructed from a multitude of sources, inferences, and professional judgment.

This step begins with an historic overview that sets the framework for the step. Following the overview are answers to key questions by issue as presented in Step 2.

Historic Overview

Prehistoric and Ethnographic Background:
Initial exploration within the area of this watershed probably occurred with the movement of fur trappers over the Siskiyous and into Scott Valley (also known as Beaver Valley and Beaver River). The fur trappers of the 1820s and 1830s made early contacts with the Shasta Indians. Included in early exploration, prior to the discovery of gold at Scott Bar, was Lieutenant Emmons who, in 1841, passed through this area leading a contingent of the Wilkes Expedition (United States Exploring Expedition). He is reported to be the first to give an account of the Shasta. They met one of four distinguishable tribal groups in northern California and southern Oregon, the Kammatwa (or "Gamutwa" and "Watido" Shasta - a possible derivation of an early Shasta group). Their territory may have included the canyon from Scott River to Seiad Valley and from Scott River to Horse Creek. There are 11 ethnographically documented village sites along the Scott River from Fort Jones to the mouth of the Klamath River. This tribal group acted as mediaries in communication and trade relations and were first affected by the discovery of gold in Siskiyou County. They were rapidly displaced as hordes of miners rushed to Scott Bar to stake claims and make their fortune. Although there is no exact recorded number of American Indians that were affected by early miners, undoubtedly there was a significant impact to the Indians and the natural resources because, by the 1860s, there were over 2,000 foreign inhabitants in the area.

Shasta village sites along the Scott River and its tributaries were integral to riverine resource exploitation. Shasta families occupied a rectangular dwelling house in winter, moved into brush shelters in spring, and lived there through the summer. Dwelling houses were approximately 16x20x3-feet deep with a "steeply sloping roof, dirt sidewalls and board end walls. Bedding included elk hide or deerskin blankets or imported buffalo hides." Bark houses were used during acorn season but people generally camped out in the mountains during the fall hunt.

Shasta territory was abundant in food resources. Important vegetal and non-vegetal foods include deer meat, bear, small mammals, fowl, trout, salmon, eels, crawfish, suckers, turtles, and mussels. There is some discrepancy as to whether mountain lion and wildcat were eaten. However, they were sought for their fur. Fishing methods included spearing, hook-and-line, netting, and the use of weirs. A major weir was constructed at the mouth of Scott River. "Anyone ... could come and spear fish at such a dam, and the owners were obliged to give to anyone who asked them as many fish as he could carry." Vegetal foods may include acorns, seeds, fruits, nuts, bulbs, greens, berries, and roots. Plants that were eaten or used medicinally included *Helianthus cusickii*, *Clemaatis lasiantha*, the berries of *Osmaronia cerasiformis*, Oregon grape, wild currant, wild celery, *Achillea millefolium* (var. *lanulosa*), *Artemisia vulgaris*, *var. discolor*, white oak, and black fir. When the *Ranunculus occidentalis* bloomed, it was the indication to fish for steelheads. Salmon was an essential part of the diet. To ensure continued harvesting of salmon, each spring ceremonies marked the running of the salmon.

The surrounding mountains were seasonally exploited for deer, grizzly bear, mountain lion, wildcat, acorns, and vegetal materials. It has been noted that the very young children and old people stayed behind in the villages while the more able individuals were gone for periods of time.

The Shasta used fire for better tobacco, wild seed crops, and to drive deer. Fall fires were set when oak leaves began to drop. Fire was set in circles with an opening used for women to stand and rattle deer bones while men, hidden in the brush, shot the deer as they rushed out. Deer as well as elk were also run down on snowshoes and clubbed or shot; however, elk were hunted in the same manner but killed primarily in winter. One method used for hunting deer was used "on the more open hills of the north side of the river, where the oak trees grew. When the oak leaves began to fall, fires were set on the hills. The

ends of the curved lines forming circles of fire did not meet, and in this opening women stood rattle deer bones, while men concealed in the brush were ready to shoot the deer as they rushed out." Brown and black bears were hunted mainly in winter while they were in their dens and to a lesser extent in the fall while people were gathering pine nuts. Hunting for grizzly bear, on the other hand, took place in the spring when they were coming out of their dens.

A variety of beads, shells, and feathers were part of Shasta clothing and ceremonial regalia. Shamans wore yellowhammer feather bands while the other men wore headbands of woodpecker scalps (bills included). Women also wore feathers and woodpecker scalps for ornamentation (bills removed). (Dentalia shell as well as woodpecker scalps were also used as money.) Items for doctoring may have included 10 each of the following items: silver gray fox, wolf, coyote, fisher, and otter skins, eagle wing and tail feathers, and yellowhammer and woodpecker tails. There were also doctors that specialized in rattlesnake and grizzly bear bites. Men's dress included buckskin moccasins with a heavy outer sole of bear or elk hide. During winter, bear hide moccasins were worn with the fur inside. In other instances, the moccasins were made larger for winter with the feet wrapped with squirrel or wildcat skins or stuffed the moccasin with long black moss. Nets were made from wild hemp; deersnares were made from iris. Grapevine and willow were also used. Shasta residing along the Klamath River purchased canoes from the Yurok or Karuk or made dugouts from sugar pine logs. The Shasta made both elk hide and stick armor to be used in times of war.

Extensive trail systems linked the Shasta with mountain resources and facilitated communication and trade primarily with the Karuk, Yurok, and Hoopa. The Shasta gave pine nuts, juniper beads, and obsidian blades for acorns, baskets, dentalia, haliotis, and other shells. The Shasta also delivered wolf skins, woodpecker scalps, and white deerskins to the Karuk in return for pepperwood gourds.

Historic Background:

John Scott has the distinction of being recorded as the first EuroAmerican to discover gold in Siskiyou County. This resounding event took place at Scott Bar in 1850. Along with Scott Bar, other early communities "grew up like mushrooms" along the Scott River. French Bar, a community just below Scott Bar, was noted to have had "three stores and a two-story saloon - the largest and finest saloon on the river" by 1856. The town was abandoned by 1880. Simonville, named after Sigmund Simon, consisted of a store and a boarding house. Adding Johnson's Bar (a camp between French Bar and Simonville), the four communities or camps "together constituted the largest voting precinct in the country in 1856. It has been recorded that "1500 votes were cast here that year." (Voting figures do not represent women and children, Indian, or Chinese minorities.) This was also an ethnically diverse group of miners and entrepreneurs of European and Asian descent. According to the Great Register of 1886, within the Scott Bar Mining District, 66 males voted that year. By 1898, voting records indicate that the number was approximately 190 voters. Later, based on a homestead application of 1910, the "village has about 200 inhabitants." If these population figures are accurate, this may indicate a boom and bust mining economy where the cost of mining and accessibility of gold played a key role.

The Chinese, also early arrivals to the Scott Bar area, followed the miners and successfully recovered gold by reworking old claims. "The low gravels between the Virginia Hill Cut and the Scott River were reputed to have been very rich, having been worked in the early days by Chinamen, who derricked the gravel after damming off the river." As the Chinese became more successful, some formed mining companies that were located near the mouth of the Scott River. This was also the general location of Chinatown. Some Chinese miners would eventually leave but those that remained became cooks, operated a laundry, or became hired help. By the early 1900s, there were no Chinese in the area of Scott Bar.

Mining claims were categorized into river, bank, gulch, and hillside claims. These claim types were defined under the Placer Mining Laws of Scott River Mining District as amended in 1867. Through extensive systems of wingdams, ditches, sluices, and long toms, early miners were able to divert the river to extract gold from the old gravel beds and benches. Resources such as lumber and water, was an integral part of mining. A sawmill, located at Tompkins Creek, supplied lumber for the San Jose Mine. The associated San Jose Ditch, twelve and one-half miles in length, had a capacity of 3000 miner's inches. It was felt that if the ditch was enlarged, it would double the amount of water delivered to the Roxbury property. (Early miners used a miners inch box, which was a special type of free flowing orifice. A miners inch is the quantity of water, which discharges through a square inch of opening under 1 foot of head. This was primarily intended for measuring small quantities of flow and eventually became the cubic foot per second unit commonly used today. For northern California, a miners inch was 11.25 gallons per minute.) The Shores Ditch transported water from the McCarthy place, about 6 miles away, to as far as Whiting Hill. According to a Mines and Mineral Resources Report discussing the Quartz Hill Mine, "ore occurs in slate, and has been worked both as a quartz and hydraulic mine, the surface having been worked as a placer deposit at one time; water is obtained from Mill Creek through two ditches, one 6 miles and the other 5 miles in length." While extensive systems of flumes and ditches transported water to the mines, to a lesser extent water was also used for irrigation. Five ditches on the north side of Mill Creek supplied household, mine, and irrigation water.

There are more than 70 documented mines within the watershed; approximately 70% were gold, 24% chromium, 3% manganese, 1% graphite, and 1% stone mines. Large amounts of chromite and magnesium were produced during World War I. By the 1940s, several chromite mines were active within the watershed.

