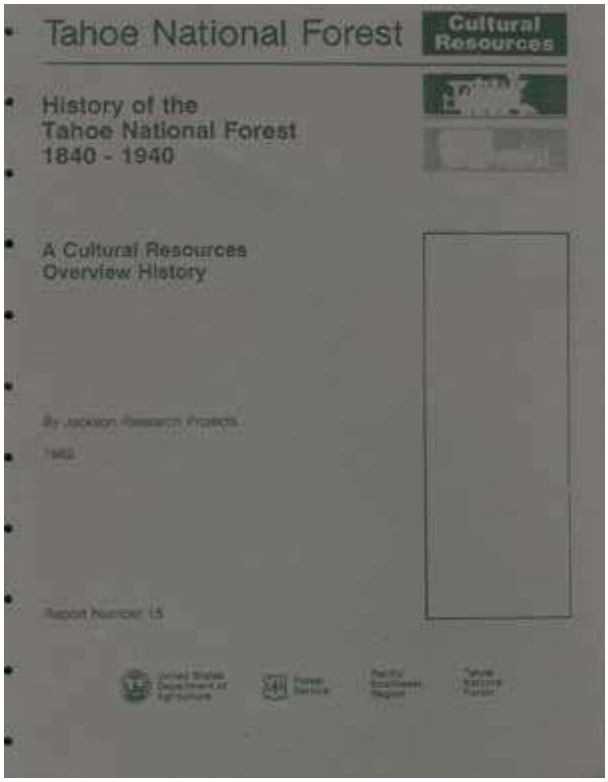


HISTORY OF TAHOE NATIONAL FOREST: 1840-1940

A Cultural Resources Overview History

Prepared by:
W. Turrentine
Jackson Rand Herbert
Stephen Wee

Report Number 15
1982

Jackson Research Projects
702 Miller Drive
Davis, California 95616

Contract Number 43-9A63-1-1745

TABLE OF CONTENTS

BIBLIOGRAPHY

ILLUSTRATIONS AND PHOTOGRAPHS

MAPS

TABLES

CHAPTER I
Introduction

Purpose of the Historical Overview

This historical study is one component of a general cultural resources overview being prepared by the Tahoe National Forest as part of its forest land management plan. The purposes of the overview are threefold. Our primary objective is to provide U. S. Forest Service personnel with an analytical and narrative historical overview to aid in identifying and measuring the potential significance of historic buildings, sites or objects located on forest lands that are representative of major themes, eras, activities or cultural processes in the area. Second, we hope to raise new research questions for future study and interpretation and to develop some research hypotheses to be tested by future work. Third, we will suggest management recommendations for enhancing identification and evaluation of historic site types and material remains likely to be discovered on Tahoe National Forest lands.

Cultural resources management is a relatively new and vital field that has developed largely in the last fifteen years as a result of intensified federal efforts to identify, evaluate and manage cultural resources as an element of the environment. Federal policies are based upon and implemented by a series of laws, regulations and presidential directives dating from the Antiquities Act of 1906 (16 USC 431). A positive national policy for the preservation of the cultural environment was provided in the National Historic Preservation Act of 1966 (16 USC 470). The act mandated protection of properties on or eligible for the National Register of Historic Places and established processes designed to ensure that avoidance or mitigation of damage to such properties be considered in the planning process of Federal agencies. The National Environmental Policy Act of 1969 (42 USC 4321) further declared it the policy of the federal government to preserve important historic, cultural, and natural aspects of our national heritage. Compliance with NEPA requires consideration of adverse impacts on cultural resources during project planning and execution. Executive Order 11593 (1971) went further than either of these acts by requiring federal agencies to assume a leadership role "in preserving, restoring and maintaining the historic and cultural environment of the nation." The Order charged agencies with the task of locating, inventorying and nominating to the Secretary of the Interior all historic properties under their jurisdiction that appear to qualify for listing on the National Register. Until such inventories are completed, the presidential order directs agencies to "execute caution" to ensure that such resources are not transferred, sold, demolished or substantially altered.

Traditionally the term "cultural resources" has been used rather narrowly to refer to archeological remains and to historical structures. Archeologists, anthropologists, historians, architects, sociologists, folklorists, geographers, planners, and others have in recent years increasingly pooled their resources and talents to respond to the new federal requirements for protection and enhancement of our cultural environment. Archeologists led the way for other disciplines in bringing about public awareness of the irreplaceable and non-renewable quality of our national heritage. They were largely responsible for forcing passage of the current legislation requiring an assessment of resources to be impacted by federal projects. The preservation of significant historical properties has long been a concern of historians and historical architects as evidenced by passage of the Historic Sites Act of 1935 which authorized establishment of the National Landmarks Program. Recently historians have followed archeologists in taking a more activist role in inventorying historic resources and in working with private and public agencies to preserve structures and sites of local and regional historical significance. Landscape architects have exhibited a keen interest in utilizing their expertise in land use planning to conserve historical and cultural rural landscapes (Zube 1977). Sociologists and folklorists have also demonstrated a concern for the impact of programs on all forms of traditional cultural expression (verbal, artifactual and behavioral) among all social classes (Bartis 1979). Each of these disciplines has its separate spheres of interest and methodological approaches. We also share many concerns and goals.

Historical resources management, as a profession and a movement, has broadened its interests considerably in recent years. The American historic preservation movement has strong roots in the eastern states; its philosophy and approach has traditionally been molded by an urban, elitists bias demonstrated by its orientation toward prestigious architectural monuments and grand homes. The National Register of Historic Places, the official list of the nation's cultural resources worthy of preservation, reflects this orientation. Critics of its policies have pointed out that rural America and a distinct anti-urban tradition have also played an important role in forming our national values. In dealing with the cultural resources of remote, mountainous settlements significant historical remains can be expected of a type significantly different than those in urban areas. Any meaningful program of rural or mountain community preservation would require placing great importance on preserving the best remaining examples of vernacular architecture. It would help preserve the diversity of our cultural heritage and mitigate against the loss of characteristic regional identities that remain where isolation and tradition have tempered the forces of change.

Local neighborhood buildings are increasingly being recognized as historic resources. The corner "mom 'n pop" grocery store, workers' housing abandoned industrial sites,

old metal gas stations have much historical value to local neighborhoods. More than building types and styles must be recognized as evaluation criteria. A major problem in protecting resources in an area like the Tahoe National Forest is determining what kind of significant properties exist on lands under the forests' jurisdiction. Fire, flood and severe weather conditions have claimed many important sites in the forest. Nevertheless, an extremely wide range of historic resources reflective of regional history themes could qualify as significant sites, among them would be mineral exploration or development, logging technologies, history of the conservation movement, transportation networks, immigrant routes, engineering structures, pioneering and early settlement, water delivery systems and dams, Civilian Conservation Corps Camps and improvements, and development of resorts and recreational potential.

The data base for this study consisted of the published and unpublished literature on the general history of the Sierra Nevada mountains, as well as information related directly to the Tahoe National Forest and Sierra, Nevada, and Placer counties. Books, pamphlets, periodicals, manuscripts, and newspapers published within the general study area pertaining to local history were viewed. Similar materials held by research libraries in the San Francisco Bay Area and Sacramento were researched. Literature published by professional historians and doctoral dissertations and master's theses from Northern California universities on general subjects relevant to the study area and some that specifically treated aspects of the forest's history were especially helpful. Materials of this type on gold rush history, logging, and transportation development are abundant. Government reports by mining engineers, surveyors, geologists, minerologists, and forest officials provided a wealth of descriptive and statistical information. Historical files of the Tahoe National Forest contained useful information for the period after 1905 on forest settlements, implementation of conservation policies, timber sales, mining claims, range use, and recreational uses. Diaries and memoirs from each of the Forest Supervisors to 1940 are available in transcript. Historical photographs held at the forest headquarters are also extremely useful in documenting logging techniques, administrative site development, and CCC activities on the forest. Interviews with ex-Forest Service personnel helped provide additional insight into activities on the forest during the twenties and thirties.

Most of the materials used to compile data for this project were located at the county historical societies, the Tahoe National Forest headquarters in Nevada City, the California State Library, the Bancroft Library and the Forestry Library at the University of California, Berkeley, and the Peter J. Shields and Physical Sciences libraries at the University of California, Davis. A fuller description of the contents of these collections and other relevant depositories can be found in Chapter IX.

Historical Perspectives on the Development of the Tahoe National Forest Region

The westward-moving hordes of humanity caught up in the California gold rush, historian Dale Morgan once asserted, "altered the course of history in so many ways that scholars will never trace them all" (Morgan 1959:i). The 49ers influenced national and world population movements, economies, finance, politics, transportation and settlement patterns (Roske 1963: 183-212). On the local and regional level, their impact was similarly felt. In a short span of years the native population was decimated, roads penetrated the wilderness, and mining towns dotted a landscape uninhabited by Euro-Americans just a year or two before. The gold rush to California heralded the opening of the mining era in the American West. By the 1860s prospectors had spread mining, based on their California experience, throughout the mountain west and north into British Columbia. Wherever the miners pursued gold, "they came and went in a continuous stream of humanity that left scattered towns and cities throughout the West" (Paul 1963: 37-55).

Unlike pioneer settlement of much of the United States, the mining frontier had the characteristics of an urban frontier. The mining camp, the germ of many present day communities in the Tahoe National Forest, appeared almost simultaneously with the opening of the region. Individual prospectors conducted initial exploration, and if successful, others quickly followed, forming the basis of the nascent community. Camps were frequently isolated, not so much by distance, but by broken, mountainous terrain and poor transportation facilities. Isolation, however, did not bring the self-sufficiency which was often characteristic of life on the farming frontier. Mining was back-breaking labor, and miners spent all their time prospecting or developing their claims. They could not raise sufficient foodstuffs or manufacture needed equipment. With gold dust plentiful, someone else could be paid to do these tasks. As a result mining camps became attractive markets.

Taking advantage of this situation, farmers and ranchers moved into regions which previously were uninhabited forests or foothills. Cheaper and more efficient means of transportation appeared. Behind the hopeful miners came merchants, gamblers, freighters, and others. Commercial centers and even embryonic industrial development in the form of blacksmith shops and sawmills appeared to serve the local mining camps. Logging and agriculture were key developments in the economic structure built by the miners and they have endured through time. Civic improvements such as a school, church, courthouse, or jail were seen as indications of permanence and stability. Certain architechtural features were symbols of the prosperous mining districts; a large and varied centralized business district, a multi-story elegant hotel and saloon, a steepled wood-frame church, and stone or brick construction throughout the community. Even with these trappings of civilization, the future of a mining town was not secure. Prosperity hinged on future extraction of a non-renewable mineral resource, hence instability was endemic to the economic foundations of the mining

district. Even for the most prosperous communities, the future was never bright. Some towns overcame the inevitable decline in mineral production by developing other industries to balance their economic livelihood. Others became a transportation hub or a center of government. Those that could not adjust retained only a shadow of their former size and significance.

A heterogenous population composed of people from every corner of the world crowded into the Sierra mining districts. The migration to California had many unique characteristics in the tremendous distances traveled by immigrants, in their sheer numbers and ethnic variation and in their desire to strike it rich and return to their homeland or the eastern states. The vast majority of those arriving were men. In other immigrations to the United States the percentage of men averaged 60 to 65 percent. In the early gold rush the percent exceeded 90. The migrants were also unusually young (Roske 1963; 183-185).

Hawaiians were the first foreigners to receive news of the gold strike from schooners sailing from San Francisco in 1848. Hawaiians of every occupation and social class crowded California-bound ships. Ships brought news to the Pacific Northwest and half of the white population in the Oregon Territory was soon on the road to the diggings. In Australia shipmasters eager to cash in on gold fever spread wild rumors to encourage would-be miners to book passage on their San Francisco-bound ships. Foreign traders carried the news to China and after 1850 a significant number of lower class peasants, uprooted by economic dislocations in the Chinese agricultural districts, departed for California's gold fields (IBID: 189-195).

Mexicans were among the first foreigners in the California gold fields. Mexican historians estimate that 4,000 to 5,000 people departed from Sonora between October 1848 and March 1849. Initially welcomed because of their knowledge of mining techniques, by 1854, racial discrimination had slowed their movement northward to a trickle. Other Latin American countries were also affected by the California gold rush.

In Europe, as well as in the Americas and Asia, the gold discovery stimulated increasing numbers to migrate to California. The 1850 census showed 3,050 Englishmen, 883 Scotsmen, and 182 Welshmen in California. Irish immigrants were also well-represented and their numbers increased to 33,147 by 1860, nearly one-quarter of the foreign-born element in California at that time (US Census, Population 1850, 1860). The English tended to congregate in the quartz mining districts, but a number of them also opened merchantile establishments (Roske 1963: 215).

The French population of California rose from less than 100 in 1849 to several thousand in the early 1850s. Most of those migrating did not belong to the lower classes or the peasantry, but were younger sons of nobility, civil servants, doctors,

lawyers, bankers, skilled workmen, former army officers, scholars, and political refugees. They came to California to speculate in real estate, agriculture, and commerce as well as to mine. Their social background, manners, and language barriers caused them to be victims of violence and discrimination as American miners regarded them as "haughty foreigners" (Masatir 1934: 10-11). Most of the French miners ended up in the southern mining districts with the Italians and Latin Americans (Roske 1963: 226).