Mining operations were able to remain active at least three-quarters of a year. It is assumed that mining could not continue during periods of drought. There are indications; however, that mining may have sporadically ceased during periods of flooding or high water. "During the winter months, the river, at times, carries an immense volume of water, as was evidenced by the storm of February 20th to 23rd of 1927, when the flow very likely exceeded 40,000 second feet." Subsequent episodes of flooding, such as the occurrences of 1955 and 1964 for example, scoured Tompkins Creek. Another reference supporting the above mentions that, "Except on rare occasions will freezing weather interfere with work, and then only for a few days at a time. At no time during the present winter would freezing weather or snow have interfered with work. Snow sometimes reaches a depth in excess of a foot, but melts in a few days. The average yearly precipitation for this section is about 25"; however, this year --1927-- the precipitation has reached 43 inches to March 15th; the lowest season's rainfall on record, being that for the years 1923-24, was 10.48 inches."

The initial and cheapest method to recover gold was through placer mining and the use of wingdams. The only prerequisites for placer mining were a pan, shovel, and a strong back. Early placer mining could be performed by one individual or several men and did not require a large expenditure of capital especially when compared to later mining technologies. In early 1851, prior to the discovery of gold in Yreka, a wingdam was constructed on Scott River "just below the bridge and on the opposite side from the present town of Scott Bar." The early expedition of Redick McKee had also noted that by October of 1851, almost the entire river from Scott Bar to the mouth was "turned from its bed" with "solid stone or log embankments, several feet in height and thickness."

By the 1870s**,** more capital was invested in several mines by companies such as the Roxbury Hydraulic Mines, Inc. to pursue hydraulic and hard rock exploration. Some of these investors were located back east, in Seattle, or in the San Francisco area. Hydraulic mining continued sporadically into the early 1900s and again during the 1930s during the depression. This form of mining was often concurrent with hard rock mining. As one example, the Roxbury Mines, consisting of at least 15 properties, was supplied water from the San Jose Ditch. " This ditch has a capacity of 3000 miner's inches, and by enlarging it, can probably be utilized in the plan for bringing 6000 miner's inches of water to the Roxbury property." Based on a 1907 Mineral Resource study, "Siskiyou has the largest number of productive mines of al the counties in the State, the total being 143, of which 36 are deep quartz mines. Of the 107 productive placers, 66 are hydraulic, 4 drift, and 37 surface placers. There are more hydraulic mines now being worked in Siskiyou than in any other county in California, there being no legal restrictions there as to impounding or otherwise caring for the debris." Also, according to a state review of registered mines in Siskiyou County in 1935, it appears that "many of the county's mines were working or in the process of re-opening in 1933-34." By 1935, George A. Milne and George Noonan leased the property where hydraulic mining methods were again used.

Farming developed early and concurrently with mining in the Scott Bar and Mill Creek area to supply food to the miners. (Oftentimes, mining claims were also reworked to grow alfalfa and then re-entered later for additional mineral extraction.) Some of these properties eventually became homesteads through the *Homestead Act of 1906* (34 Stat. 233), which provided that "those lands within Forest reserves chiefly valuable for agriculture were to be released for homestead entry purposes." Orchards were planted and fields plowed and irrigated to provide alfalfa and grass for cattle, pigs, and chickens and to provide food for the home. (It appears that enough apples were produced that "Searles Tompkins sold wagon loads of apples to the teamsters on their way back to Red Bluff.") By 1914, a homestead application submitted by Jefferson Ryan lists 10 acres of apple and peach trees and alfalfa. In describing (his) property, Edward Leduc states, "Some of the land on our place was rather steep. It was irrigated by taking water out of the main ditch into small sluice boxes about every 100 or 150 feet apart. About every 50 feet down the hill a small box was installed with gates in it that closed to let the water run out parallel into small ditches. Generally, we cut two crops of hay a year and sometimes three if the weather was favorable."

Early documented use of the watershed by livestock dates back to the late 1800s. At this time, there may have been over 1900 head of cattle grazing. The cattle were moved seasonally in seeking a continued source of forage. In the spring and summer, the cattle grazed in the foothills. The mountains were used for grazing in the summer and to the valley during the winter. It became common practice to burn the rangeland to create better forage production. One early reference mentions "possibly eighty or ninety cattle" near the mouth of McCarthy Creek. Another reference states, "There may have been as many as 180 cattle on one piece of property in the Mill Creek area." To address the continued high use of mountain rangelands and subsequent degraded conditions in some areas, and the need to regulate use of public lands, the Forest Service published a "Use Book." Printed in July 1905, it states, "Every effort will be made to assist the stock owner to a satisfactory distribution of stock on the range. Grazing permits for the 1906 season would be given preference in the following

order; small nearby owners and then persons living in or close to the reserve whose stock have regularly grazed upon the reserve range and are dependent upon its use. The protection of settlers and homebuilders against unfair competition in the use of the range is a prime requisite. Priority in occupancy and use of the range and the ownership of improved farming land in or near the reserve will be considered, and preference will be given to those who have continuously used the range for the longest period." Range allotments were established giving a schedule of the number of livestock to be grazed and the length of season. "Since 1947 overall numbers have declined. Allotment boundaries were reduced and improvements including fencing were implemented to regulate livestock use and improve management.

To give some indication as to the varied means of subsistence and land use within the watershed, the following excerpts are just a few examples: of the Schuler Drift Mine - "put sluices in river and ran gravel out in cars and washed same in river.... The present claimant has worked mine both by tunneling beneath the surface and open cut all on bedrock ... Main tunnel 400' and side tunnels 600'... 12 acres in alfalfa, few head of cattle and hogs, but due to the dry winters the past three years, he has to make a living somehow ... 5 acres sluiced or drifted out, shaft 55' deep, open cut about 75' long ... A large shaft and portions of said property ground sluiced and worked off. The claimant further states that he has a good and inexhaustible water supply both from Scott River which flows in a general northwesterly direction to the east of said property and from water ditches which are above said claim on the mountain side and from a gulch that extends down along the north side thereof"; of the Ruby Placer Mining Claim - "digging ditches, running open cuts, sinking holes, shafts, leveling down banks, cleaning bed rock, and actual Placer mining. The soil is a clay and gravely and is used at the present time for agricultural purposes and orchard."

The extractive process of mining could not have taken place without the availability of lumber. Similarly, this same process affected the vegetation as well. Lumber was a critical commodity that was produced and utilized for almost every level of human activity. By 1927, according to the Roxbury Hydraulic Mining Company, "the very small amount of standing timber on the properties suitable for sawing into lumber hardly deserves mention as a resource; however, ample timber can be purchased from the United States Government at reasonable prices, and several miles up the Scott River are two large acreages of privately-owned timber of excellent size and quality, most of the growth being "fir", which is more desirable for flume construction than is "pine". One parcel contains between 6,000,000 and 8,000,000 board feet and the other about 4,000,000. Negotiations are under way for the purchase of the larger tract, as it will require about this amount of lumber to construct the flume recommended." Lumber that was produced in the Scott Bar and Mill Creek area was also rafted to the adjoining mining district on the Klamath River.

Forest Service management of the watershed took on a physical presence through the construction of the Gold Flat Guard Station along the Scott River. To administer activites in more remote, mountainous areas, the Marble Valley Guard Station served to facilitate and monitor range management and fire activity within the Marble Mountain Wilderness. It was not until the 1930s that another wave of construction took place. The depression era found many able-bodied men involved in a variety of work projects on national forests. Known and the Civilian Conservation Corps (CCC), roads were built, and lookouts and administrative sites constructed. Scott Bar Mountain Lookout, Scott Bar work center, and Marble Valley cabin and barn are existing examples of their presence.

Fire prevention, according to a 1929 and 1936 KNF brochure, was one of the primary duties of Forest Service officers. To protect resources, the KNF "has constructed 1,000 miles of trails and 150 miles of roads, and has maintained many miles of existing roads and trails. Telephone lines, totaling over 500 miles, connect 12 fire lookout stations." Fire exclusion, according to KNF policy, "is the only practical principle on which our forests can be handled, if we are to protect what we have and to insure new and more fully stocked forests for the future."

Recreation, other than car camping, was almost nonexistent until the federal government passed the Act of March 4, 1915, which enabled national forests "to permit the use and occupancy of suitable areas of land within the national forests...for the purpose of constructing or maintaining summer homes and stores." As a result, occupancy permits enabled the construction of summer residences such as Kelsey Creek Tract and Eagle Tract, along the Scott River. (The 1955 and 1964 flood destroyed several Kelsey Creek residences.) Steelhead, a resort near the mouth of Scott River, was constructed around the 1920s to provide lodging primarily for people coming downriver for the great fishing. The Klamath River, especially during the 1920s, was nationally renown for great fishing. The resort received a significant amount of damage during the 1964 flood and shortly thereafter burned to the ground.

The means of transportation significantly influenced communication and the movement of goods and services. The historic Kelsey Trail of the 1850s was initially used to transport supplies from the coast to the Scott Bar area. The old stage road led from Scott Bar over Scott Bar Mountains and on to Scott Valley to supply beef and grain products to the mining communities. Later, as competition led to development of a trail leading to the markets in Redding (Reading), Red Bluff, and Sacramento, the Kelsey Trail was abandoned. In the 1896 election, one urgent issue was to elect someone who "might be able to

do something towards improving the "canyon" road from Fort Jones to Scott Bar, over which the entire section must freight their supplies." More recently, a series of maintained trails, such as Kelsey Creek, Paradise Lake Trail, and the PCT, offer access to many remote and scenic areas. Within the Marble Mountain Wilderness, these trails continue to provide a unique experience for visitors who enjoy camping, hiking, and fishing, in remote, mountainous areas.

Aquatics

Hillslope Processes

Key Question #1 - What were historical (pre-Euro-American settlement) and reference erosion rates, and what natural processes and post-European activities affected them?

The metamorphic rocks of the Klamath Mountains originated over 200 million years ago under the ocean as igneous bedrock (peridotite, gabbro, and basalt), upon which fine-grained mud was deposited. These rocks were emplaced on the margin of the continent by the processes of plate tectonics. About 60 million years ago, volcanoes, similar to the modern Cascade Range, erupted through the marine rocks. These volcanoes have been completely eroded away, exposing their roots, the granitic rocks. There are no rocks younger than the granitic rocks in the Klamath Mountains.

Thick red soils in the project area are formed of slope and channel deposits, relicts of times in the past million years that erosion and uplift rates were different from today. If the erosion rate was higher than today, as would be expected during the time that glaciers occupied the high canyons, sediment might accumulate at a higher rate than today. When the Klamath River or one of the tributary streams was dammed by a landslide or differential uplift, sediment would locally accumulate at a higher rate than today. If the climate was drier than today, sediment would be less efficiently produced and transported, so sediment sources would tend to accumulate on the hillslope, but channels may tend to deplete stored sediment.

In reality, the long-term sediment budget is controlled by the interaction of climate, uplift, and erosion. Although rare, movement of dormant landslides may be associated with seismic shaking. Although the environment is erosion-dominated, some sediment is stored for as long as tens of thousands of years. Thick red soils lying within a few hundred feet elevation of the modern river channel often contain rounded cobbles. The river and streams deposited well-rounded cobbles; elsewhere more angular cobbles indicate debris flow deposits. Some thick red soils are interpreted to be at or near the rocks from which they formed. At higher elevations, river and landslide deposits are more deeply weathered, indicating greater age. Deeply weathered granitic rocks are similarly interpreted as stored products of weathering. As these deposits are uplifted and undercut by the river, landslides and erosion remobilize them. Strong earthquakes occasionally accelerate the rate of landsliding. Eruptions of and earthquakes associated with the Mount Shasta volcano have likely put large pulses of sediment into the Klamath River, although no deposits have been found. The rate of landsliding and erosion vary through time.

In historic time, man has greatly increased the rate of landsliding and erosion by hydraulic mining of old river deposits, dredging of younger river deposits and road construction. Road construction and maintenance have also increased the rate of erosion, landsliding, and sediment production. Man-made dams influence river channel form by retaining sediment and reducing stream power in flood flows. In theory, clear water flows below the dams make up their sediment load by transporting channel deposits at an accelerated rate.

Riparian Areas

Key Question #1- What are the historic and reference riparian and stream conditions in the watershed?

There is a limited amount of information pertaining to riparian conditions prior to Euro-American settlement available based on historical accounts. In the early 1830s, Hudson's Bay Company trappers discovered the Scott Valley and Scott River. They described the Scott Valley as all one swamp caused by beaver dams (Wells, 1881 in Sommarstrom, 1990). In spite of trapping, the earliest map of "Scott's Valley" in 1853 indicates that beaver dams were still obvious around Kidder Creek near Greenview. The map also shows a defined stream channel for the Scott River rather than a marshy area of ill-defined channels (Sommarstrom 1990).

This general perception of beaver dams dominating the riparian zones of the Scott Valley probably applies to the lower gradient reaches of Scott River tributaries within the analysis area as well as the Scott River. These areas would have been dominated by wetland vegetation periodically altered by beaver activity or severe flooding. The riparian zones of higher gradient, more confined upland portions of these same streams were dominated by upland trees except in close proximity to perennial water. Intermittent streams had vegetation little different than adjacent uplands.

A review of 1944 air photos shows that in general, many upland areas were relatively open compared to current conditions, especially in areas not impacted by timber

harvest. By contrast, the riparian areas along larger, upland area streams appear mostly dominated by dense stands of timber. Apparently, the frequent fires that periodically reduced tree densities in the mid to upper slope areas had relatively minor effects on riparian areas. Most riparian areas probably had older conifers trees at densities near site potential. Infrequent severe flooding and debris torrents would decimate vegetation within the flood zones and create areas of early seral vegetation. Overall, about 70-80% of upland riparian areas were fully stocked mid to late- seral stages.

Little is known about riparian and stream channel characteristics and aquatic habitat conditions prior to the onset of activities such as mining, road building, and timber harvesting that began in the mid 1850s. It is assumed the habitat was in good condition to support the salmon and steelhead populations that were said to exist by miners and R.D. Hume in Snyder's (1931) report. The extent of change resulting from removing beaver, mining, and other human activities had on the physical characteristics of the streams, including pools, fine sediments, riparian vegetation, and stream channels, is unknown, however, can probably be considered extensive since streams were moved across their valleys as gravels were mined for gold. In 1934, streams were lower than they had been during the previous decade and hydraulic mining was still occurring in areas of the Klamath Basin. Water quality conditions were considered fair and had "improved over 1933 when the Klamath River was at times very badly polluted" (Taft and Shapovalov 1935). Moffett and Smith (1950) state that the Klamath River and many of its tributaries “ran silty.”

Extensive cattle, sheep, horse, and mule grazing historically took place in the analysis area. As the Scott Valley became settled and ranches were established, cattle and sheep were moved into adjacent mountains to forage. In the early 1900s, grazing was still largely unregulated and livestock numbers were as much as five times higher than are currently permitted on National Forest Lands. Grazing seasons were also much longer than today.

Factors affecting riparian habitat quality may vary from stream to stream, however, the physical and biological components that create and maintain riparian habitat are similar. These components are important within the aquatic, semi-aquatic, and surrounding riparian and upslope area and are able to sustain the character of a stream corridor. They are also continually changing as ecological processes within the watershed modify and reshape the habitat. Together, these components maintain and restore productivity and resilience. The following describes how these components contribute to a fully functioning aquatic ecosystem.

Upslope processes are critical in providing and maintaining suitable amounts and intensities of water flow, and natural delivery mechanisms of sediment without accelerated rates of erosion and sediment yield. Headwater areas are important for exchange of water, sediment, and nutrients. The timing, magnitude, and duration of peak and low flows are critical to sustaining aquatic habitat and patterns of sediment, nutrient, and wood routing.

Riparian areas are essential in maintaining stream temperatures, dissolved oxygen levels, and other elements of water quality. They also ensure large wood recruitment, stabilize the channel, provide for filtration of sediment, and increase habitat diversity.

Forested riparian ecosystems should have a diversity of plant communities. Late-seral stages in a community should predominate and consist of endemic conifer and hardwood species, with intermingled areas of early-seral stages such as grasses and forbs. Ideally, this should be a multi-layered canopy including signs of decadence such as standing and fallen dead trees. An overstory of conifers should provide future recruitment of large wood, and shade and thermal cover of the streams and lakes. An intermediate layer of mixed deciduous and coniferous vegetation should provide thermal buffering, nutrient cycling, bank stability, and recruitment of terrestrial insects as an aquatic food source. The vegetative canopy should provide stream surface shading during the summer and should be at site potential.

Wet meadow areas should have stable overhanging banks with herbaceous vegetation and/or woody vegetation providing canopy cover, bank stability, and sediment filtration. The water table should be near the meadow surface, with the stream meandering through the meadow. Few signs of gullying or compaction should be apparent.

Diverse and complex instream habitats are essential for all life stages of aquatic species and should include large, deep pools for holding and rearing. Large woody material is critical for maintenance of these diverse habitats as it maintains stream channels and provides a source of cover through a range of flows and seasonal conditions. A diverse substrate is necessary with small percentages of fines and embeddedness for successful egg and alevin development. Sub-surface interstitial areas are also critical for invertebrates and juvenile fishes. An abundance of cool, well-oxygenated water, free of excessive suspended sediment is important for aquatic species production and survival.

Aquatic-Dependent Species

Key Question #1 - What were the distributions and population sizes of aquatic dependent species?