Most of the Germans who came to California during the gold rush were from Southern Germany, a region of small agricultural holdings. Unlike most other groups, they came with the idea of taking up permanent residence and never intended to mine, but desired to engage in business and agriculture. The Spanish, Portuguese, Dutch, Belgian and Austrian immigration was negligable during the gold rush period (Wright 1941: 69-70). By 1852 young Italian-Swiss peasants caught gold fever and began arriving in groups, especially from Canton Ticino, an area devastated economically by political problems with Austria. Most of the Italian-Swiss immigrants remained in California and eventually found their way into farming (Raup 1951: 306-307).

All of these groups and nationalities blended and mixed with Americans (sometimes with considerable associated violence), producing a society which had all the characteristics of all their backgrounds. Not only did they start from nothing to build communities, but these diverse pioneers had to reconstruct from their previous experiences a method to govern society and provide law and order. Out of their experience grew the mining codes, local government institutions, a rudimentary court system which became the foundation of much of the future growth of California and western mining (Shinn 1885).

One of the first lessons learned by the argonaut in '49 was that the auriferous gravels could be more profitably worked by associated labor and adoption of simple devices to increase the amount of gravels that could be washed in a day. Soon men began to form cooperative associations to dam and divert rivers, or to construct ditches to dry diggings. Ventures into the field of lode mining required considerable technical skill and financial resources. The "Bonanza Kings," San Francisco capitalists and foreign investors, dominated the middle period between the self-sufficient, independent, itinerant prospector and the large multidivisional corporations of the twentieth century. The early capitalists were hampered by limited financial resources, the need for technological training and expertise, difficulties in the acquisition of properties, and the pressures favoring corporate consolidation. Industrializing the mines revolutionalized the organization of the work force, drastically altered the methods of financing mining operations, imposed absentee ownership, and tied Western mining to the national and world economy.

Mining was the magnet that attracted people to the northern Sierra Nevada region. Many migrants had no intention of working the mines, but, as noted, the burgeoning population needed shops and services, food and clothing, transportation and building materials. Economic rationality in these areas tended to lead to economic concentration, and in the cases of logging and agricultural developments to a waste of resources and environmental degredation.

Railroads were the key to economic development in California, for they linked the different sections of the state and provided Californians with access to markets in the East and the Midwest. Pine lumbering operations emerged as a major enterprise for the first time in the Sierra Nevada. Lumbermen got their start cutting pine to meet the needs of the miners for timber and flumes and the needs of the railroad for ties and cordwood. When mining declined, its loss was offset by the demands of fruit growers for lumber used in making boxes and by the needs of builders in the state's expanding cities.

Wider markets, better transportation, larger corporations, more sophisticated financing, advanced technologies, and scientific knowledge brought varying degrees of material prosperity, but they also brought severe costs to the natural environment. In the Tahoe National Forest, eroded hillsides, hydraulic pits and silted rivers, toxic tailings, depleted vegetation on overgrazed range lands, and denuded timberlands were the principal environmental costs. Similar exploitation on a national level gave rise to the idea that natural resources should be conserved and the natural environment protected.

The impetus for the conservation movement came from scientists, usually European trained, who had witnessed or studied European resource exhaustion because of centuries of wasteful management. Joined by naturalists and transcendentalists in the late nineteenth century, this small group came to exert a powerful force in government, especially under Theodore Roosevelt. Critics of his programs directed their hostility against the chief advocate and architect of Roosevelt's conservative policy, Gifford Pinchot. Land speculators, western sectionalists, and large lumber cattle and sheep interests opposed setting aside millions of acres of forest as national reserves and parks. This hostility tended to overshadow some substantial western support of the policy. There were persons who viewed as wise a policy that provided protection of forests and related resources vital to their local economy. Contrary to prevailing western rhetoric, Pinchot was not an impractical theorist, and his interests were not inimical to western development. Roosevelt-Pinchot forest policy aimed at "multiple-use," "scientific management," and above all *use* of resources in a way beneficial to the whole of society in the long-run. In fact, when it came time to decide how National Forest resources were to be managed, clashes within the conservation movement itself were often as intense as those between it and western opponents of

federal forest policies. The ideological split within conservation ranks into "utilitarians" and "preservationists" persists to today.

CHAPTER II

The Environmental and Historical Context of the Tahoe National Forest Region

---

Physical Characteristics of the Area Encompassed by the Tahoe National Forest.

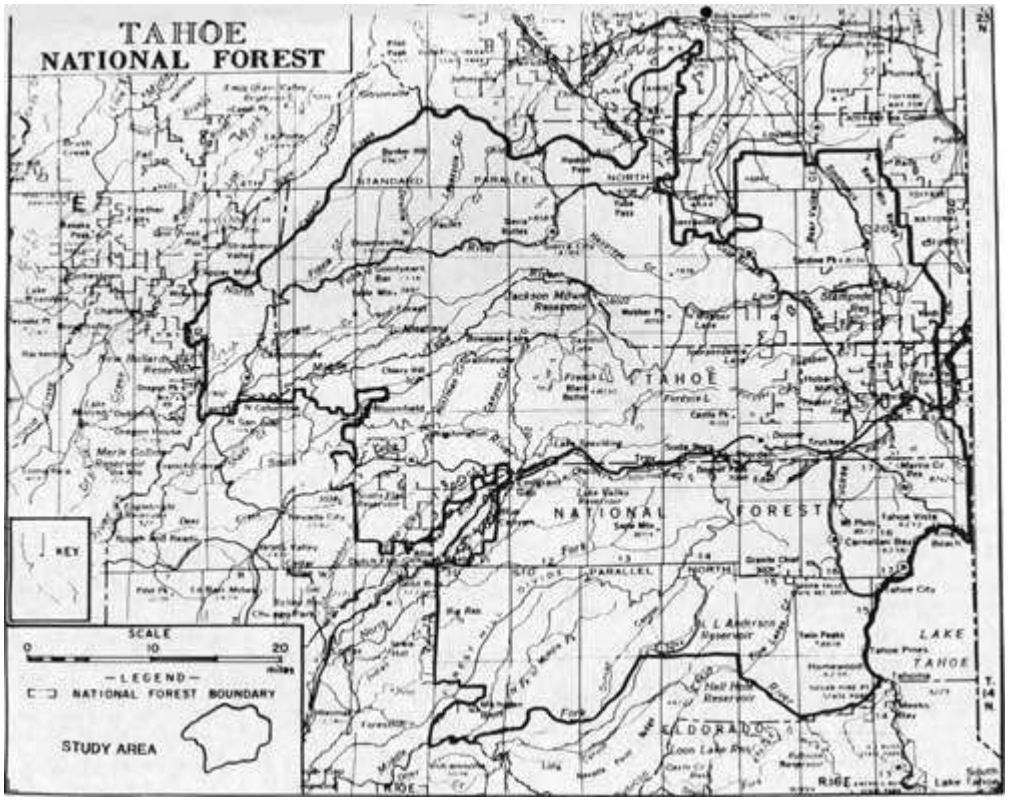
The area within the boundaries of Tahoe National Forest lies inside the geographical region of the Sierra Nevada and its foothills. On the western side of the forest the foothills are approximately 2,000 to 3,000 feet high, rising higher toward the east to the crest of the Sierra Nevada at approximately 8,000 feet. The forest straddles the crest, and takes in land as far east as the California-Nevada border. (Durrenberger 1959: 9; "The Irrigation of Nevada County" 1923: 1; USFS, Tahoe National Forest Map 1977). On the northeastern side of the Sierra Nevada within the Forest are broad, high valleys that have been the sites of extensive agricultural activities since the gold rush, while on the western side the valleys tend to be more narrow and rugged. (See below, Chapter III and IV.)

Both sides of the Sierra Nevada are drained by a system of rivers and creeks, those on the west draining into the Feather and Sacramento rivers and those on the east side into Pyramid Lake and the basins of Nevada. The formation of the Sierra Nevada, then, "has produced rather gentle slopes to the west which have been dissected by the copious streams of water coursing down its flanks to the Central Valley;" while the eastern side, in some areas "a precipitous wall," is more rugged. (Durrenberger 1959: 9)

The area within the Tahoe National Forest is drained by four major river systems: the Yuba, Bear and American on the west; the Truckee on the east. Of the four, the Yuba and American are the greatest, encompassing a far larger area than the Bear and Truckee.

The Yuba River can be divided into three sections — north, middle and south. The North Yuba basin is the largest, draining an area of approximately 304,530 acres (Leiberg 1902: 98). Its source is in the mountains east of the Sierra Buttes, and is fed by a number of important tributaries including the Downie River and Goodyear, Indian, and Slate creeks before joining the other branches of the system to form the main Yuba River (USFS Tahoe National Forest May 1977). The Middle Yuba Basin is the smallest in the Yuba system. It encompasses a drainage between two narrow parallel ridges three to six miles wide. Oregon Creek is its only major tributary (Leiberg 1902: 109). The Middle Yuba joins the North Fork west of the town of North San Juan. The South Fork system is nearly as large as the North Fork's, draining about

280,000 acres. The basin can be divided into two areas: east, near the crest of the mountains; and west, below the crest and into the foothills. The eastern portion is characterized by lakes and ponds of glacial origin, the west by two large ridges running in a generally east-west orientation. Of the two the southern ridge is the broadest, but is also cut by deep canyons, some of which are quite spectacular. Big Canyon Creek canyon has walls 1,000 to 1,300 feet high nearly its entire length (Leiberg 1902: 119).



TAHOE NATIONAL FOREST STUDY AREA

The Bear River basin within the forest consists of one major canyon and small tributary streams. The Bear arises near Yuba Gap and flows in a southwesterly direction toward Colfax before turning west and draining into the Sacramento River (Leiberg 1902; 138; USFS Tahoe National Forest Map 1977; Coy 1948: 34).

The basin of the American River, like that of the Yuba, can be divided into three sections: north, middle, and south. Only the north and middle sections are within the boundaries of the Tahoe National Forest; in fact the Middle Fork of the American is substantially the southern boundary of the forest. The basin of the American River is bordered on the east by the ridge of the Sierra Nevada west of Lake Tahoe, and on the

north by the Bear River canyon (USFS, Tahoe National Forest Map 1977). The North Fork is "rocky and precipitous," drains an area of about 177,440 acres and is fed by a large number of tributary streams (Leiberg 1902: 145; USFS Tahoe National Forest Map 1977). The Middle Fork also drains a large area and collects water from a number of smaller streams within its drainage before flowing into the North Fork near Auburn (USFS Tahoe National Forest Map 1977; Coy 1948: 34).

The major river on the eastern side of the Sierra Nevada within Tahoe National Forest is the Truckee. The Truckee flows out of the northwest corner of Lake Tahoe in a northerly direction for about twelve miles to a junction with Donner Creek, and then heads in a generally northeast direction into Nevada. It is fed by a number of lesser streams, including Squaw, Donner, Prosser, Alder and Martis creeks, and the Little Truckee River. (USFS Tahoe National Forest Map 1977)

The higher elevations of the Sierra Nevada also contains a large number of natural lakes. Most of these are small, but several have attained large dimensions. Among the largest are Tahoe, Donner, Webber, and Independence. Since 1850, Sierra Nevada streams have been dammed and reservoirs built. The forest has within its boundaries several large reservoirs, including New Bullards Bar, Bowman Lake, French Meadows, Stampede, and Prosser Creek, as well as many smaller dams and reservoirs. (USFS Tahoe National Forest Map 1977).

Mining and settlement of the area within the Tahoe National Forest began after the discovery of gold in 1848. The deposits that attracted miners to the area were of three types: river placers; Tertiary or "Blue" Gravels; and quartz lodes.

In geologic terms the youngest of these deposits are the river (or Quaternary) gravels. These were laid down as geological forces altered the slope of the Sierra Nevada. New stream channels were cut, eroding gold deposits laid down in earlier times into the modern river beds. These placers were small but rich, and were those worked early in the gold rush period (Durrenberger 1959: 155).

The other major form of placer gold in the Sierra Nevada was found in the Tertiary or "Blue" Gravels. The Tertiary Gravels were deposited by the ancient rivers of the young Sierra Nevada. The streams were slower and had more gradual slopes than the modern rivers, and thus laid down huge deposits of sedimentary material. When the Sierra Nevada were lifted higher, lava flows associated with the process filled some of the ancient channels and other canyons were blocked forcing new patterns of drainage. "The slope of the mountain range was tilted more to the southwest, so that the newer streams all had a decided tendency to follow a southwesterly direction." (Coy 1948; 4) The ancient Yuba River

was a mighty stream that drained the western slope of the Neocene Sierra through a territory now covered by Sierra, Nevada, Placer, and Yuba counties. Its debouche was near the site of present Marysville, not far from the channel of the present Yuba River. It soon forked, as does its later counterpart, its north fork rising as far as northern Sierra County, while its south fork took its rise near the crest of the ancient Sierra in what is now northern El Dorado County. It is to this great river that this district owes its rich auriferous gravels. (Coy 1948: 59)

ANCIENT AND MODERN RIVER SYSTEM

Thus the ancient Yuba, which drained much of what is now the western portion of the Tahoe National Forest, left behind large gravel deposits covering a wide area. The ancient American River was apparently not as large as . . . the Yuba; in fact, not much larger than the modern South Fork of the American. "No predessors in this period of the now existing Feather and Bear rivers have been found" (Coy 1948: 3,62). These Tertiary Gravels deposited by the ancient rivers were very rich. One estimate suggests that miners extracted $300,000 in gold from these deposits over the years (Durrenberger 1959: 155).

The "Mother Lode" is the popular name for the main quartz vein in the Sierra Nevada gold region. This name, given by the miners, is also applied to much of the gold mining area itself. The Mother Lode veins are generally considered to run from Coulterville in Mariposa County to Plymouth in Amador County. "North of the Middle Fork of the American River it splits up into a number of seams and cannot be described as one belt or lode." It is this system that underlies the quartz lode region within the National Forest (Coy 1948: 6). Quartz lode mines are scattered throughout the western portion of the forest. Among the famous quartz lode mining areas within the forest are the Alleghany and Sierra Buttes districts. (Clark 1970: 13)

The Tahoe National Forest covers a large forested area, much of which has valuable commercial timber. Within the boundaries of the forest are several woodland types of varying values.

In the foothill region of the forest, the western side is a zone called "foothill woodland," characterized by oak forest. Chief species include Live Oak and Blue Oak, as well as Digger Pines and California Buckeye. Typically fifteen to twenty percent of the ground is covered by trees. Higher up in the mountains is a zone of "Ponderosa Pine Forest." Within this zone are commercially valuable trees, including Ponderosa and Sugar pines Douglas Fir, White Fir, and Incense Cedar. This area usually spans the 3,000 to 6,000 foot region in the northern Sierra Nevada. Above the Ponderosa Pine forest are two zones: Red Fir forest in scattered areas above the Ponderosa zone from 5,500 to 7,500 feet; above the Red Fir forest is "Lodge-pole Sub-Alpine Forest," usually at an altitude of over 7,500 feet (Durrenberger, 1959: 59-61).

The land within the Tahoe National Forest is, in general, not extensively used for agricultural purposes, with the exception of grazing livestock. The mountainous terrain and cold winter weather limits the extent of cultivation. In 1902, John Leiberg estimated that of the 304,000 acres drained by the North Fork of the Yuba River, only 6,280 acres were cleared and in tillage. Most of these were in small patches adjacent to cabins, usually no larger than one or two acres. A similar situation existed on the Middle and South forks of the Yuba and on most of the American River drainage

within the forest (Leiberg 1902; 98, 109, 119, 138, 145). These areas were located on valley floors or cleared areas on the lower elevations of the mountain ridges. Since that time cultivation in the region has not expanded very much. By 1900, agricultural production of many crops had reached their peak level. ("The Irrigation of Nevada County" 1923: 2)

Agriculture has centered on ranching of both sheep and cattle. "Farming in the mountain region is largely the production of hay and grain for wintering and feeding of range livestock." (Durrenberger 1959: 134) This pattern is true today, and was set early in the gold rush period (see below, Chapters III and IV). Livestock is grazed on lands within the forest in the high pastures during the summer months. The mountain valleys were also utilized very early for production of hay for winter feeding.

The area within the Tahoe National Forest is both varied in geography and the uses to which its natural resources have been put. Mountain rivers have provided valuable placer gravels and the water necessary for their utilization. Quartz veins have provided another source of gold. Mountain forests and valleys have sustained the commercial timber industry and livestock ranching. Much of the history of the forest revolves around the use, development and exploitation of these resources.

Pre-Gold Rush History of the Northern Sierra Nevada Region.

As was the case of most of the interior portions of California, the northern Sierra Nevada region was not settled until after gold was discovered in 1848. There was, however, some contact between whites and Native Americans, exploration by U. S. government expeditions, and transits of the area by pre-gold rush immigrants to California.

Exploration and settlement during the Spanish and Mexican periods was limited. During the Spanish period (1768-1822), a small number of expeditions were made into the interior of California, but these were largely aimed at locating runaway Mission Indians, chasing livestock, or examination of the terrain for possible future mission sites. Several of these expeditions, led by Lt. Gabriel Moraga and Lt. Luis Arguello between 1805 and 1817 skirted the foothills on the eastern side of the Central Valley as far as the Feather River. It is not thought that the Spanish expeditions entered the Sierra Nevada foothills within the Tahoe National Forest (Bean 1978: 43).

Activity increased during the Mexican period (1822-1846), but no permanent settlements were made east of the Central Valley. The ranchos granted to John Marsh near Mt. Diablo and John Sutter at the confluence of the American and Sacramento

rivers were for a long period the only attempts at settlement within the Central Valley (Bean 1978: 66-67).

The growing American interest in the Trans-Mississippi West and California stimulated the U. S. government to dispatch expeditions to explore the region, produce accurate maps, and report back on the region's inhabitants and resources. The first of these that reached interior portions of California was that of Lt. Charles Wilkes, USN, who was sent into the eastern Pacific "in the interests of the American whaling industry" in 1841 After passing through the Pacific Northwest, a detachment of Wilkes' men traveled down the Sacramento River, rejoining the main body of the expedition in San Francisco Bay (Caughey 1970: 161-162). Wilkes' men apparently did not venture far into the Sierra Nevada foothills.

Perhaps the most famous of these explorers is John Charles Fremont, an ambitious and talented member of the Army Topographical Engineers. During his career as an explorer he undertook four expeditions into California. Fremont's expedition in 1845-1846 traversed the central portion of the Sierra Nevada over Donner Pass and down the mountains into the Central Valley. Fremont and his men moved up the Truckee River camping at Cold Creek south of Donner Lake on December 3, 1845. "All the way, they appear to have followed the traces of the Stevens-Townsend-Party of 1844, which had entered California via this route." (Egan 1977: 307) Fremont measured the altitude of Donner Pass as his men traversed it, and was within forty feet of its actual altitude. Fearing being caught by winter weather, the party moved quickly to the west and south, spending the night of December 4 in a mountain meadow.

Six days more was all it took for the men to work their way out of the mountains. But those six days were long and hard as they climbed in and out of canyons, along crests of ridges, through great stands of virgin timber, down the South Fork of the American River and through the foothill region . . . Tough going was putting it mildly, but once they broke into the open, they saw the rolling hills and valley oaks. (Egan 1977: 308)

The group arrived at Sutter's Fort a few days later.

While Wilkes and Fremont explored under orders from the U. S. government, private individuals were traveling overland from the U. S. into California. Beginning in 1841, overland immigrant groups entered California on foot or with wagons, crossing the Sierra Nevada as the last major obstacle on their journey. (Stewart 1962: passim) The first overland groups, however, did not cross the Sierra Nevada within what is now the Tahoe National Forest, but rather to the south at Sonora and Walker passes, or to the north along the Malheur and Pit rivers (Jackson 1967: 1).

The route up the Truckee River out of Nevada, up and over Donner Pass, and down the mountains into the Central Valley was discovered and opened by immigrants in 1844. The Stephens-Townsend-Murphy Party followed the Truckee River into the mountains. "The ascent of the Truckee River was a difficult route that involved interminable crossing from one bank of the stream to the other and at times it was necessary to follow a jolting passage up the stream bed itself." (IBID: 1) One member of the party, Moses Schallenberger, noted that "the river was so crooked that in one day they crossed it ten times in traveling a mile." (IBID: 1) Walking in water softened the hooves of the oxen; members of the party were forced to walk alongside the animals in the water and urge them on. Upon reaching the junction of Donner Creek and the Truckee, the party split into two groups: a pack train which would follow the Truckee; and the wagons which followed Donner Creek up to Donner Lake. The pack party followed the course of the Truckee to Lake Tahoe, and thus were the first white travelers to reach the shore of the lake. They moved south along the western side of the lake, and apparently ascended McKinney Creek to its headwaters, crossed over to the Rubicon River and descended into the Central Valley by way of the Rubicon, Middle and North forks of the American River (IBID 1967: 2-3). The wagons traveled west to Donner Lake. "They camped and spent several days exploring ahead in an effort to find a practical pass." (Stewart 1962: 71) The party decided to leave six of the eleven wagons at the lake, with a portion of their cargo to be retrieved in the spring, and attempted to cross the mountains with five wagons and all the remaining oxen. The party skirted the north shore of Donner Lake, and then camped in a meadow west of the lake. The laborious crossing of the pass was probably completed on November 25, 1844. Double teams of oxen hauled the wagons, which in several places were pulled up nearly vertical granite faces. Once over the pass, the remainder of the wagons were abandoned because of snow and a winter camp made near Big Bend (IBID: 72-73). The Stephens-Murphy-Townsend Party in 1844, then, deserves recognition for being the first to use the Donner Pass route and to take wagons across the mountains. It was the traces of this party that John C. Fremont and his men followed the next year.

Several members of this party returned east the next year, and the trouble they had had ascending the Truckee River canyon prompted them to look for another route that would avoid this stretch of the river. One of the members of the party described the new route they followed:

Leaving the lake (Donner), and the river which flows from it, to the right, we bore off to the northeast, for a wide, deep gap, through which we supposed that we could both pass, and leave the mountains. At ten miles, we crossed the North branch of Truckies River [sic] *(Prosser Creek), a stream of considerable size. We traveled eight miles further, to the head of a stream, running to (from) the North West, which we called*

Snow River (Little Truckee River); as a heavy fall of snow, here obscuring our course, compelled us to halt. Snow continued to fall during this, and the succeeding day . . . when it ceased, we again proceeded on our journey, leaving the gap for which we had been steering, and bearing to the East, through a break in the mountain which follows this course of Truckies [sic] *River . . . Having crossed this mountain, we came again, at five miles, to Truckies* [sic] *River, which we crossed and traveled down the south side* . . . (Jackson 1967: 4)

The party traveled northeast from the area around Donner Lake and around the northern end of the Verdi Range before using Dog Canyon to rejoin the Truckee River below the rugged canyon area (IBID: 4-5). This part of the Donner route became widely used after 1845, and later fed other routes over Yuba, Henness, and Donner passes (Galloway, 1947: 30-31). One historian has asserted that no party after 1844 used the Truckee Canyon above Dog Creek (Jackson 1967: 13).

In the years that followed, until 1848 and the great overland migration of gold-seekers, this route was used by parties of immigrants. Once a party had reached Donner Summit, the route down the western slope was comparatively easy, with the ridge tops having only minor obstacles, providing paths down to the Central Valley. With the discovery of gold, the major route across the Sierra Nevada shifted to the Carson Pass and Johnson's Cutoff route south of Lake Tahoe. Nevertheless, the Donner Route was one of the most important pre-gold rush and gold rush era routes into California and was used by many. The most famous of these was the Donner Party in 1846, whose tragic story resulted in the pass being named after the leaders of the party (Stewart 1960: passim).

Before the discovery of gold, activity by the Spanish, Mexicans and Americans had little impact on the area of Tahoe National Forest, leaving no kind of permanent site or settlement. Largely ignored by the Spanish and Mexicans before 1848, the region was an obstacle to be overcome on the long and perilous journey to California. It was only with the discovery of gold in the Sierra Nevada that the mountains became a goal for immigrants. These "Argonauts" had the benefit of the earlier pathfinders' efforts in finding trans-Sierra Nevada routes, and it is these miners who first settled within the Tahoe National Forest.

<u>Gold Rush California, 1848-1849: A Regional Overview</u>.

Gold was discovered on January 24, 1848, at Coloma on the South Fork of the American River. An employee of Johann Sutter, John Marshall was supervising a crew of Mormons and Native Americans building a sawmill. After letting the the river water wash the trail race of the mill, Marshall noted some small nuggets and announced to his men, "Boys, I believe I've discovered a gold mine." (Bean 1978; 88;

Caughey 1948: 8) News of the discovery, despite vain attempts to keep it quiet, spread from Sutter's Fort to San Francisco, and by May, 1848, gold fever became epidemic. "Within a short time nearly every town in California lost a majority of its population." (Bean 1978: 89-91) The *San Francisco Californian* of May 29, 1848, noted:

The whole country, from San Francisco to Los Angeles, and from sea shore to the base of the Sierra Nevada, resounds with the sordid cry of gold, GOLD, GOLD! while the field is left half-planted, the house half-built, and everything neglected but the manufacture of shovels and pickaxes.

The paper went on to announce it was folding up — its staff had left for the gold fields (Bean 1978: 91).