It is difficult to determine the historical population size of salmon and steelhead in the Scott River watershed, however fish numbers were sufficient to supply the primary subsistence food and be the basis for the economy of the indigenous people prior to the mid 1800s. Starting in the 1820s, fur trappers removed thousands of Beaver from Scott Valley (then known as Beaver Valley), which set in motion the immense changes in the character of the Scott River and its tributaries (Scott River Watershed CRMP 1995). In the early 1830s, the Hudson Bay trappers discovered Scott Valley and its river. They reportedly trapped beaver on both forks (east and south) and described the Scott Valley as all one swamp caused by beaver dams (Wells 1881 in Sommarstrom 1990). The removal of beaver from the valley was the first unnatural change in the landscape. This likely affected tributaries as well. After 1850 and the discovery of gold in the area, fish populations were subject to additional human impact including mining, commercial timber harvest, water diversions and dams, artificial propagation, and other historical activities. The 1861 flood, in combination with mining activities, caused the Scott River to alter its course from the west side to the east side of the valley.

Stocks and species of salmonids that existed at the time of cannery development on the Klamath in 1912 included spring and fall run chinook salmon, coho salmon, and steelhead trout. Three fish canneries were operating at the mouth of the Klamath River, which was heavily fished for salmon with no limits. Steelhead trout were an incidental catch since migration times coincide with salmon. Both Snyder and R. D. Hume in Snyder's (1931) report state that historically the spring run of chinook salmon was the "main run" of salmon and the population was very pronounced in the Klamath River basin. "These spring salmon have now come to be limited" and "practically extinct" while the fall run was reduced to "very small proportions" (Snyder 1931). By the mid 1930s it was reported that anadromous fish populations within the Klamath Basin were already significantly jeopardized (Taft and Shapovalov 1935). They reported, "Unfortunately no exact recorded facts exist concerning the size of the present and past runs of steelhead in the Klamath River. It would, nevertheless, be perfectly safe to say that the general consensus of opinion of fishermen and residents on the river is that these runs have decreased alarmingly, particularly during the past few years." Suggestions during the early 1930s to determine the decline of the spring run chinook included mining operations, over fishing both in the river and ocean, irrigation, and the building of Copco Dam.

Mining had other impacts to the Klamath fishery. "During the period of placer mining, large numbers of salmon were speared or otherwise captured on or near their spawning beds, and if credence is given to the reports of old miners, there then appeared the first and perhaps major cause of early depletion" (Snyder 1931). Taft and Shapovalov (1935) studied occurrence of benthic invertebrates in Klamath River tributaries and found mined areas had consistently fewer organisms than non-mined areas.

In 1965, the California Department of Fish and Game estimated the Scott River's fish population at 10,000 chinook, 2,000 coho, and 20,000 to 40,000 steelhead (CDWR 1965). These estimates were probably only a portion of the average fish populations that existed within the Scott sub basin in the early 1800s.

Many dams were built in the Klamath system to divert water for mining, agriculture, and domestic use. These dams and diversions blocked salmon and steelhead from more than 200 miles of spawning and rearing habitat along Klamath River tributaries (CDWR 1960 from CH2MHill). Unscreened or poorly screened water diversions and ditches resulted in a significant loss of juvenile fish in which Taft and Shapovalov (1935) reported as the "most serious present loss of trout and salmon". During their review of Klamath River ditches most were found to contain juvenile fish. In a survey of diversions in the Klamath basin, Scott River was reported to have seventy diversions, most of which were unscreened. The vast majority of screened diversions needed repair.

Artificial propagation began within the Klamath River Basin in 1896 when eggs taken from a tributary to the Sacramento were raised to fry and introduced into the upper Klamath. Eggs from the Sacramento River were also taken in 1907, 1911, 1913 and 1917 for a total of 4,950,000; these were released in the Klamath River. A small hatchery was established at the mouth of the Klamath River in the 1890s that released fry originating from the Rogue River, and after Copco Dam was established, a hatchery was developed at Fall Creek (Snyder 1931). The affect these historic hatcheries and resulting fish had on the Scott River is unknown. A hatchery was also built to mitigate the effects Iron Gate Dam would have on the salmonid fishery.

In general, numbers and the variety of life history patterns for all anadromous fish populations (steelhead, coho and chinook salmon) within the Scott system and the analysis area are assumed to be substantially reduced from historical numbers and patterns. Historically, sustainable populations of spring chinook and summer steelhead, existed within the sub basin but these stocks are either no longer present or occur very infrequently in low numbers. Fall chinook were able to access historical spawning grounds in the upper mainstem Scott and in the East Fork and South Forks of the Scott with regularity. Now, as a result, it is assumed that proportionately more fall chinook spawning occurs today in the analysis area than historically, due to lack of access to upstream areas. Annually, stream and river flow usually return to near historical levels by the time coho salmon and winter-run steelhead seek to access historical spawning grounds. An exception may be infrequent years when fall rains are

substantially delayed, not allowing the water table, depleted from a season of ground water pumping, to rise in timely fashion.

Historically, it is assumed that tributaries throughout the sub basin generally illustrated higher juvenile salmonid densities than at present due to better seeding of the habitat by more numerous adult, anadromous fish. Tributaries and the mainstem river generally displayed a greater diversity in species and size classes than at present due to past robust populations of steelhead, coho, and fall chinook.

Historical anadromous processes (upstream migration, egg development, rearing, downstream migration) on the average functioned more efficiently than at present due to better habitat connectivity and stream conditions. Rearing conditions were more favorable for juvenile fish staying in the sub basin during the summer and the winter, hence there was less selection against coho and steelhead populations. Low stream flows and abnormally high stream temperatures historically impacted juvenile salmonid out migration less frequently. (Today, when ditch diversions are initiated in the spring for agricultural purposes, stream flow in some tributaries, such as Kidder and Shackleford Creeks, is observed to go dry within a few days. This leaves all aquatic species, including coho and steelhead juveniles, stranded in pools, which eventually dry a few days later. The California Department of Fish and Game (CDFG) conducts an annual program to rescue a portion of these fish and place them downstream in the main Scott River. This process occurs outside of the analysis area). Historically, no unscreened ditch diversion existed to divert and trap out migrating salmonids. Unscreened ditch diversions exist today in the analysis area in Tompkins and Mill Creek.

Lakes within the analysis area were all assumed to have been historically barren of fish. Likewise, analysis area streams located above long term and significant barriers, such as upper Kelsey Creek, were probably also devoid of fish. (It is assumed that fish exist in these upper reaches due to escape from artificially stocked lakes located in headwater areas and/or previous stocking). Historically, no stocked fish of any type existed within the Scott subsystem and no genetic intermixing occurred between hatchery and wild stocks. Today, the CDFG produces an annual report of all high mountain lake and other stocking occurring in Siskiyou County, including the analysis area. Records are also available on the district illustrating out plants of hatchery anadromous fish within the Scott subsystem from the Irongate and Trinity River hatcheries. Most out plants within the Scott subsystem from these two hatcheries occurred in the 1970's and 1980's. Approximately, 10 different out plants were made during this time and most of these occurred outside of the analysis area in the upper Scott sub basin. Most out plantings involved the release of surplus sea-run adult steelhead. Canyon Creek and Middle Creek within the analysis area were planted with these stocks in 1983. Adult coho salmon were out planted in the South Fork of the Scott and Shackleford Creek (just upstream of the analysis area) in 1970 most releases of either steelhead or coho salmon involved 50-100 fish. Undoubtedly, fish transfer and stocking from unknown sources, by pioneer families, also occurred. The impact of these operations and hatchery planted stocks, if any, on the wild fish within the Scott sub basin, is unassessed. Stocked fish, such as bass, catfish, and sunfish, are present in farm ponds located in the valley portion of the Scott. High water periodically releases some of these fish into the mainstem Scott River where they are infrequently observed during snorkel dives and out migrant trapping operations. (The impact of these fish in unknown but it is assumed to be not significant).

The historical numbers and viability of other non-salmonid aquatic populations within the Scott system are unknown. Lamprey numbers are assumed to have been much larger in the past. One individual from Scott Bar observed that mussel beds in the lower Scott River were much more numerous, and the individual mussels themselves, were much larger before the 1964 flood, than currently. They also observed that the mussel beds today may be recovering, but the individual size of each mussel is still small.

Terrestrial

Forest Health

Key Question #1 - Under natural disturbance regimes, what were the vegetation communities, and what were the stand densities of the conifer communities?

To visualize the condition of the vegetation prior to fire suppression, it is important to think of the documented fire return intervals known to have naturally occurred in the area prior to the fire suppression era. Research done on fire-scarred trees by Taylor and Skinner (1996) on Thompson Ridge (14 miles northwest of the analysis area) indicates that the fire return interval on south aspects averaged 8 years, and on the east aspects the fire return interval averaged 16 years for the pre-settlement time period (prior to 1850). The Taylor and Skinner study spanned the years of 1627 through 1992. Another study looked at changes in openings over a period of 41 years during the suppression era (Skinner 1995). This study indicates a decrease in the size of openings by over 10% has occurred during the 41-year study period.

Based on these studies and the effects of the natural frequent fire return interval, early-seral vegetation and openings were more prevalent prior to the fire suppression era. The vegetation communities that exist currently were

present historically, although changes have occurred in seral-stage, density and the area occupied by fire tolerant and intolerant species. The natural fire regime favored fire tolerant species and communities.

The Douglas fir mixed conifer community was naturally maintained with frequent fire in a much more open condition than is found today. Stand densities currently found in this community are very dense, with 73% of the community having greater than 60% crown closure. Most of this density consists of vegetation that has grown in during the fire suppression era. In natural stands the older (pre-suppression era established) vegetation contributes between 20% and 60% of the crown closure depending on the site. The understory was naturally maintained mostly with grasses, forbs, and scattered shrubs and hardwoods (including black oak) with reproduction of conifers occurring in intensely burned areas that would be protected from the next fire passing through the area.

The ponderosa pine mixed conifer was naturally maintained in a very open condition. Much of this community could be described as grass-covered slopes with scattered pines. This community is found mostly on south aspects and the very frequent fire returns on these slopes maintained the naturally occurring grasses, black oak, and ponderosa pine.

Due to site limitations, the ultramafic mixed conifer community has changed the least over time. Currently this community is maintained with less than 60% crown closure. Naturally the Jeffery Pine found on these sites was maintained in an even more open condition than it is currently. This community could be characterized as very open with scattered trees and a rich diversity of wildflowers, grasses and forbs that were adapted to these ultramafic soils and maintained with frequent fire.

In the white fir mixed conifer community with influence by frequent fire, stands were more open and the understory of these stands were maintained relatively clean of litter and open with few sapling and pole-size trees or shrubs. Fires were more frequent on south and west aspects, which limited the extent of this community. This community is intolerant frequent fire, which would limit the area occupied to north and east aspects. Frequent fires cleaned the forest floor of litter and understory vegetation. In this frequent low to high intensity fire regime, there were pockets of moderate to high fire intensity that helped to create a mosaic of seral stages. Some sites experienced fire less frequent than others. These were found mostly in draws and riparian areas, where a thicker understory of shade-tolerant vegetation was often present. Even these areas were maintained with much less coarse woody material and fewer snags than found on these sites today.

The higher elevation true fir community is much cooler and moister than the lower elevation vegetation communities, resulting in a different natural disturbance regime. Lightning fires, wind throws, and insect out-breaks were the primary agents of change in this community. True fir is very sensitive to damage by fire and sometimes even low to moderate intensity fires can kill large trees. Fires were mostly limited in size, with infrequent large fires. In combination, wind throw, insect damage, and lightning fire would create a pattern of groups of even-aged trees that covered areas from several acres to several thousand acres.

In the higher elevation sub-alpine areas, lightning fires were common, but moist conditions, lack of fuel continuity, and barren areas limited the spread and intensity of fires. This community is found in a condition very similar to what was maintained historically, although the loss of frequent small-scale low intensity fires has promoted a build-up of dead and down material and decadence in understory shrubs.

With the natural fire regime, the hardwood and hardwood mixed conifer communities were naturally more extensive. These communities do well with frequent fire. South and west aspects were dominated by grass, shrubs and hardwoods (Oregon white oak on better sites, canyon live oak on harsh sites).

Riparian vegetation is found in close proximity to streams, lakes and wet meadows. Natural conditions have changed along streams (mostly the Scott River) that were heavily impacted by mining operations i.e., around Scott Bar to the mouth of the Scott River. These areas have been recovering to some extent since the end of hydraulic mining era, which for the most part was from the late 1850's to around 1900. Severe flood events that occur every 10 to 20 years remove riparian vegetation especially along the Scott River and vegetation. Riparian vegetation usually re-establishes quickly after flood disturbances. The last severe flood event occurred on New Years Day 1997.

Aspen is a relic of the ice age that was once more widespread, but is now found in isolated high elevation pockets. At the beginning of the settlement period (1850) the areas occupied by aspen were slightly larger than they are currently. Domestic livestock heavily grazed aspen. Grazing removed sprouts and saplings not allowing new growth. Aspen is a fire-adapted species, sprouting readily after fires. Fire suppression and grazing has encouraged decadence in aspen stands and allowed encroachment by conifer species to occur.

The shrub natural community except for areas that were impacted by the fires of 1987 has gotten smaller and more decadent. This community is mostly found in high elevation harsh sites (rocky, shallow soils), which have not changed over time. The removal of small-scale low

intensity fires has allowed for a build-up of litter and for decadence in the shrubs.

The shrub-harvested community was non-existent prior to settlement. These areas were composed of the adjoining vegetation communities, mostly Douglas fir mixed conifer. Seed descriptions for Douglas fir mixed conifer, ponderosa pine mixed conifer, white fir mixed conifer, and true fir.

Key Question #2 - What were the endemic levels of mortality in conifer stands?

Endemic levels of insect/disease infestations have probably always been present in the landscape. However the types and amounts of these infestations probably were different prior to active fire suppression activities than today. Insects/diseases, which were dependant upon oak, pine, and Douglas fir were probably more prevalent, while those favoring white fir as host were less prevalent (dwarf mistletoe and cytospora). Also because there were fewer incidences of high stocking levels, and resultant competition for moisture/ nutrients, conifer stands remained more vigorous overall and less susceptible to insect attacks. Outbreaks of insect and disease were much less widespread than they are currently. Isolated small-scale outbreaks were typical in older stands.

Fire

Key Question #1 - What was the historic fire regime for the analysis area?

In late October of 1863, the journal of William H. Brewer recounts hiking from Seiad (then Sciad) Valley to the Three Devils, about a 4,000-foot elevation climb on a south aspect. "The hills are covered with scattered timber, not dense enough to be called forests, or in places with shrubby chaparral. The whole of this wide landscape was bathed in a smoky vapor, and the mountains faded in it at no great distance (Farquhar 1930)." Brewer mentions the smoke in the air twice more during his short stay in Seiad Valley.

An 1857 lithograph of the mountains around Scott Bar also depicts the trees as very scattered, and somewhat denser on north aspects and in draws. By comparison with current stand densities the conditions in 1857 depict very open stands. Notable from these historical items: it was routine to be smoky in the fall, and that dense, old-growth Douglas-fir forest was not what caught early journalist's eyes, it was hills with scattered timber not dense enough to be called forests.

Since the establishment of the Klamath National Forest in 1905 fire suppression has been a major effort. The Klamath National Forest maintains a fire start database for the years 1922 to the present. During the time period 1922-1997, 732 fires were ignited within the analysis area, 636 (87%) of these fires starts were successfully contained at less than 1 acre.

See Figure 4-1 Historic Large Fires, which displays large fire perimeters that have occurred in the analysis area between 1922 and the present.

Few forested regions have experienced fires as frequently and with such high variability in fire severity as those in the Klamath Mountains (Taylor and Skinner 1998). As cited above, the fire regime was frequent on south aspects, averaging 8 years, and less frequent on east aspects, averaging 16 years. These frequent fires would remove damage caused by insects and disease, clean up the forest floor, and reduce the amount of decay available for short-term insect and disease habitation. The presettlement period (1627-1849) had an average of 14.5 years between fire returns. Fires have been and continue to be ignited within the watershed every year by lightning. American Indians living in the watershed are also known to have ignited fires. Fire spread and severity was and is dependant on fuel accumulations. With frequent fire, fuel accumulations over most of the area were maintained at low levels. Frequent fire and low fuel accumulations ensured mostly low to moderate fire severity. The settlement period (1850-1904) had an average fire return of 12.5 years. During this period there were more human caused fires, due to the influx of miners and settlers. The suppression period (1905-1992) had an average fire return of 21.8 years. During this period fire suppression is not determined to have been successful until 1948 when men and modern equipment were available and the National focus on utilizing timber resources forced protection of timber stands.

Key Question #2 - What is the history of fire suppression and fuels treatment in the analysis area?

Prior to the establishment of the Klamath National Forest in 1905, fire fighting was done primarily to keep wildfires from spreading to homes and improvements. These efforts usually would not result in suppressing wildfire. In many cases, fires were encouraged to spread to improve grazing conditions. Fire suppression activities were initiated after the establishment of the National Forest. In the early years of the Forest Service, very few personnel were available for fire suppression efforts. It was not until the 1930s with the establishment of the Civilian Conservation Corps. (CCC) camps in and near the analysis area, that fire suppression was attempted with more success. With this influx of manpower and equipment, suppression of more

fires could be achieved. With advances in fire fighting equipment (engines, air tankers, helicopters, etc.) and in fire fighting techniques and training, successful fire suppression efforts has been the norm. Discussions with men that fought wildfire in the 1930s, 40s, and 50s describe firefighting as having been for the most part much easier, with less vegetation and fuels to impede fire line construction. They describe fires mostly as having less intensity and less severity due to the lesser amount of fuels. With successful fire suppression, fuels have increased and fires have become more intense and difficult to control. Occasionally events such as the 1987 dry lightning storm will occur and overwhelm the fire suppression forces.