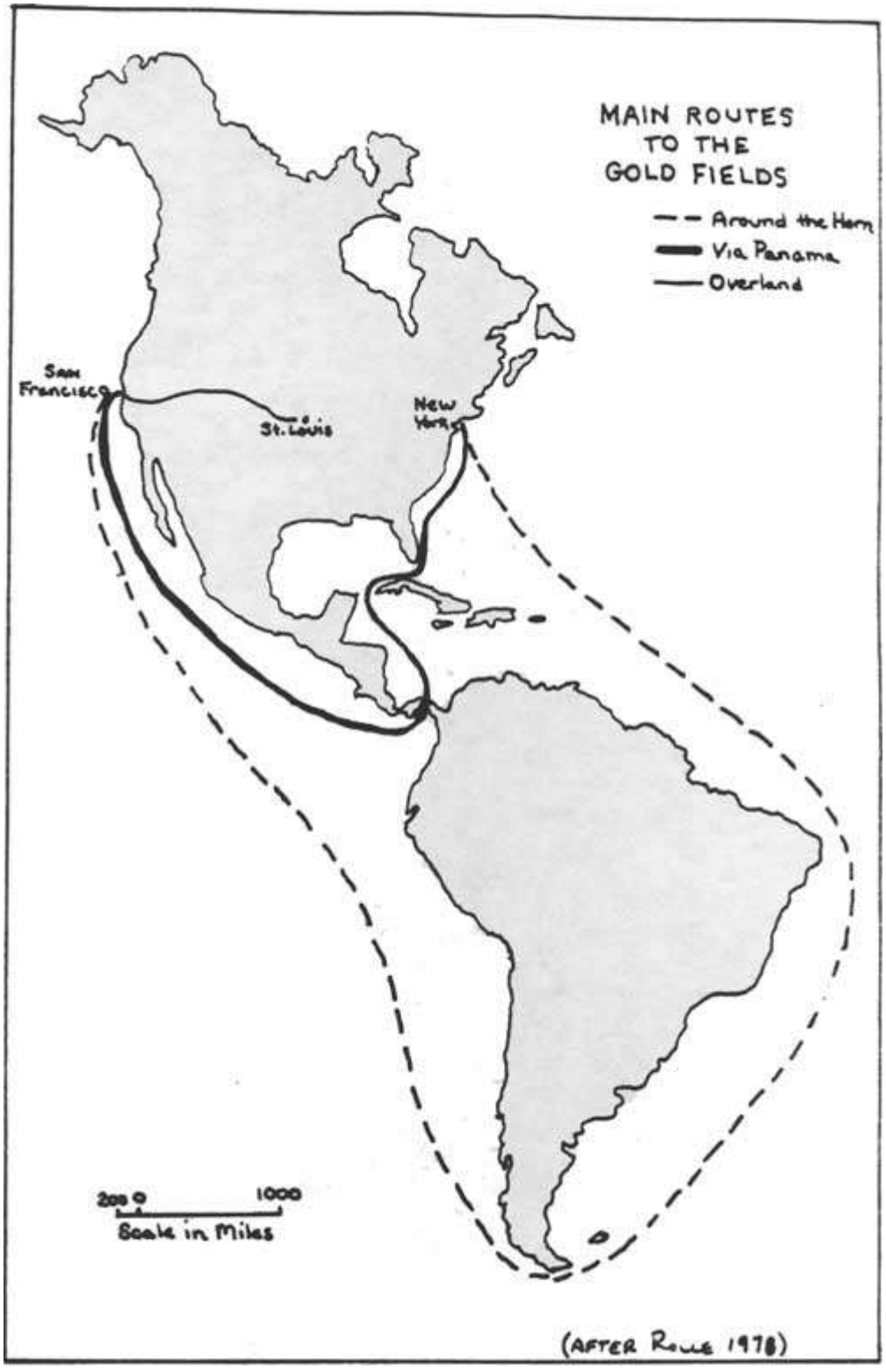
These "48ers" spread out in the foothills, usually after visiting Coloma and noting how similar it was to areas with which they were familiar. John Bidwell, early immigrant and founder of Chico, began mining on the Feather River near his ranch after a visit to the Coloma gold fields. By the summer of 1848, prospectors had begun to move up the American River and lower portions of its forks, and up the main channel of the Yuba as far as Foster's Bar (Coy 1948: 15). Early equipment was crude, but estimates of the year's production vary widely from as much as $48,000,000 to $245,301 (Clark 1970: 4; Coy 1948: 20-21). Actual output must have fallen somewhere in between, most likely at the lower end of the scale.

Word reached the eastern United States and Washington D. C. in September of 1848; President Polk excited the interest of prospective miners by announcing in December that "the accounts of the abundance of gold are of such an extraordinary character as would scarcely command belief were they not corroborated by the authentic reports of officers in the public service." (Bean 1978: 92) A tea caddy containing $3,000 worth of gold nuggets lent substance to the reports, which were judged to be high quality by the Treasury Department (Caughey 1970: 180).

There were three major routes to the mines taken by the flood of excited gold seekers starting in 1849; by sea, around Cape Horn or to Panama and across the Isthmus and on to San Francisco; or overland by way of the routes previously established by earlier immigrants. Routes were chosen by the Argonauts based on where they were starting from and how much money they possessed.

People on the eastern seaboard were most like to choose the ocean routes, because ships were available for the journey and because New England had years of experience in reaching California by sea. Merchant ships and whalers were refitted to carry passengers. "In nine months 549 vessels arrived at San Francisco, many of course from Europe, South American, Mexico and Hawaii but more than half from the

Atlantic seaboard." (Caughey 1970: 180-181) The Cape Horn route was preferred in 1848, but because it took five to eight months for the trip, would-be miners focused on the Isthmus of Panama thereafter (Bean 1978: 93).



MAIN ROUTES TO THE GOLD FIELDS

The Panama route eventually became the fastest route to California before the completion of the transcontinental railroad in 1869, with scheduled runs from the east coast to the Atlantic side of Panama and from the Pacific side up to San Francisco. By 1850 the trip took six to eight weeks. However, the 49ers did not make the trip this fast — many got stuck in Panama awaiting passage on board passing ships. In 1848, "the average time from New York to San Francisco was three to five months" (Bean 1978: 93). It is estimated that 40,000 gold seekers used the Panama route during the height of the gold rush, 1849-1850 (Caughey 1970: 183).

The route taken by migrants from the midwest was overland. Those who came from Texas, Arkansas and other southern states usually chose the established routes to Santa Fe and then on through the Southwest, along the Gila River, across the Mojave Desert and on into southern California. Between 10,000 and 15,000 Argonauts chose this route (IBID: 183). Those leaving the northern portions of the midwest usually chose the California Trail, from St. Joseph, Independence, or Council Bluffs, up the Platte, through South Pass, and along the Humboldt River to the base of the Sierra Nevada, a route already well established by earlier immigrants and described by John C Fremont (Bean 1978: 94; Caughey 1970: 183; Egan 1977: 297-309). Once having reached the eastern slope of the Sierra Nevada, immigrants had to choose either Carson Pass south of Lake Tahoe or Donner Pass. Many used Donner Pass, but a good number headed for Carson Pass because of settlements along the route and because Donner Pass had acquired a reputation of dangerousness after the experience of the Donner Party in 1846 (Bean 1978: 95). Independent traders located east of the crest sold goods at exhorbitant prices to exhausted and poorly supplied immigrants. One trader offered water to parched immigrants at $1.00 per gallon. In order to avert potential repetition of the Donner Party's tragedy, the state government sent out relief parties in 1849 under the command of Major Rucker and in 1850 under William Waldo of Sacramento (Caughey 1970: 186-187).

Immigrants traveling up the Truckee River and over Donner Pass noted some of the changes on the route. Journals described the conditions along the trail, difficult portions, and provided other information. E. Douglas Perkins, a 49er, made detailed notes on the leg of the trip from Donner Lake to Johnson's Ranch north of Sacramento:

The ascent of the pass from the Donner Cabins is about 5 miles, as the road was very winding in finding a passage through the trees and rocks. At 3 o'clock we arrived at the foot of a terrible passage over the backbone. The pass is through a slight depression in the mountains, about 1500 feet lower than the tops of the mountains in its immediate vicinity. As we came up to it, the appearance was like marching up to an immense wall, and the road goes up to its very base, before turning short to the right, and then ascends by a track in the side of the mountain, when about 1/3rd of the

distance from the top, it turns left again, and goes directly over the summit. In the distance of about ½ mile, I judge this steep climb covers an elevation somewhere near 2000 feet. We rested ½ hour at the top, and went down into the valley to camp.

Once across Donner Pass, Perkins and his party passed a solitary peak ("Devil's Peak") and some small lakes, before turning down sharply into the valley of the South Fork of the Yuba. "Camp was down an almost perpendicular descent, where the wagons are let down with ropes, and the trees at the top are cut and marked deeply by the friction" (E. Douglas Perkins 1849: passim).

In 1852, Eliza Ann McCauley also described the route. Like earlier immigrants, crossing the pass and descending the western side required concerted effort:

September 16, 1852. This forenoon the road was very rough. In one place we had to let the wagons down by ropes over a smooth rock several yards long where cattle could not stand.

By 1852 there were trailside improvements:

September 18, 1852. We started down the valley (of the Bear River) passing a house on the way . . . it is three logs high, about six feet long, and four wide, one tier of clapboards, or shakes as they are called here, covering each side of the roof. Leaving this and passing through a gate we soon came to a cabin of larger dimensions.

This was the first house Eliza Ann saw in California.

September 19, 1852. We passed Mule Springs this morning. There are some mines at this place, also a tavern and a small ranch. About noon we arrived at Father's cabin . . . (McCauley 1852: 1)

Mule Springs was used in 1846 as a base of operations by rescuers of the Donner Party. East of Mule Springs travelers began to come upon mines, ranches, and other signs of permanent habitation.

The influx of gold seekers wrought great change in California. This is especially true for the gold mining areas. California's population climbed rapidly after 1848. It has been estimated that in February, 1848, there were 2,000 Americans in California; by December, 6,000; by July, 1849, 15,000; and by December, 1849, 53,000 (Shinn 1885: 125). In 1852 there were 100,000 miners in the gold country, and by spring of 1853 there were 300,000 people in the state (Shinn 1885: 125; Bean 1978: 100). Census records show that Nevada, Placer, and Sierra counties had a combined population of 35,107 in 1852 (U. S. Census 1850: 892).

Figure II - 1: Population by County.

	1850*	1860
Nevada	20,583	10,933
Placer	10,783	5,670
Sierra	3,741	7,340

*(Based on the State Census of 1852)
(U. S. Census 1850: 982; U. S. Census 1860: 90)

The population of the mining areas was quite mixed, and included U. S. citizens, Blacks, "mullattos," "Indians Domesticated," "Foreign Residents," and Chinese (U. S. Census 1850: 982); of these, white males made up by far the largest group; of the 35,107 counted in Placer, Nevada and Sierra counties, 22,680 (64.6%) were white males. There were comparatively few women, less than 4% in the three counties (U. S. Census 1850: 982). One observer noted that many of these were "neither maids, wives, or widows" (Paul 1947: 82). It has been estimated that four-fifths of the able-bodied men in California were in the gold fields or enroute to them in 1849 (Shinn 1885: 125).

The world-wide migration into California, as noted earlier, resulted in a diverse population within the area encompassed by the forest. There was a significant number of racial minorities; of these the Chinese were the most numerous within the region. Large numbers of Chinese were attracted to the gold fields of California with the same desires as the other gold seekers, the chance for wealth. In addition, the Tai-Ping Rebellion (1850-1864) in Kwantung Province provided a further impetus to migrants.

The announcement that gold had been discovered in California, that the passage was cheap, that indentured labor could be secured, and that Chinese merchants had already pioneered a settlement electrified the peasants and handicraftsmen who had begun to overcrowd the port cities of Canton, Macao, and Hong Kong. (Lyman 1974: 5)

The census lists 3,886 Chinese in Nevada County and 3,019 Chinese in Placer County in 1852 (U. S. Census 1850: 982).

Figure II - 2: Ethnicity ca. 1852*

	Whites	Chinese	Blacks	Foreign	Native Americans
Nevada County	13,368	3,886	103	782	3,226
Placer County	6,945	3,019	89	634	730
Sierra County	3,692	**	49	1,067	0

Totals	24,005	6,905	241	2,483	3,956
Statewide	171,841	**	2,206	54,803	31,266

*Data from U. S. Census 1850: 982.
**No figure given.

There were other minorities in the gold fields besides the Chinese. The census of 1852 listed 241 Blacks and "Mulattos," 3,956 "Indians Domesticated" and 2,483 "Foreign Residents" within Nevada, Placer, and Sierra counties (U. S. Census 1850: 982) Native Americans played an important and little acknowledged part in the earliest period of the gold rush. "To a remarkable extent California Indians participated in the gold rush as miners. One government report estimated in 1848 that *more than half* of the gold diggers in California mines were Indians" (Rawls 1976: 28). As the gold rush brought in ever increasing numbers of whites who resented Native American competition either as independent miners or as employees of whites, Native Americans were gradually forced out of the mines altogether in the early 1850s (Rawls 1976: 37-39).

In many cases foreigners received similar treatment. Anti-foreign feeling was common in 1849 and in the early 1850s, and focused on Latin Americans as well as the Chinese and Native Americans (Paul 1947: 111; Lyman 1974: 58). Taxes and intimidation were employed to drive out the foreign miners. In 1852, the state legislature enacted a "Foreign Miners' License Tax," largely as a means of forcing foreigners out of mining (Bean 1978: 141-143). This tax affected all foreign miners, but focused specifically on the Chinese. Anti-Chinese sentiment and propaganda dwelt on the "swarming" of Chinese miners over the gold fields. Chinese miners "were subjected to popular tribunals and mob violence" (Lyman 1974: 58-59). Early in the gold rush

at Marysville another miners' assembly declared that 'no Chinaman was thenceforth allowed to hold any mining claim in the neighborhood.' A movement to expel the Chinese from the area gained widespread support. Accompanied by a marching band and carnival atmosphere, white miner groups drove the Chinese from North Forks, Horseshoe Bar, and other neighboring camps. (IBID: 60)

With the increasing development of the mines arose the need for a commercial and transportation infrastructure to supply the mining areas. San Francisco, as a major port and point of disembarkation for those arriving in California via Cape Horn or Panama, rapidly grew into the state's largest and most important city (U. S. Census 1850: 982). Subsidiary centers like Sacramento, Stockton, and Marysville arose at convenient transshipment points for the mines on the major rivers.

Save for the overland caravans from Oregon, Mexico, and the Mississippi Valley, supplies and immigrants from the east and Europe usually were landed at San Francisco from ocean-going vessels, and there were transferred to river craft — light-draft steamboats and small sailing vessels — for reshipment to the three interior commercial cities of Sacramento, Stockton and Marysville. From those three points both goods and gold hunters had to travel overland for another fifteen to fifty miles before reaching their destination. (Paul 1947: 71)

From these cities people traveled by stagecoach, wagon, horse or one foot; goods were brought up to the mines by mule, ox team or packtrain (IBID: 71-72).

The Tahoe National Forest lies within the heart of the region many have called the "Northern Mines." "During the early days of the Gold Rush it became customary among miners to speak of districts tributary to Sacramento as the 'Northern Mines,' and those tributary to Stockton as the 'Southern Mines'" (IBID: 91). The former area included all or part of El Dorado, Amador, Placer, Nevada, Yuba, Sierra, Butte and Plumas counties (Paul 1947: 92; Bean 1978: map, 96). The Northern Mines differed from the Southern mines in several ways. First, the Northern Mines were rich in the Tertiary Gravels laid down by the ancient Sierra Nevada rivers and were sufficiently watered to be able to exploit them. The region also had extensive quartz lode deposits, and was more accessible to the commercial cities than the other mining regions. The Northern Mines had the largest population of any of California's mining areas, and had a high percentage of Americans because it was at the terminus of the overland trails and near Sutter's Fort. By contrast, the Southern Mines were drier, with shallow placers and some deep quartz deposits. Because they were located nearer the trail's end from Mexico, there was a higher concentration of Latino miners in the Southern Mines (Greever 1963: 45; Paul 1947: 108-109, 112-113). Of the two Sierra Nevada mining regions, the Northern Mines were the most productive, owing largely to the resources within the area and the fact that gold was available in large quantities in both placer and quartz deposits of great size.

The area that lies within the exterior boundaries of Tahoe National Forest is rich in natural resources and varied in topography. It contains foothills, mountain valleys, high peaks and deep canyons containing a variety of minerals, commercial lumber species, water resources, and agricultural areas. Largely ignored by the Spanish and Mexicans and an obstacle to pre-gold rush immigrants, the area quickly became a focus of population growth and mining industry after the discovery of gold in 1848. The development of resources within the Forest is the subject of the next chapters of this report.

CHAPTER III

The Era of Individual Enterprise: Mining and Settlement on Tahoe National Forest Lands, 1848 - 1859

Introduction.

The decade 1848-1859 was a period of great change for California and for the lands within the Tahoe National Forest. During this interval between the discovery of gold in 1848 and the rush to the Washoe Mines in 1859, the California mining region was the focus of attention within the entire state, the United States, and around the world. Inrushing miners settled and mined on the lands within the Forest boundary, ending its isolation within the state and making it one of the most heavily populated of the mining areas.

Gold mining was the central economic enterprise within the state and Forest during this period. Other activities — logging, milling, agriculture, transportation — were adjuncts to mining and supported the mining industry. Non-mining enterprises usually depended upon miners as their customers.

The decade was also one of development within the mining industry. As readily available placers played out, miners developed new means to exploit less accessible deposits. Some of these changes were technological; others involved changing organizational and financial arrangements. New machinery and mining methods were introduced, most requiring greater capital outlay by miners and, eventually, by outside investors. While these investors were at first California residents, the changing nature and scale of mining soon began to attract capital from the eastern United States and Europe.

The period was also one of changing settlement patterns. The early years of the rush, typified by transitory mining camps and great fluidity of population, gave way to a much more settled and permanent pattern by 1858. The camps matured into towns, based on deep long lasting deposits or other resources, or location on a transportation link. By the end of the period virtually all of the major towns in the region that exist today had been established.

By 1859 most of the pieces of the more modern phase of development in the Forest were in place. New mining technology and investment of capital began to have a positive impact on production. The transportation system — roads, bridges, freight and express companies stagecoach lines, inns — was firmly established. Agriculture

and logging, while still tied closely to mining, were beginning to find markets outside of the mining region. The result of the development was a change away from the "boom-bust" structure common to a mining frontier and the growth in its place of a more mature, stable economy and social structure not based on mining alone.

Gold Mining in Tahoe National Forest, 1848-1859.

Mining developed during this period from an individualistic, primitive form of industry into a system based increasingly on cooperation between groups of miners and finally to employment of miners by capitalists and mining companies. It was also during this period that mining-dependent industries like canal and flume organizations began their activities.

As noted above (Chapter II), miners began prospecting for gold away from Coloma soon after the discovery in January, 1848. Gold was found on other forks of the American River and into the hills around Iowa Hill and Yankee Jims that year (Coy 1948: 12-13). Through the summer of 1848 the forks and major tributaries of the American River were explored by a group of miners from Oregon. They found gold in varying amounts on almost every river bar they examined on the North and Middle forks (Thompson and West 1882: 68). The river bars were the focus of mining in the first years of the industry.

The word 'bar' in the camp's name was taken from the gravel deposit or gravel bar bank deposited on the sides of the river. These bars could be extensive in the case of a wide sweep of the river, but as a usual thing they were small and afforded the men of the gold days but little opportunity for city planning, if indeed there was enough room for the actual mining operations. Nevertheless, if a bar was sufficiently rich it quickly gathered its full share of miners with their hangers on, and an embryo city was soon started. (Coy 1948: 26)

Not only the bars on the forks of the American, but also along the Bear and Yuba rivers were being mined by 1850, and more were exploited as the population of the region grew.

The Yuba River, its forks and tributaries had a large number of active bars as early as 1849. On the North Fork of the Yuba bars near Downieville were mined in 1849, and on tributary streams such as Goodyears Creek, bars like Goodyears and Eureka North were located at the same time. "Along the North Fork were Monte Cristo, Fur-Cap Diggings, Rattlesnake Diggings, while on its eastern banks were Graycraft Diggings and the Empire Mine" (IBID: 67). Bars were also located and claims staked out on the Middle and South forks of the Yuba between 1849 and 1850. The Yuba system was

dotted with bars; one source counted fifty-one between Marysville and Downieville alone (Wiltsee 1931: 2).

As the gold rush continued to grow, the American River system was an expanding area for mining of bars. One historian has stated that at least 1,500 men were mining river bars on the Middle Fork above the junction with the North Fork near Auburn in 1850. Over the years following:

The amount of gold taken from those river bars was very great. Estimates of returns from the leading bars on the Middle Fork of the American River place this amount at nearly $17,000,000. Among the chief contributors were American Bar, $3,000,000; Mud Canyon, $3,000,000; Horseshoe Bend, $2,500,000; Volcano Bar, $1,500,000; Greenhorn Slide and Yankee Slide, $1,000,000 each. (Coy 1948: 37)

Of these, Horseshoe Bar, Volcano Bar, and Mud Canyon were probably on or within the boundaries of Tahoe National Forest (USFS Tahoe National Forest Map, 1977). The North Fork of the American also had a great many bars, including "Calf, Kelley's, Rich, Jones, Barne's, Mineral, Pickering, Euchre, and a score of other(s)" (Coy 1948: 37). Euchre Bar is in the Forest.

Although the North Fork of the American was less productive of gold than the Middle Fork or South Fork, it is not safe to assume that the region north of the Middle Fork was not rich in gold. For here were to be found the very productive mines of which Forest Hill, Michigan Bluff, Yankee Jim's and Iowa Hill were representative names. These were not river mines but located upon the divides between the river channels. (IBID: 38)

Placer gold in river bars was the first form of gold exploited, yet early on miners noticed placer deposits away from the river canyons. One authority states: "While the earliest diggings had been river claims, the men of 1848 and 1849 soon discovered that gold bearing gravel was to be found in the ravines and other places removed from the present river channels" (Coy 1948: 29). Some early mining was done by crevassing — digging out nuggets caught in cracks in the bedrock. This was true along the Middle Fork of the American River (Thompson and West 1882: 69) Gold bearing claims away from available water supplies became known as "dry diggings" (Coy 1948: 29). One reason for increasing prospecting was the fact that as more miners arrived in 1849 and 1850, yields per miner decreased.

Another means of dealing with increased competition and decreasing returns was to improve mining methods (Paul 1947: 56-58). The earliest equipment used in placer mining in California was the pan, pick, and shovel (Wiltsee 1931: 3). Miners dug up gold bearing dirt and washed it in the pan in a swirling motion used to remove dirt and

small rocks. Heavier than almost any other object in the dirt, gold particles would gradually be deposited on the bottom of the pan (Bean 1978: 97). This system was suited for the solitary miner; it was also physically demanding and tedious. A standard pan, if such existed, was

. . . about 10 inches in diameter at the bottom, 16 inches at the top with a depth of about 2-1/4 inches. Usually a heavy iron wire rim strengthened the top of the pan. In the rush to find equipment suitable for washing gold, any kind of bowl or basin was brought into use, even wooden bowls and Indian baskets found their place. (Coy 1948: 97)

Gold would be separated from the other heavy objects and "black sand" at first by drying and blowing away particles, and later by the introduction and use of mercury, to which gold adheres and forms an amalgam (Paul 1947: 58). Pans were used continuously throughout much of the gold mining era, often as the final step in washing gold after the pay dirt was processed by other systems.

Greater efficiency in washing gold bearing dirt would increase yields, and miners were quick to introduce new means of placering. In 1848 the "rocker" or "cradle" came into use; most likely it was first employed by miners with previous experience in Mexico or Georgia (IBID: 52-3; Coy 1948: 98). The rocker washed gravel on a perforated plate. Larger rocks and clumps of earth would be removed or broken, and the finer particles allowed to pass through and fall on a second level, where the heavier pieces of gold would be caught behind cleats on a board or cloth in the bottom. The water was allowed to pour out on the ground. The rocker was designed to be rocked from side to side in order to speed the washing process. Water would be dipped and poured into the hopper continuously to wash out the dirt. Pans would sometimes be used to wash the material caught in the rocker. The use of a rocker was possible by one man, but much greater efficiency was achieved if two or three miners were involved, one digging and one or two dipping and washing (Wiltsee 1931: 3-4). Examples of rockers are common in California museums. Some are quite elaborate.

The fact that the rocker was most efficient when used by teams of miners led to important changes in the organization of work. Each technological or methodological advance after the introduction of the rocker required greater cooperation by groups of miners. The lone miner with his pick and pan, then, employed the shortest-lived single mining method and occupies a disproportionally large place in the public image of the gold rush.

The invention of the rocker was followed by two innovations that were refinements on its basic principle, and were among the first "Californian" contributions to gold mining technologies in their modern form. The first of these was the "long tom,"

essentially a short washing sluice with a perforated iron plate at the lower end, and an undercurrent sluice to catch finer particles (Wiltsee 1931: 4). Most were shaped like an inverted funnel, so that when water and gravel were mixed at the narrow end a greater force of water could be employed; the wider lower end would reduce the force and catch smaller pieces of gold before the stream of water and dirt reached the under-current sluice (Paul 1947: 61-62). Like the rocker, usually three or more men used a long tom in concert. It differed from a rocker in that it remained stationary and water flowed through it continuously, replacing the rocking motion of the rocker. Mercury would be placed in the lower end and undercurrent sluice to adhere to fine gold particles (Wiltsee 1931: 4). The long tom allowed for a much greater amount of gravel to be processed per miner per day.

Another placer invention was the sluice box. These were similar to long toms in construction, except they did not flare widely at the end; rather they were usually built to uniform size so that they could be connected end to end in long strings. Some sluice systems were hundreds of feet long and required large groups of miners (Coy 1948: 100; Wiltsee 1931: 4).

Long toms and sluices required a plentiful and constant supply of water in order to operate. They were, naturally, used at first along rivers. It was clear, however, that gold bearing gravels were located in places throughout the gold country away from water supplies. It was this requirement for water to work "dry diggings" that brought another of the important changes in California placer mining after 1850.

The miners who arrived during the 1848-1850 rush shared a common experience in the mines. Most were inexperienced in gold mining, and were usually faced with learning how to mine and finding a claim to work at the same time (Coy 1948: 92). A 49er, James P. C. Allsopp, described his fellow Argonauts as

. . . almost to a man young and hearty, and they had the digestive power of the ostrich. A man of 30 was considered middle aged, and if he had attained the mature period of 35, why he was looked upon as a patriarch, a veritable Nestor among the young bloods. (Allsopp 1881: 45)

Miners usually worked with partners, or in small companies of three to six men in the early years of the rush. These early miners (1848-1850) erected crude shelters, often of brush with a canvas top, or of logs with a tent-like roof. In 1848 it was thought that mining would be a seasonal, summer activity; it soon became apparent that winter rains would provide more abundant supplies of water to work claims and thus cabins or somewhat more permanent accommodations would be necessary to protect miners from the elements (Wiltsee 1931: 7).

Miners usually worked six days a week, with Sunday off for rest and recuperation. Clothes were washed, cabins repaired, trading posts or stores in local camps visited and other domestic activities pursued. If available, newspapers, letters, and books were read. Friends in nearby camps might be visited. Of course, less wholesome diversions were also available, and drinking, gambling, horse racing and various sports were popular diversions. Miners might also attend meetings of their mining district (Wiltsee 1931: 8).

In an article looking back at the 49ers, the Nevada City *Transcript* discussed the "genuine article," the true California miner.

(He) . . . feels thoroughly equipped . . . if he possesses a slab of bacon, a few lbs of flour, a little sugar, coffee, tobacco, and an old pick and shovel. If he has a pack animal, all right; if he hasn't, all the same. And thus outfitted he scales the mountains, swims the rivers, and skims the plains for months, happy as a stuffed goat.

Among the other items in his baggage might be a frying pan, butcher knife, and some spirits (Nevada City *Transcript* 3-30-1882).