The Klamath National Forest working with the S.W. Experiment Station began a project to develop guidelines for control burning of logging slash in the early 1950's. By 1956 some slash was being burned under the guidelines. The Bogus Fire of 1957 (an escape slash burn) set the program back a few years (Morford 1981). Fuels treatment following timber harvest has been practiced since the 1960s. Burning of harvest units to remove slash and prepare the units for planting has been done on approximately 6,000 acres within the analysis area. In addition to slash removal, burning to improve wildlife habitat and reduce fuel hazard has been implemented in recent years. At this time, approximately 10,137 acres within the analysis area has or will receive some application of prescribed fire.

Key Question #3 - Based on the historic disturbance regimes, what were the vegetative conditions and fuel loadings?

With a fire-return interval of 8 years, shrubs that are present now would have had to be much less dominant, as eight year old deer brush, scouler's willow, and snowbrush normally will not carry a fire even in August, they do not accumulate a lot of litter at that age and have high live fuel moisture. The most likely answer is that perennial grasses and forbs were much more prevalent, which would have been possible in the more open stand conditions. The grasses and forbs would cure out by late summer and would be capable of carrying fire at the short intervals indicated by the fire scar history. The make-up of the grass/forb layer is not well-documented in the historical record, but given the large numbers of grazing animals such as horses, cattle, and sheep that were supported during the early settlement days, the grasses had to be much more highly represented.

See Forest Health- Key Question 1.

Late-Successional Habitat

Key Question #1 - What was the historic distribution of late-successional habitat and what was its condition?

Late-successional Forest

The Lower Scott Analysis Area is very diverse, it is characterized by complex species and plant community distributions resulting from the variable climate; steep, rugged terrain; and diverse soil parent material. Vegetative characteristics across the landscape are constantly changing. Therefore, several sources of information are needed, in addition to the existing condition, to get an idea of what the landscape looked like in the past. The best available information on past vegetative conditions in the analysis area comes from the journals of early explorers, literature dealing with past fire regimes, old growth studies, and review of the 1944 aerial photographs (the oldest set of aerial photographs on the Forest). The interpretation of literature, vegetative conditions, and the photographs are designed to set a framework for historical conditions.

Accounts from early European settlers that came to the area in the 1850s describe very open conditions with ample grass to sustain livestock. Much of the area was described as a hardwood/conifer savanna. It was described as mostly grass covered with scattered hardwoods and conifers. Conifers were found mostly near drainage bottoms and the lower half of north slopes. Douglas fir was the dominant conifer, but higher proportions of ponderosa pine and sugar pine were present when compared to today.

As part of this analysis, a comparison was made between 1944 photographs and those taken in 1995. The comparison shows a trend toward denser conifer stands with smaller trees. In the relatively short period of time between 1944 and 1995, natural openings and forest stand size appear similar; the main differences seem to be encroachment of conifers on south and west aspects, increased density in tree canopy, recovery of burned areas evident on the 1944 photographs, and increased fragmentation due to timber harvest and road building. It is expected that historically dense, late-successional forest habitat was found mostly near drainage bottoms and on the lower third of north aspects. Late-successional habitat was limited to sites, which experienced fire less frequently. These were found mostly on cooler, moister north and east aspects of the hardwood/conifer communities and the higher elevation true fir community. More open stands were found throughout the analysis area on south and west aspects. Scattered hardwoods and conifers with open understories were found through much of the low to mid elevations.

Review of research conducted over the past several years can provide additional information on the historical vegetative patterns that existed within the analysis area. Skinner (1995) measured and compared vegetative patterns in aerial photos taken 41 years apart in areas of the Happy Camp Ranger District. Significant changes were noted in the spatial characteristics of the openings, meadows and brush, in the landscape studied between 1944 and 1985. The pattern of change suggests a more continuous cover of forest has developed over the last half-century, with less variation in the pattern of forest openings. Additionally, it has been noted that snag and log densities were likely lower than at present because of frequent fires (Taylor and Skinner 1995; Agee and Edmonds 1992).

A study of historical fire frequency was recently conducted on the west side of the Forest. This study concluded that prior to European settlement, fires occurred at 4 to 24 year intervals (Skinner 1994). It is very apparent when looking at forest stand conditions from aerial photos taken in 1944 that large fires were a common occurrence in the area. Fire scars are visible and vegetative patterns indicate the occurrence of large disturbances. These fires were of varying severity, but severity was obviously higher on exposed south aspects and ridges.

Fires within the analysis area appear to have been the most frequent disturbance event to shape the historical landscape. Fires occurred much more frequently in most areas than they do today. At lower and mid-elevations, historic occurrence has changed from frequent, low intensity ground fires to infrequent, high intensity stand replacing fires. At higher elevations, historic occurrence has changed from infrequent, low and moderate intensity ground fires to infrequent, low, moderate and high intensity surface or stand replacing fires. The lower severity fires of the past maintained open understories and kept levels of woody debris low. Fire severity varied depending upon the weather, fuels conditions, and local topography.

Terrestrial Wildlife

Wildlife habitats depend upon vegetation communities and disturbance regimes that determine the characteristics of the vegetation. This discussion of historic wildlife habitats is based on the descriptions of the historic vegetation patterns, comparisons between photographs from 1944 and 1995, accounts of early explorers and naturalists, and the known habitat needs of wildlife species.

Key Question #1 - What was the historic distribution of habitats and populations for the identified species?

Bald Eagle

Historically the nesting and foraging habitat along the Scott River and its tributaries was probably similar in amount and distribution to what it is today. The historic anadromous fish runs would have provided a good food source and the old-growth forests near the river would have provided nesting habitat. The Scott River corridor would have provided adequate bald eagle habitat. Bald eagles are commonly seen wintering along the Scott River and it is likely that they wintered there in historic times. Bald eagles are not known to nest along the Scott River within the Lower Scott Watershed; the reasons for this have not been determined but may be related to the shape of the canyon, the lack of wide pools with slow water, or to the high number of osprey that are known to nest along the Scott. The territoriality of bald eagles and competing osprey may be a limiting factor for population density, not a lack of habitat. Today, human activities such as timber harvest and road building has somewhat reduced the large tree component along the Scott River. In addition pesticide contaminants, human disturbance and reduced salmon fisheries may impact the number of bald eagles along the Scott River.

Northern Spotted owl

Historically, NSO nesting habitat probably occurred low on north and east aspects and in cool, moist drainage bottoms where historic fire regimes had the least affect on stand structure. More open stands that burned more frequently, stands suitable for foraging and dispersal, occurred on south and west slopes and higher in the drainages. Habitat for owls within the analysis area was well distributed and could be found in all major drainages. Suitable nesting/roosting habitat was likely found across most of the analysis area. Suitable nesting/roosting habitat in these vegetation types would have been somewhat linear, following the north and east aspects of the drainages, with foraging/dispersal habitat covering most of the area in between.

Historic distribution of NSO was probably more uniform in the watershed with a somewhat higher density. Areas impacted by timber harvest, roads, wildfire, and subsequent fire salvage logging would have supported NSO in drainages where fewer are known to occur now (e.g., the area south of Mill Creek, Tompkins Creek, Deep Creek, and potentially Scott Bar Mountain). In addition, current fragmentation in the home ranges of individual birds may be exposing owls to greater risks of predation and competition, leading to decreased reproduction and survival from historical times.

Goshawk

Goshawks prefer mature coniferous forests with moderately dense canopy closure and an open understory for foraging through the forest. Their preferred nesting sites are in large trees located at middle and higher elevations on north slopes near water (CDFG 1990). Suitable habitat in the analysis area is similar to that used

by NSO. Historically, the more open stands created by a frequent fire interval, would have provided good habitat for goshawks. The higher diversity of habitat types, such as conifer forest interspersed with oak woodlands, meadows, and riparian areas, would have provided a diverse and abundant prey base for goshawks. It is expected that much of the analysis area below the true fir zone would have been good goshawk habitat. The effect of past and present land use activities on goshawk habitat is poorly understood. Activities such as timber harvest, road building, recreational uses, and mining have reduced the available habitat and increased disturbance potential in the analysis area since historic times. Fire suppression activities have lead to forested stands that are denser than in the past. These stands are more susceptible to catastrophic fires; insect epidemics and disease, resulting in higher tree mortality in the older age classes important to goshawks. Very dense conifer stands currently found in the analysis area may limit the northern goshawks access to prey. These changes to stand structure and habitat availability suggest that current reproductive success and survival of goshawks may be lower than in historic times.

Pacific Fisher

At the time of European settlement, fishers were found throughout the northern forests of North American and Pacific Coast Mountains. Between 1800 and 1940, fisher populations declined or were extirpated in most of the United States and in much of Canada due to over trapping and habitat destruction by logging (Ruggiero et al. 1994). Closed trapping seasons, habitat recovery programs, and reintroduction programs allowed fishers to return to some of their former range. Populations are still extremely low in Oregon and Washington (the Pacific Northwest) and parts of the northern Rocky Mountains (Ruggiero et al. 1994).

Fishers have been categorized as "closely-associated" with late-successional forests (Ruggiero et al. 1991; Thomas et al. 1993). Riparian areas are also considered important for fishers in California and Idaho. Habitat for fisher within the analysis area, prior to European influence, was most likely similar to what currently exists. However, human activities, such as logging, mining, agricultural practices, roads and homesteading, have reduced the amount of late-successional forest habitat and increased the potential for disturbance in the watersheds.