Prospecting for a claim was hard work and paid nothing, and the time and expense of prospecting was a major source of complaint among the early miners, especially as the process might take weeks (Wiltsee 1931: 12). Naturally then, word of a rich find might attract a large number of miners to an area overnight. At "Bird's Store" (Byrds Valley) just west of Michigan Bluff, two men began mining in the winter of 1849-1850. By February the word about their successful claim was out and "the men came in hundreds, making Bird's Store their place of rendezvous, until the number of men gathered there amounted to two or three thousand" by early spring (Thompson and West 1882: 68-69). Other areas in the Forest were first prospected and mined after similar early discoveries and "mini-rushes." The result was a highly mobile mining population and an extraordinarily large number of temporary settlements.

Fairly early in the mining era miners along the rivers began to exploit more than the riparian bars that attracted their initial interest. They began to mine the river bottoms themselves. Streams were diverted into flumes and the exposed bed mined with conventional placer equipment, crude "Chinese" pumps being used to keep the workings reasonably dry. Other miners built wing dams and mined the river one half at a time. Chinese miners were known for being adept at river mining and wing dam construction (Williams 1930: 56). River mining was responsible for a large portion of the state's output, and all rivers in the state were mined through the 1860s (Clark 1970: 7). A newspaper noted in August, 1853, that "the North Fork of the Middle Fork (of the American River) is flumed from the junction to El Dorado Canyon" (Thompson and West 1882: 226).

The changing placer technologies continued to expand the use of associated labor. River mining required a great deal of teamwork, as well as capital to develop such claims. River mining then, necessitated a change from individual mining or mining in partnership with others, to a more "capitalistic," investor oriented form of mining. To be sure, many of the river bed mines initially were built by groups of miners in partnership. Nevertheless, investors from mining towns, San Francisco and elsewhere began to enter the gold industry by investing in river mining (Paul 1947: 116).

THE MINER'S SUNDAY. (Rotter: 1979, 13a)

More and more interest was also expressed in claims located away from available water supplies. To work these claims water had to be brought to them. In addition, long toms and sluices required a continuous flow of water to operate; large delivery systems had to be built to supply water to these claims. "Water in many of the California diggings was scarce; 'fluming' companies were organized to bring water from a distance, and the cost was high" and when water "had to be brought a considerable distance only men with capital at their command could do it" (Rowe 1974: 110-111). The *San Francisco Alta* wrote about this transition in February, 1851.

. . . The real truth is, by far the largest part of the gold . . . (mined hitherto) was taken from the river banks, with comparatively little labor. There is gold still in those banks, but they will never yield as they have yielded. The cream of the gulches, whereever water could be got, has also been taken off. We now have the river bottoms and the quartz veins; but to get the gold from them we must employ gold. The man who lives

upon his labor from day to day, must hereafter be employed by the man who has in his possession accumulated labor, or money, the representative of labor. (Quoted in Paul 1947: 116)

A SUNDAY'S AMUSEMENTS (Rolle 1978: 204)

Gold mining then was beginning its industrial phase, in which large scale engineering operations, machinery, and the skills to run them were needed (IBID: 116). The individual miner with his pick and shovel gave way to the miner as wage earner.

New sorts of mines were developed as conditions, exploitation and development of resources allowed. Among these were coyote holes and drift mines, which worked the Tertiary Gravels; ground sluicing and hydraulic mining, which also exploited the deep gravels; and quartz lode mines. All of these mining methods were used in the 1850s in the Forest, although some of the techniques were abandoned in favor of more efficient methods. To a greater or lesser extent, all required a more advanced industrial system to operate successfully.

Coyote holes and ground sluicing were the forerunners of the two important placer mining systems, drift mining and hydraulicking. A coyote hole was simply a shaft sunk into the ground to get at gold bearing gravels beneath the surface. "In 1849, the

miners in the dry diggins at Nevada (City) would sink shafts to the depth of fifteen or twenty feet to the bedrock, and then, rather than throw off the whole surface, would 'coyote,' as it was called, from the bottom of their excavation, and this was the beginning of drift mining" (Thompson and West 1882: 192). Coyote hole diggings led to the discovery of the great Tertiary Gravel deposits (Pagenhart 1969: 86).

Drift mining was an outgrowth of coyote holes. Miners following the course of the gravels would tunnel into the hillsides. "When the gravel is thus reached it is mined out, the process being called 'drifting,' the superincumbant mass being held in place by timbers held beneath" (Thompson and West 1882: 192). Drift mines have been among the most productive in the state. In Placer County "this branch of mining is most extensively prosecuted in the region lying between the North and Middle Forks of the American River, commonly designated as the 'Divide,' the gravel or mining area comprising about 250 square miles." The area was prospected in 1849, and the exploitation of the deep gravel deposits by drift tunnels began in earnest in 1853. Drift mining went on it a variety of other locations within the Forest, including Damascus in Placer County and Monte Cristo, Forest City and Alleghany in Sierra County (Thompson and West 1882: 192, 377; Sinnott 1976: 190; Clark 1970: 19; Stevens 1969: 2) Water was required to wash the gravels once mined. This was sometimes available within the mine itself as aquifers were drained by tunneling; if not, water companies brought water to the mine (Thompson and West 1882: 192).

Coyote holes and drift mines exploited gravels that were either shallow and rich, or so deeply buried that other methods could not be used to reach them. Gravels located near the surface or overburdened by relatively loose material were exposed and developed by means of the direct application of water to the claim. In the first years of the gold industry "ground sluicing" was practiced. Simply stated, a ditch of water would be directed on to a placer deposit, thereby washing the gold from the gravel as the overburden was stripped away (Pagenhart 1969: 88).

. . . To make use of this technique, the miner dug a small gully down the hillside that he intended to wash. He then had a supply ditch or flume extended to the top of his hill, and presently he would send water cascading down the gully. Trusting rocks and other obstructions to serve as natural riffles, the miner would then stand on the bank of his artificial watercourse and shovel and thrust masses of earth down into it. At intervals of a few weeks or months he would use a long tom or board sluice to 'clean up' the fine debris that had accumulated behind the obstructions in the gully . . . The ground sluice undoubtedly lost a good proportion of the gold that passed through it. (Paul 1947: 151-152)

Miners quickly began to refine the ground sluicing method. In the spring of 1852, a miner named Anthony (sometimes Antoine) Chabot attached a canvas hose to the

head of the flume bringing water to his claim on Buckeye Hill east of Nevada City to more efficiently apply the water to his ground sluicing site. In March a miner nearby on American Hill, Edward Matteson, attached a nozzle to the canvas hose to better direct the water and increase its force. These two men are credited with the invention of hydraulic mining. "Given water, ground, drainage, and the proper equipment, one man could do in a day what dozens could hardly do in weeks" (Kelley 1959: 26-28). Buckeye Ridge and Diggings are within the Forest (T16N/R10E, MDM, sections 16, 17, 18, 19, 12) (USFS Tahoe National Forest Map 1977).

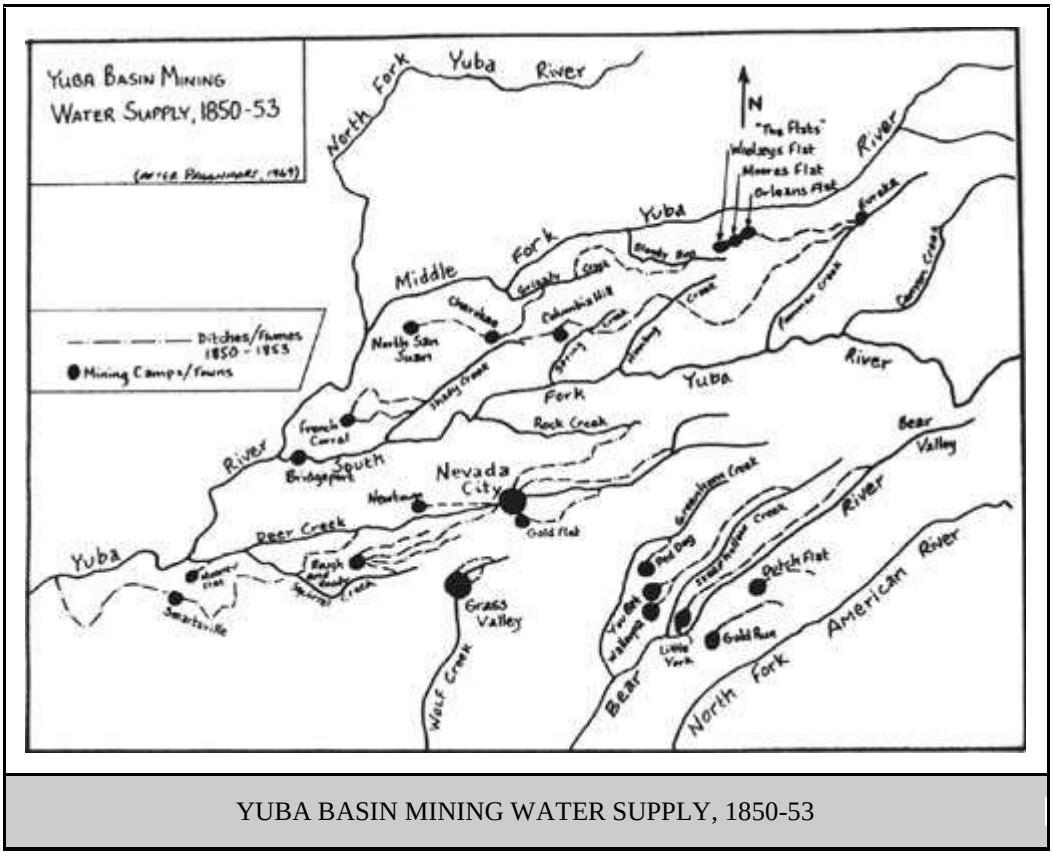
During the years 1853-1859 hydraulic mining underwent a series of important innovations. Canvas hose was quickly replaced by iron pipe, and improved nozzles (monitors) allowed water to be diverted under great pressure. Pipes and monitors were manufactured in Marysville and San Francisco (Pagenhart 1969: 101-103). Other innovations after 1859 were of great importance to this kind of mining and will be discussed in Chapter IV. Hydraulic mining rapidly replaced coyote holing, ground sluicing and drift mining wherever it could be effectively applied, mostly because it required far fewer miners to develop very large claims. Drift mining continued in those places were the overburden was too dense or too deep for hydraulic operations. Hydraulicking was widespread within the Forest, and was often carried on alongside or nearby drift and quartz mines. Hydraulic mines were located from Michigan Bluff in the south of the Forest, to Alpha, Omega, and North Bloomfield in the central portion, to Brandy City, Eureka North, Poker Flat and Morristown in the northern portion. All of these hydraulic mining towns were located on the Tertiary Gravels of the Ancient Yuba River (Coy 1949: 38,63).

The major limitation to the spread of placer mining in general and hydraulic mining in particular was the availability of water to work the claims. Pans and cradles required relatively little water to operate, and were usually employed in riparian settings. Long toms, sluice boxes and hydraulic systems required ever-increasing amounts.

As early as the spring of 1850 ditches were dug along Deer Creek near Nevada City with the capacity to supply seventy to ninety gallons per minute to long toms used nearby (Pagenhart 1969: 85). Miners began to recognize that selling water could be as lucrative as mining. Such development proceeded rapidly during the 1850s.

The early (water) companies had no storage facilities and tapped streams and ravines which had so little water in summer that mining had to be shut down. During the three-year period of 1850 to 1853, before the demands of hydraulicking were made, ditches and canals were dug to serve shallow placers which were not expected to be of more than short duration. Nevertheless, by 1853 the major outlines of the water conveyance system visible [in the Yuba Basin] *today had already been indicated. The volume and head of water needed had led several of the early companies to build*

ditches far up into the rugged ridge and valley region, adjoining the Sierra crest. (Pagenhart 1969: 89)



YUBA BASIN MINING WATER SUPPLY, 1850-53

The ditches mentioned here were built within or near the forest (see map, page 32). Between 1850 and 1853 ditches were built or being constructed for use by long toms and sluices from Eureka (Graniteville) on Poormans Creek to Orleans, Moores, and Woolsey's flats (later known as the "Flats"); from Bloody Run to Grizzly Creek and on to Cherokee; from Cherokee to North San Juan; from Humbug Creek to Columbia Hill; from Steephollow Creek to Walloupa and You Bet; and from Greenhorn Creek to Red Dog. These systems were in Nevada County. In 1852 Placer County listed $1,427,567 invested in ditches and mining equipment. Of this, $858,037 was invested in river mining; $556,000 was in ditches and water conveyance systems (Thompson and West 1882: 145). By 1854, water companies were serving claims in Placer, Sierra and other counties within the Forest. The Sacramento *Daily Union* of December 7, 1854 listed over seventeen ditch companies in Sierra County and described their ditches, located from Gibsonville to Eureka Diggings. The ditches varied in length from two to eleven miles. The Placer County Assessor's Report of 1855 listed a number of canal companies, including the El Dorado Water Company. This organization, with offices in Michigan City (Bluff), had offered $60,000 in capital

stock and controlled canals and laterals totaling thirty miles in length (Thompson and West 1882: 151).