American Marten

American martens have been trapped for fur since aboriginal times and are primarily known as furbearers over much of their range. The distribution of martens has undergone regional contractions and expansions, some of them dramatic. The American marten has a smaller distribution now than in presettlement historical times; the total area of its geographic range appears similar to that early in this century, when it was at its historical low (Ruggiero et al. 1994).

American marten occupy a narrow range of habitat types, living in or near coniferous forests. More specifically, they associate closely with late-successional stands of mesic conifers, especially those with complex physical structure near the ground. Habitat for marten, prior to European influence, would have been similar to what occurs now in the analysis area; however, it is expected that the upper elevation conifer stands were generally more open with fewer large clearings (clear cuts or burned areas) and numerous, natural, small openings compared to what currently exists within the analysis area. Human activities, such as logging, mining, agricultural practices, roads and homesteading, have reduced the amount of late-successional forest habitat and increased the potential for disturbance in the watersheds.

Willow Flycatcher

Willow flycatchers use extensive thickets of low, dense willows along the Klamath River and in wet meadows or near ponds. It is expected that willow flycatchers were historically common in willow thickets along the Klamath and Scott Rivers and in montane meadows where willows occurred. It is expected that numbers have declined since historic times due to habitat destruction, grazing in montane meadows, fire exclusion which allowed conifers to encroach on meadows, and possibly cowbird parasitism. Extensive mining in the watershed during the gold rush era altered riparian habitats considerably. Hard rock tunneling, wing dam, derrick, and pick and shovel mining occurred in addition to extensive hydraulic activities. Hydraulic mines required vast systems of reservoirs, ditches, flumes, and pipelines and at one time altered many major tributaries, which flowed in the watershed area**.** Homesteading and clearing for agricultural purposes along the Scott River and the larger creeks may also have removed riparian willow habitat early in this century.

Historic information on willow flycatcher numbers or pre-grazing habitat quality within the Lower Scott Analysis Area is practically non-existent. Comparison of aerial photographs from 1944 and 1995 show little change in the amount of available habitat. The only changes apparent on the photographs were increased encroachment of conifers into meadows and an apparent increase in size in alder patches. Long-time permittees of allotments in the analysis area suggest that there has been a conversion from open grass/forb meadows to brush/alder thickets since the cessation of seasonal burning and reductions in number of permitted livestock (V. Van Sickle, pers. comm.).

Western Pond Turtle

Documentation on historic western pond turtle populations or habitat quality does not exist for the Lower Scott Watershed. There is mention in historical literature (refer to historical overview) that Indians included turtles as a food source. It is expected that, prior to extensive mining and associated human populations, western pond turtles were common and abundant in the Scott River.

Alterations of aquatic habitats began with the advent of hydraulic mining in the 1850s. These activities resulted in localized flooding, siltation, and some alteration of habitat in the Scott River and its tributaries. Fossil records of western pond turtles are known from Pleistocene deposits just outside the current range of the species, indicating that the distribution of the species was once more widespread. The current range of the western pond turtle is similar to its range prior to the arrival of European man on the west coast; however, the range has been fragmented by human activities. In many areas, only isolated small groups or individuals remain within significant portions of the range (Holland 1991).

Logging and cattle grazing, which began in support of the miners in the mid-1800s, also impacted aquatic habitats through increasing erosion, siltation and direct and indirect alteration of the habitat. The most notable declines in western pond turtle populations have occurred outside of the analysis area, in lower elevation riparian habitats (such as warm shallow lakes, ponds, and riverine habitats) that have been converted to agricultural lands and urban developments.

Red Tree Vole
There is no historical information on red tree voles within the analysis area. Recent surveys with positive detections of Oregon red tree voles in the Applegate Watershed of Oregon, and potentially on the Scott River Ranger District, indicate that further surveys are needed to determine if this species of red tree vole occurs in northern California. Habitat for red tree voles is similar to that described above for northern spotted owls, the historical perspective of suitable habitat for spotted owls would apply here for red tree voles.

Bats
Although little is known about the historical occurrence of these bat species, it is reasonable to assume that they have always occurred within the analysis area. Changes in harvest methods, the amount of timber harvest, and the effects of fire suppression over the last 50 years have likely affected bat populations in positive and negative ways. Mining activities during the last century, where deep mine shafts were carved into hillsides, may have had beneficial effects on bat species by providing roosting habitat.

Terrestrial Salamanders
There is little or no historic information on Del Norte and Siskiyou Mountains Salamanders. Recent surveys have suggested that these species' ranges are much broader than previously thought. Within the analysis area it is expected that the abundance and distribution of salamanders was historically similar to what exists now. However, changes in forest structure may have affected local abundance, for example: fire suppression activities have created more dense forest stands which may have lead to better conditions, an increase in abundance, and wider distribution locally (e.g. south slopes); conversely, forest practices, such as timber harvest, road building and mining, may have reduced suitable habitat in patches, leading to extirpation of small populations. It stands to reason that salamanders were adapted to the historic fire regime and, due to fires occurring during the hot, dry time of year, they were below the surface and protected from flame and excessive heat. The abundance and distribution of individual populations would have changed through time depending on the intensity and distribution of the fires.

Mollusks
Reference conditions prior to European influence are difficult to determine for the mollusk species of concern in this analysis. It wasn't until recently that scientists began to conduct surveys and identify the various species locally. Based on the current condition of the species' habitat, reference conditions were most likely very similar to what exists now, except that the forested stands were more open as a result of a more frequent fire regime.

Peregrine Falcon
Peregrine falcons are limited by suitable cliffs and ledges for nest sites. Several large rock outcroppings in the analysis area provide this type of habitat. Historical nesting habitat for peregrines was probably not very different from what exists today. The amount and distribution of foraging habitats, including oak woodlands, riparian areas, conifer forest, and meadows, was probably similar to what currently exists in the analysis area. Although habitat for peregrines has not changed appreciably, numbers of animals may be down from historic populations due to drastic declines in the last several decades from pesticide contamination. Through recovery efforts, peregrine numbers are increasing.

Deer
Prior to settlement by European man (before the 1700s), deer in California appear to have been abundant, but less so than in modern times because of the lack of large-scale habitat disturbance (wildfire, clear cutting). Deer are well known to be a "seral" species that thrive on disturbed (early successional) habitat dominated by shrubs and herbaceous plant species that are succulent and nutritious (Leopold, 1950). Deer are less abundant in densely forested areas.

Before the arrival of European man, the Shasta Indians occupied the area in which the Klamath deer herd occurs. These Native Americans utilized deer extensively for food, clothing, and utensils. According to Indian history, the Marble Mountains abounded in deer, elk, and bear (CDFG, 1989).

The descriptions of early 1800s explorers and settlers provide the closest estimate of what deer and other wildlife

populations may have been like before European settlers. From these accounts, it appears that deer were originally numerous in the coastal mountains from San Diego to the Klamath River in foothills and valleys, but were apparently scarce in the dense forests in the northwest.

Jedediah Smith traveled over much of California in 1827-1828. He indicated that deer were abundant along the Trinity and Klamath Rivers, but when his party explored the mountains north of the Klamath, they saw no deer.

The Gold Rush Era saw a dramatic decline in deer numbers due to high levels of unregulated market hunting to supply venison and hides for the mining camps. From 1850 until about 1903, commercial deer hunting camps and market hunters operated throughout the State of California.

By 1892, when the first National Forests were established, most of the timber areas of California were being exploited, and tremendous areas had been slashed and burned. In subsequent years, the clearings developed into brush fields, which supported many more deer than the original forest; hence the process of timber clearing, while it might have been enormously destructive of resources as a whole, was only temporarily deleterious to deer. In addition, the elimination of unrestricted hunting, combined with increasingly effective enforcement, contributed substantially to the increase of deer first noticed in the period 1910 to 1920 (CDFG. 1993). Predator control apparently contributed to the rapid increase of deer in the period 1910-1930 and may have contributed to local overpopulation of deer in the 1950s (Longhurst et al., 1952). By the 1960s and 1970s deer numbers declined. The current deer population trend is lower than it was from 1950 through the early 1970s, but greater than most estimated historical levels prior to 1940.

Domestic livestock were brought to northern California over 150 years ago. Miners and homesteaders raised livestock to supply food for local residents and for transportation. As the Scott Valley area became settled and ranches were established, cattle and sheep were moved into the adjacent mountains to forage. In the early 1900s, grazing was largely unregulated and livestock numbers were as much as five times higher than what is currently permitted on the Forest today. The longer grazing seasons of February through December allowed animals to graze plants in the more phenologically sensitive times of early summer and early winter. The continued high use of the mountain rangelands created degraded conditions in some areas; forage production was reduced. The land affected by grazing today is a much smaller portion of the watershed.