A large number of ditches served the area around Downieville in 1854. Havens and Cracroft [sic], whose water source was Pauley Creek, had an aqueduct over the North Fork of the North Fork of the Yuba sixty feet high which also served as a bridge for footmen and packtrains, and cost $9,000. The Wisconsin Ditch, which drew from the "Middle Fork" crossed the river to Natchez Flat by means of a suspended hose. It was two miles long, cost $4,000, and paid for itself in eight weeks. The Minnesota Ditch drew water from Wolf Creek and supplied Minnesota, a town of 2,000 in 1854. The ditch cost $75,000 and was eleven miles long. There were approximately fifty other small ditches and water companies in the area (Sacramento *Daily Union* 12-14-1854). Hydraulic mining was being utilized by this time, but was not yet fully developed. These ditches and flumes were built to supply long tom and sluice claims. While costly, the returns were sufficiently large to attract a large number of canal builders.

Miners who needed water organized the first water companies and built the initial delivery systems. They formed joint stock companies, to which local merchants often subscribed (Paul 1947: 64). As miners became more experienced in water system construction, some began to move away from mining itself and into the business of providing water to the mines. Three miners, Spencer, Rich, and Fordyce, combined to build a canal from Upper Deer Creek into Nevada City in 1853-54. Rich and Fordyce surveyed the upper reaches of the South Fork of the Yuba River looking for diversion sites and securing water rights. They merged in 1855 with other early Nevada City water companies and formed the "Rock Creek, Deer Creek, and South Yuba Water Company," which over a period of years became the South Yuba Canal Company. The last of the pre-hydraulic mining ditches built in the Nevada County portion of the forest were the Poorman Creek Ditch (from Poorman Creek to Eureka and Moores Flat), and the Irwin Ditch (from Poorman Creek to Relief Hill and Humbug Creek) under construction since 1851 (Pagenhart 1969: 99, 119).

Hydraulic mining became widespread after 1854-1855, and water companies within the hydraulic mining region quickly realized that the systems built for long toms and sluices would not be adequate for hydraulicking.

In the early mining days, operations were often completely suspended during unseasonal droughts The economics of later corporate enterprise, however, made intolerable such unreliable water supplies, and was the main reason for the early construction of headwaters storage dams. Storage facilities had to be planned for a possible extension of the regular summer drought well into winter. (IBID: 75)

While much of the development of large storage facilities occurred at a later period (after 1860), in the 1850s a number of ditch head diversion dams developed into storage dams. As early as 1850 rock and flashboard barriers were built across the outlets of White Rock and Upper Peak lakes. In 1855 several other small high Sierra Nevada lakes were enlarged this way. Between 1855 and 1865, twelve such enlargements took place. One of the most famous of these, Rudyard (or English) Dam, was built in 1858 at the headwaters of the Middle Yuba River, using dry-laid stones with a board facing (IBID: 113).

Such large projects were costly and required large amounts of capital for construction and operation. Common problems facing canal and ditch companies were high prices for labor, small gold deposits, strikes by miners over high water prices, and bankruptcies. The Sierra Nevada Lake Company built in 1858 a $1,000,000 ditch and dam system to supply Alleghany and Minnesota, only to discover that the deposits were too deeply overburdened to be effectively mined by hydraulicking. As hydraulic mining increased only those systems that had built the largest of canals could meet the demands placed on them by hydraulickers (IBID: 114-115).

The size and complexity of mining claims grew during the 1850s. The original system adopted *ad hoc* by the 48ers and 49ers allowed for one claim for each miner, normally thirty by thirty feet. Size of claims varied by district and were determined by local miner's associations. As mining became more advanced, and requirements for capital grew, the small claim rules were too inefficient. Thus during the 1850s the rules were relaxed to allow for larger claims able to support the expensive mining operations working them. In 1852, around North San Juan larger claims were voted in, and after 1854 rules were changed to allow one miner to own more than one claim (IBID: 109-110). By 1854, claims along the Downie River were increased to 100 feet along the river and 200 feet into the hillside; claims along Pauley Creek were 100 feet along the stream and extended to "30 feet above low water mark" *(Sierra Citizen*, 12/13/1854). Although larger, the 100 foot limit on these claims still allowed each mile of river to accommodate many miners.

To summarize, between 1848 and 1858, about ninety percent of the gold mined in California was from placers (Sinnott 1981: 7). The early forms — pans, rockers, and so on — gradually developed into more efficient sluicing systems used or adapted by all placer mining operations. By 1855-56 river mining reached its peak; white miners got out in 1859 and by 1863 Chinese miners were virtually the only ones left using that system (Paul 1947: 129-130). Water systems developed for long tom and sluice claims were slowly adapted in the mid-50s for the demands of hydraulic mines. Placer mining, by 1859, required capital, skills beyond those known by the 49ers, and enormous amounts of water.

In California, quartz lode mining was a less important mining technique than placer mining until after the discovery and development of the Washoe mines in Nevada in the late 1850s. Nevertheless, quartz lode mining began in California during this early period, and the techniques discovered were important to the industrial development of the quartz mines in northern California.

Quartz lode mining began in Mariposa in 1849, largely by "amateurs" with no knowledge of the requirements, techniques, or geology of the region. The system quickly attracted investors.

. . . The rush of capital into the gold diggings began. From speculating in grandiose trading schemes in California, the investing public began investing in quartz-mines, undeterred by the bruises and shocks it had sustained by over-sanguine ventures in previous schemes bearing the glittering name — California. Eager and gullible speculators were easily found by 'Californian' company promoters in London as well as in Boston and New York, although many of the concerns were genuine enough . . . The first quartz mining ventures in California met with very mixed success. Many early companies had far more capital than financial management or technical skill. (Rowe 1974: 112)

The failures in early quartz mining raised the suspicions of prospective investors and hindered quartz mining development for several years after 1853 (Paul 1947: 130-131).

Quartz mining required three separate steps. First, ore had to be mined from the earth. Next, it had to be separated and pulverized to release the gold ores. Last, gold had to be separated from the surrounding material and treated to remove impurities. Simple stamp mills were developed in 1849-1851 that could pulverize gold bearing quartz. Other mines continued to use the arrastre, a system by which ore was crushed by placing it beneath a series of moving rocks chained to an arm swung by a mule or other draft animal. Arrastres were used before stamp mills and alongside them after the mills were improved later in the period. By 1856 a complete mill could be purchased for six to ten thousand dollars (Paul 1947: 132-138). However, once gold ores were separated from the other material, a new problem was discovered. When mercury was added to form an amalgam, it failed to adhere to the gold. This was because the gold was in the quartz in a different form: sulphurets. A new process had to be developed to remove the gold from the sulphurets. This process, chlorination, was introduced into California in 1858, and the combination of improved mining skills, stamp mills, and chlorination led to a revival of interest in quartz mining. In 1854, there were thirty-nine successful quartz mines in the state. After 1856, the numbers increased so that by 1858 there were an estimated 279 (IBID: 141-144).

Within or near the area of the Forest were a number of early quartz mines. In 1852, Placer County listed $13,530 invested in quartz mining; by 1855, two quartz mills were described as operating in Humbug Canyon and Sarahville (near Michigan Bluff) operated by Strong and Company and Hancock and Watson, respectively. Strong's mill was the "first successful quartz mill" in the county (Thompson and West 1882: 145, 151). By 1856, quartz mining in the county developed further.

There are four quartz mills in successful operation in this county. One of them is situated at Grand Ledge on Humbug Canon, eight miles east of Iowa Hill. It has a sixty-horsepower engine, working twenty-four stamps, and capable of crushing fifty tons of quartz in twenty-four hours. This mill is under the management of Dr. McMurtry . . . the quartz mill of Watson and Co., situated at Sarahville . . . is paying handsomely. (IBID: 223-224)

Nevada County quartz mines were centered around Grass Valley and Nevada City, to the west of the Forest boundary. Sierra County had extensive quartz deposits. One of the most famous was located at the Sierra Buttes. The ledge was located in 1850 and worked continuously thereafter (Fariss and Smith 1882: 481). Quartz mines were also located at Forest City, Alleghany, and other areas within the county (Stevens 1969: 2; Clark 1970: 19).

The man responsible for much of the early development of the quartz mines at Sierra Buttes was Solomon Wood. He had placer mined at Downieville between 1848 and 1850; after a trip to the east he was part of a rush in the spring of 1852 to the quartz lodes at the Buttes. Wood secured an interest in the Ariel Mine and Plumas - Eureka Mine near Johnsville, and bought up all the available claims around the Ariel. By 1853, he was the sole owner of the ledge, and had Mexican laborers crushing ore in arrastres while waiting for his stamp mills to be built. He called the mine the Telegraph. In 1857 he sold it to the Reis Brothers who renamed it the Sierra Buttes Mine. This mine, along with the Plumas-Eureka, was one of the original important quartz mines in the state. Wood is interesting also because he was involved in a variety of other mines in the Forest, including the Live Yankee at Forest City, the Four Hills mine near Gold Valley, and the True Fissure near Gold Lake (Sinnott 1976: 217).

By 1858, there were seven quartz mills in Sierra County, worth $56,000 and which had crushed 12,500 tons of quartz. One of these was an eight-stamp mill near Chips Flat (Fariss and Smith 1882: 482-483). Clearly quartz mining did not rival placer mining operations in the 1850s, but the processes had been developed that would result in quartz mining becoming the most productive and longest lasting major gold mining industry later in the century.

Thus, California gold mining developed considerably during the period 1848-1859. The process went from an individual and cooperative enterprise to an industrial form requiring gold to mine gold. Primitive placer mining technologies had become greatly refined, and deep quartz deposits began to be exploited. The scene was set for the next phase in mining in California and the Forest, during which hydraulic mining and drift and quartz tunnels would become completely industrialized. Deep, extensive deposits would be exploited over a long period of time using the basic methods and techniques discovered during this earlier period. The more stable, mature mining system of the years after 1859 resulted in a more settled pattern of community development and an increased exploitation of timber and agricultural resources.

Mining Settlement and Community Development.

Settlement on the Tahoe National Forest was, during the years 1848-1859 tied closely to the advance and maturation of the mining industry. The early transitory settlements, characterized by impermanent mining camps, were replaced by towns whose existence was based on deep, long lasting gold deposits, or proximity to an important transportation route, or development and use of other resources needed by the mining industry. The pattern of settlement set down during this period has largely remained to the present day, with only the most important settlements lasting past 1859.

The Native Americans were among the first to feel the impact of the invasion of miners into their area. The initial affects of the gold rush on the Native American population resulted in changes in village sites and village extinction. Village locations were changed because of exploitation of the Indians and their lands; extinction was often the result of "wars" and homicide. After the United States claimed possession of California, Native Americans were often relocated so that their land could be made available to Anglo settlers (Heizer 1978: 65). The Anglo period in California was characterized by the introduction of whites seeking available land and the intense exploitation of natural resources. While the Spanish and, to an extent, the Mexicans tried to integrate Native Americans into their society and culture, Americans in general had no place for them except insofar as they performed as white men (IBID 1978: 107).

While some Native Americans mined early in the gold rush, they were gradually forced out of mining and the mining region (Rawls 1976: 37-39). The process of removal was often brutal. During and after 1849 the actions of whites against Native Americans consisted in general of widespread personal combat between individuals and small groups (Heizer 1978: 107).

The primary factor for genocidal activity toward Indians has always been the Indian land. The gold miners found the Indian to be an obstacle in his search for precious

metal; much of the prime territory was on Indian land. The ranchers and farmers coveted this same land area, and timbermen recognized the value of Indian timberland. (Coffer 1977: 14)

The Native Americans living within the Tahoe National Forest west of the Sierra Nevada crest, and thus most impacted by the gold rush migration, were the Nisenan or Southern Maidu (Heizer 1978: 387). They apparently had had little contact with whites during the Spanish and Mexican periods, and received into their area escaped mission Indians and Miwoks from the area to the south. They apparently had some brief contact with Hudson's Bay trappers in the valley in the 1820s. In 1833, about seventy-five percent of the Nisenan in the Central Valley portion of their territory died during a malaria epidemic; those in the foothills were little affected by this or the immigrants passing through their lands in the 1840s (IBID: 396). Fremont's men hunted the Maidu mercilessly in 1846, and caused great destruction and death among the tribes living near the Sacramento River (Egan 1977: 339-340).

With the discovery of gold the fate of the Maidu in the foothills was sealed, and the area they lived in overrun. Widespread killing, destruction of villages, and persecution of the tribe quickly destroyed them as a viable culture. The surviving Nisenan lived at the margins of the foothill towns and found work in agriculture, logging, ranching, and domestic activities (Heizer 1978: 396).

The miners of 1848 and 1849 settled in the river valleys and along rich placer bars. Since the United States had just acquired the territory through war with Mexico, civil authority lagged behind the population explosion caused by the rush of miners.

Because the mining camps had sprung up beyond the reach of any established law, they had to adopt their own regulations. Practically none of the land had passed into private hands, and the rights of the Indians were ignored . . . there was no Federal mining law that would have been relevent to the California mining camps, because no precious metal had ever been discovered before on public lands in the United States. (Bean 1978: 99)

To fill the legal vacuum miners acted on their own to devise practical mining laws to provide a measure of law and order. Each camp, district, or mining area would hold a meeting to organize an "official mining district," elect officers, and write regulations. There were over 500 such districts in the Mother Lode region, and the laws and rules they produced drew heavily on the experience of Spanish, Cornish, Mexican, and English mining law as well as common sense. The size of claims was established as well as a rule that they be worked more or less continually for them to be held. Each district appointed a register of claims or secretary to keep a record of the use and location of claims to ajudicate disputes among miners. Less attractive were the

provisions or clauses that sometimes excluded Asians, Latinos, or others (Bean 1978: 99). Miners formed districts within the National Forest around all the major early mining areas.