The historical effects of livestock grazing may have ultimately increased the numbers of deer in the State, as perennial grasslands were converted to a diverse array of shrub or annual grass/forb types. Many of the shrubs and other plant species that invaded or increased on disturbed rangeland were more palatable and digestible for deer than were the perennial forage species (Wallmo 1981). In addition, seasonal burning of the range maintained early seral or open conditions in many areas of the watershed.

Elk

Elk are grazers that move up and down the slope, depending on the season. Historically, the more open oak woodlands and conifer forests with grassy understories provided excellent elk habitat. Native Americans utilized elk extensively for food, clothing, and utensils. Roosevelt elk were once abundant in the Klamath Mountains, but were extirpated at the turn of the century due to high levels of unregulated market hunting and habitat loss.

Elk became a major food source for thousands of immigrants moving into the gold fields of the Salmon Mountains (Klamath Mountains) after 1850. Accounts of meat hunting by the miners are numerous. The demand for meat brought such high prices that many miners abandoned their claims to make a good living market hunting. The effect of such uninhibited shooting decreased elk numbers in many areas. Market hunting prospered for over half a century. Records show hide, meat, and jerky camps existed in Happy Camp and Cecilville from 1850 to about 1903.

Extensive cattle, sheep, horse and mule grazing in the analysis area in the late 1800s and early 1900s may have had negative effects on elk in the area. Elk and livestock compete for the same forage; competition is known to be especially critical when rangeland conditions are poor (Chapman and Feldhamer, Eds. 1982). Often, the reason for range deterioration is heavy livestock grazing, such as that which took place in the analysis area around the turn of the century. Competition for forage may have been a factor in the decline of elk populations in the area.

The Forest began a reintroduction program on the Happy Camp and Oak Knoll Districts in the 1980s in cooperation with the CDFG. The populations in Elk Creek and Horse Creek, to the west and north of the analysis area respectively, have grown steadily through successful reproduction and continued re-introductions.

Bear

Bear, mountain lion, coyote, and bobcat populations were reduced in the early 1900s through unregulated hunting, trapping and, in some cases, poisoning. Wolf and grizzly bear populations were exterminated in California by the early 1920s (Grinnel et al., 1937).

The areas of California occupied by black bear and the areas of the State occupied by the California grizzly bear were relatively distinct at the time of the arrival of the European explorers and settlers. As Nevis is quoted by

Storer and Tevis (1955), "he (black bear) is the bear of the forest, while the grizzly bear is the bear of the chaparral." Consequently, the black bear was not as negatively affected by the settlement of California, as was the grizzly bear. In fact, as the grizzly bear was eliminated from coastal areas of California by unregulated killing due to conflicts with European settlers, the black bear expanded its range into these areas.

However, some long-term and lasting impacts on black bear began with the arrival of European settlers. Habitat capability was reduced in some areas as land was converted to agricultural uses. As indicated above, however, because the black bear is generally restricted to the more forested types, the impacts of early agriculture in valley and foothill grasslands were not as significant on black bear as they were on other wildlife species such as the grizzly and elk (CDFG. 1992).

Turkeys
The wild turkey was not a part of the fauna when the first settlers arrived in California. Turkey-like birds are known from the Pleistocene or Ice Age but those species disappeared during more recent times for unknown reasons. It is believed that ecological or geographic barriers, in the form of the deserts of the southwestern United States and the high north-south mountain ranges, prevented the spread of wild turkeys to the westernmost states. These western states, formerly devoid of wild turkeys, evidently possessed the prerequisites for good turkey habitat, as evidenced by the recent successful introductions (starting in the late 1800s to the present) (Sanderson and Schultz, eds., 1973), including introductions on Scott Bar Mountain within the analysis area.

Plants
Reference conditions prior to European influence are difficult to determine for the plant species of concern and the Botanical Special Interest Area. Based on the current condition of species' habitat, reference conditions were most likely very similar for Klamath Mountain buckwheat and Siskiyou lewisia. The habitat requirements for these species (open serpentine slopes, rock outcrops, forest openings) have been altered very little since the introduction of European influence. The rarity of these species is primarily a reflection of the natural rarity of the habitat, and not the result of man-caused impacts.

The Lake Mountain Botanical Special Interest Area represents high elevation ultramafic soil habitat. Because of the natural limiting environmental factors of the site, it is not likely that the habitat has changed much in the last two to three centuries.

For the sugar stick, clustered lady-slipper orchid, and mountain lady-slipper orchid, reference conditions are more difficult to determine. In some areas species habitat has been reduced by large timber harvest operations and stand-replacing catastrophic fires, magnified by years of fire suppression. In other areas fire suppression and cessation of Native American burning has resulted in maturation of closed-canopy forests of favorable habitat. Overall, habitat for these species was likely more abundant prior to the advent of commercial logging in the 1940s.

Reference conditions prior to European influence are difficult to determine for the aspen stands in the analysis area. Aspen stands are currently located in isolated high elevation meadows; it is expected that, prior to the influence of heavy livestock grazing around the turn of the century, fire suppression and subsequent conifer encroachment, that stands were more widespread.

Botanical Special Interest Area
Reference conditions prior to European influence are difficult to determine for the Lake Mountain Botanical Special Interest Area. Use by Shasta Indians is likely, but the type and extent of use pre-European is not documented. The old age of the stand (in excess of 400 years) points toward a stable community over a long period. However, several significant impacts of recent times white pine blister rust, cattle grazing and fire suppression, were absent in pre-historic times.

Research Natural Areas
Marble Caves - The caves of the Klamath Mountains have been described in the oral traditions of Native Americans, but definitive physical evidence of cave use in the RNA has not been documented to date. Cave explorers first entered the larger caves in the RNA in 1964, but systematic survey did not begin until about 1974. Though most of the caves contain few formations (stalactites, stalagmites, etc.) there are some very notable exceptions, and these fragile features can be easily damaged by uncontrolled human use.

Exotic Plants
Leafy spurge and Dyer's woad (Marlahan mustard) were likely introduced into the area in the first half of the 1900s. Leafy spurge is thought to have been introduced into North America via Minnesota with shiploads of oats (Batho 1932). Since its initial introduction, leafy spurge has spread west across the northern prairie states to eastern Washington and then south into California. Dyer's woad was first introduced into the United States during the Colonial period in Virginia where it was cultivated as a blue dye (Farrah 1987). Near the beginning of the 20th century it arrived in northern California in contaminated alfalfa seed.

Human Dimension

Roads

Key Question #1 - Why and how was the road system developed?

Pre 1930: Prior to inception of the Forest Highway Program in 1915, the Forest Road Development Program in 1925, and the Works Progress Administration, the normal method of travel in the analysis area was by foot, mule, or horse over early historic trails with a few rough wagon roads. The transportation system in the landscape has developed over the years primarily in association with resource development and/or extraction.

When the Klamath Forest Reserve was established in May of 1905, transportation in the western half of Siskiyou County was primitive, with roads established only to Happy Camp on the Klamath River and to Forks of Salmon on the Salmon River. Travel was by horse drawn wheeled vehicles or horseback. Early road construction followed old trail alignments and centered around providing access for workers and equipment to mines. The road from Fort Jones to Scott Bar station was operation by vehicle in 1916.

1930-1950: Further development did not occur until the early 1930's when the Civilian Conservation Corps began a road construction program primarily directed toward developing a transportation system to meet the requirements for adequate fire protection. Their earliest recorded accomplishments in the analysis area were the reconstruction of the Scott River road, and the construction of the High CCC, and Mill Creek road.

In 1935 a Klamath Transportation study was developed. The primary objective was to enhance the fire protection in Region 5. In 1942 emphasis was redirected to mineral access roads in support of war related activities.

1950-Present: Most of the remaining roads in the area were constructed to access timber harvest beginning in the late 1950's. Examination of early Klamath and Shasta Forest Maps (1911 -present) show the progression of road building within the analysis area. See Figure 4-2 Road Construction History, contained in the Map Packet located at the end of this document.

Human Uses

Key Question #1 - What were the prehistoric and historic human uses in the analysis area?

Commercial timber harvest on National Forest lands has occurred in the watershed since the 1900s. A total of 6,040 acres (8%) of the analysis area has had some level of timber harvest, with regeneration cutting (clearcut) being the primary silvicultural prescription. The highest level of timber harvest occurred in the 1980-1989 decade, which includes the large catastrophic fires of 1987 (Kelsey and Lake Mountain). The 1990s had the second highest harvest level and included completing the salvage logging from the 1987 fires. For the locations of areas harvested, see Figure 4–3 Historic Logging By Decade, contained in the Map Packet located at the end of this document.

The acres harvested by decade are identified in Table 4 - 1.

Table 4 – 1 Acres of Plantations by Decade.

Decade	Acres	% Of Plantations	% Of Total NF Lands
1990-Present	1,440	24	2
1980-1989	2,880	48	4
1970-1979	450	7	<1
1960-1969	1,100	18	1
Unknown	170	3	<1
TOTAL	**6,040***	**100**	**8**

* Source: *Forest Plan* Managed Stands Layer & Stand Record System Database