As elsewhere, mining camps in the Forest were, above all, temporary. Early structures were often of the rudest sort, sometimes nothing more than a brush wall with a canvas cover, or a simple tent. Early camps were built on hilly rather than mountainous terrain, but as mining spread into the mountains, camps were located at the bottom of steep canyons (Paul 1947: 79). Access was a problem for many camps.

At some (camps), the steepness of the surrounding ridges was so great that the rays of the sun never touched the community during the winter months. At others, access to the camps was possible only by roads so abrupt that the approaching traveler found himself beginning the last stage of his journey from a point almost directly above his destination. (IBID: 79)

Camps were often thrown up with no sense of a plan. However, most mining camps and later towns, shared some common features. Most had a similar spatial distribution and the structures in them spread out along a "Main" street, with laterals depending on the town and the length it survived. Most buildings had a wooden frame, plank floors and canvas serving as wall and roof. "Unfortunately for the safety of the populace, construction costs were so high and men's impatience so great that until late in the fifties the majority of houses, whether in city, town or camp, continued to be built chiefly of wood and canvas" (IBID: 75). After 1858, in Sierra County, frame buildings became common in larger towns (White 1961: 79). While most miners continued to live in "temporary" tents and "plank hovels," gradually log or plank sided cabins became more common in the 1850s. These usually had canvas roofs and a stone chimney (Paul 1947: 75). Examples of such structures are exceedingly rare.

Because of the materials and methods used in constructing these buildings, most camps were visited by devastating fires. Forest City, for example, was burned in 1858 (Stevens 1969: 1). In the modern towns that have survived to the present day only those buildings constructed of brick or stone date back to the 1850s. The others are gone and have been replaced by later structures.

A DAILY PLEASURE (Rolle 1978: 206)

Thus, a few if any, of the surviving towns have retained their original arrangement of buildings or architecture.

Mining camps contained a variety of businesses. Stores sold supplies to the miners and it became apparent to many that supplying the mines could be more lucrative than mining. Major William Downie, founder of Downieville, kept a store there (Sinnott I 1972: 6). Leland Stanford, who was later involved with the building of the Central Pacific Railroad and who became governor of California, owned a store in Michigan Bluff in 1855 where he sold oil and groceries (Kraus 1969: 14). Another common structure was the boarding house. These were often operated by the few miners' wives in the camps.

When a miner's wife arrived at a mining camp she found that she was one of several women in a camp of hundreds of men. Immediately she was compelled by popular demand to become an entrepeneur by running a boarding house . . . these hardy women . . . had to cook, serve, and clean up after crowds of men in the boarding houses. It was a profitable business, more reliable and renumerative, in many cases, than panning gold in the streams. (Woyski 1981: 45)

OCCUPATION FOR RAINY DAYS (Rolle 1978: 204)

The scarcity of women in the camps forced men to assume traditional female roles — cooking, washing clothes, and sewing. Gradually some boarding houses evolved into hotels, often ambitiously named "Empire," "Palace," or "Hotel De Paris" (Fatout 1969: 4).

Saloons were an important social center in mining camps.

Especially in the early days, the saloon was the frontier's most versatile social institution. It served as a place to sleep, a clearinghouse of communication, a location of limited banking facilities, and a site for church services and political discussion. Above all, the saloon was a place for entertainment and relaxation, with facilities for gambling, dancing, conversation, and companionship as well as drinking. (Blackburn 1980: 447)

Early saloons were nothing more than a tent with a rough bar, glasses and whiskey barrel. "As the town developed so did the saloon to perhaps a large tent or a structure with a false front and frame siding or an elaborate building with a second floor meeting room" (Blackburn 1979: 447). Among those who frequented saloons were miners, camp folk, "dancehall girls" and occasionally prostitutes. The latter group

usually maintained separate fancy parlor houses in the mining towns. Downieville apparently had such a section in the 1850s (Woyski 1981: 42).

Sanitation in the camps was primitive. Streets and "were littered with empty bottles, old boots and oyster tins, hambones, wornout kettles, broken picks served as public dumps, hats, sardine cans, and shovels" (Fatout 1969: 14).

As earlier noted, mining camps grew and faded rapidly. At Goodyears Bar, mining began in late summer of 1849. The bar was first worked by Miles Goodyear, who died there in November 1849 (his remains were placed in an old rocker, covered with a buffalo robe shroud, and buried at Slaughter Bar across the creek,) By 1852, the bar and nearby flat was covered with houses; 600 votes were counted in the presidential election of 1852 (Drury 1969: 4-8). Similarly, the mining town of Alleghany grew up after 1853, as miners from nearby camps gravitated together to a better location (Sinnott 1981: 8). Other camps were established throughout the Forest during the decade of the 1850s; some, like Downieville, Alleghany, Camptonville and North San Juan, have survived to the present day. Others like Alpha, Omega, and Morristown have vanished as their available gold was mined out.

These mining camps and later towns in the Forest area, served as population centers for a variety of people. Among the many groups that arrived were the Chinese and Cornish. These two groups were exceptionally numerous in or near Tahoe National Forest.

As noted above, Chinese arrived in California as one of the earliest groups in the gold rush. The first were merchants who located largely in San Francisco; later Chinese came as miners (Mai 1979: 475). The Chinese brought supplies and equipment with them from China. "The (Chinese) immigrants always bring a chest of clothes and a bundle of bedding. But the amount of these articles is small, so that in a year or so you may notice inner parts, then shirts, then coats and caps or hats" (Quoted in Williams 1930: 25). A former miner, J. D. Borthwick, described the Chinese heading toward the mines in a fashion typical of many whites.

Crowds of Chinamen were also seen, bound for the diggings, under gigantic basket hats, each man with a bamboo laid across his shoulder, from each end of which was suspended a higgledy-piggledy collection of mining tools, Chinese baskets and boxes, immense boots and a variety of Chinese 'fixins' which no one but a Chinaman could tell the use of, all speaking at once, gabbling and chattering their horrid jargon, and producing a noise like that of a flock of geese. (Haskins 1890: 189)

The Chinese miners used the pan for some time after it was abandoned by white miners; and even after 1855, when whites had largely abandoned the rocker, the Chinese continued to employ it (Williams 1930: 56).

The Chinese mentioned by Borthwick were probably wise when they avoided direct competition with white miners, because when they did they were often treated roughly. Sir Henry Vere Huntley traveled through the mining region in 1852 and described an occurance on Deer Creek, a branch of the Yuba River.

The miners of Deer Creek . . . turned out last week and drove all the Chinese off that stream. The heathen had got to be impudent and agressive, taking up claims the same as white men and appropriating waters without asking leave . . . that afternoon about 50 miners gathered together, ran the Chinese out of the district, broke up their pumps and bores, tore out their dams, destroyed their ditches, burned up their cabins and warned them not to come back on penalty of being shot . . . (Huntley 1856: v. I, 222)

Chinese miners were also harrassed by Mexican bandits. State legislators gave official sanction to the anti-Chinese sentiment with the passage of a series of taxes and bills aimed specifically at the Chinese (Williams 1930: 67-69).

Faced with such opposition, many Chinese left mining and opened stores and restaurants in the mining camps and towns (IBID: 58-59). Chinese settlements in the mining region were of two kinds: camps located on or near mining claims along rivers, streams or in other areas; and Chinatowns within mining towns. Chinese mining camps housed Chinese only and usually consisted of a group of small tents and brush huts that served as shelter for the miners (Chinn 1969: 30). In contrast, Chinatowns were districts within a mining town separate from white areas. The Chinatowns functioned as supply centers for the Chinese camps and provided services (stores, laundries, restaurants) for the general population of the mining town, usually at a lower price from those charged by white owned businesses (Williams 1930: 39-41).

Much of the hostility felt by Chinese in California found its origin in a feeling that the Chinese were "swarming" in to take the mines from Americans. The Chinese did mine in groups and they tended to cluster about in a newly settled mining district, oftentimes for their personal protection. These migratory patterns intensified the fears of local miners who viewed the arrival of Chinese as "an invasion" of their territory. In some areas the Chinese population reached a significant percentage of the total population, however, in general they represented less than ten percent of the total population of the state. It was the rapid proportional increase and their obvious physical and cultural differences that led to the racist actions of white miners.

Another major ethnic group in the mining regions of the Forest were Cornish miners who were attracted to California mines in 1849 and thereafter from other mining areas in the United States and directly from Cornwall (Rowe 1974: 113). Most were concentrated around Grass Valley and Nevada City, but "more Cousin Jacks (Cornishmen) were located elsewhere in Nevada County" (Rowe 1974: 113). Their experience in mining, and especially in deep mining and tunneling made them particularly important as quartz mining developed after 1859.

Other ethnic groups, such as Latinos and Blacks were also present in the mining camps and towns within the Forest. In 1852, 241 Blacks were counted within Placer, Nevada, and Sierra counties (U. S. Census 1850: 982). These people, along with Latino miners, felt many of the same pressures that the Chinese did. Mexicans and other Latino miners left the diggings to take up other occupations like pack mule train wrangling. Blacks were heavily discriminated against, and many left the mines in California in 1858 when news of the discovery of gold on the Fraser River in British Columbia reached California (Rowe 1974: 137).

As the mining industry developed during the 1850s in terms of methods, equipment, and ability to reach deep deposits, only those camps that were located near highly productive mine sites or other important resources survived. During the 1850s many of the river bars were mined out; as deposits were exhausted, the occupants moved on. These camps disappeared because there was nothing besides the gold to keep people there. Camps like Goodyears Bar faded; towns like Downieville, Alleghany, Washington, North San Juan, Michigan Bluff and others survived because the mines were rich or other factors permitted development of diversified economic activities.

Compare the description of mining camps, with log and brush huts, tent buildings and saloons to two mining towns, Alleghany and North San Juan. Alleghany, located on extremely rich deposits, was established as a town when people in adjacent mining camps moved to its better geographic location. As the town grew, portions of the earlier camps were incorporated within its boundaries. Miners from Pennsylvania and the eastern states made up most of the population. North San Juan was described by the *Hydraulic Press* in April 1859. The town had a population of about 1,000; 100 families, some of whom had built small cottages and houses with planted gardens. The town had eight brick buildings on Main Street, testimony to the feeling of permanence felt by the inhabitants. The town also contained a public school, brewery, church, three hotels, four or five sawmills, two restaurants, an iron foundry, about sixty stores and shops of various kinds (of which twenty sold liquor) "and more houses of ill fame than we like to mention." The town had a library with 600 volumes, Masons and Oddfellows clubs, a "Mutual Relief Society," and a temperance association "consisting entirely of Welshmen." Of the 250 houses in or near town, forty "ramshackle affairs" were inhabited by Chinese. The number of miners' cabins

in the surround territory was unknown *(Hydraulic Press* 4/2/1859). Clearly a town like North San Juan was much different than the early mining camps that were settled in the first years of the rush. While these towns were not immune to change, they had the fundamental structures representative of a more modern stable, mature society.

THE MOUNTAIN EXPRESSMAN

From "Chips of the Old Block" by Alonzo Delano. Woodcut by Nahl.

THE MOUNTAIN EXPRESSMAN
From "Chips of the Old Block" by Alonzo Delano. Woodcut by Nahl.
(Wiltsee 1931: frontispiece)

Supplying the Mines, 1848-1859.

The growth of gold rush era camps and towns stimulated the development of an industry based on supplying mines and camps with needed mail, express and provisions. While at first the pack train system was primitive, providing only limited supplies and selection, throughout the fifties both the transportation system, and the goods and services it made available, became more varied and complex.

Goods heading for the mining region within the Forest normally came out of San Francisco and distribution points in the valley like Sacramento and Marysville. Because the area that Marysville served was so rugged, it became the major packing center in California. Freighting with wagons was not undertaken until hydraulic and quartz mining developed in the late 1850s and gave a greater aura of permanence to the settlements east of Marysville, justifying the heavy expenditures commonly required for road building (McGowan 1949: 209-218). These transshipment points were scenes of great activity during the period.

. . . *Steamers and barges unloading, merchandise stacked all around, and the busy pack-mule trains, and afterwards, wagons loading for the arduous uphill journey to the foothills and the camps of the mines which dotted their broad expanse.* (Wiltsee 1931:

The earliest transportation into the mines was done by the miners themselves, with crude wagons, pack animals, or backpacks. There were, at first, no stores or trading posts within the region (Wiltsee 1931: 3). One of the first Cornishmen to arrive in the mines, a Col. Collins, wrote his family from the North Fork of the American River in August 1849.

We had a hard time getting our baggage and provisions to this place distant from San Francisco about two hundred miles. We came within some forty-five miles of this place by water, and then purchased a wagon and a yoke of oxen between seven of us, which by packing them up the mountains, we brought about a hundred and twenty pounds to this place, and sent the team back and brought up nine hundred (pounds) more. The price of carrying this forty or forty-five miles is from twenty to twenty-five cents per pounds, and can scarcely be had for that. We were lucky in getting a yoke of cattle cheap that had been driven from Oregon. They were of small size, about such as you could get about twenty dollars for in Wisconsin, but we were glad to get them at

one hundred and fifty dollars. — Our wagon — oh such a wagon! — why you would have to give a boy to [sic] *bits to burn the tire off, and yet it was worth a hundred and fifteen dollars.* (Quoted in Rowe 1974: 103)

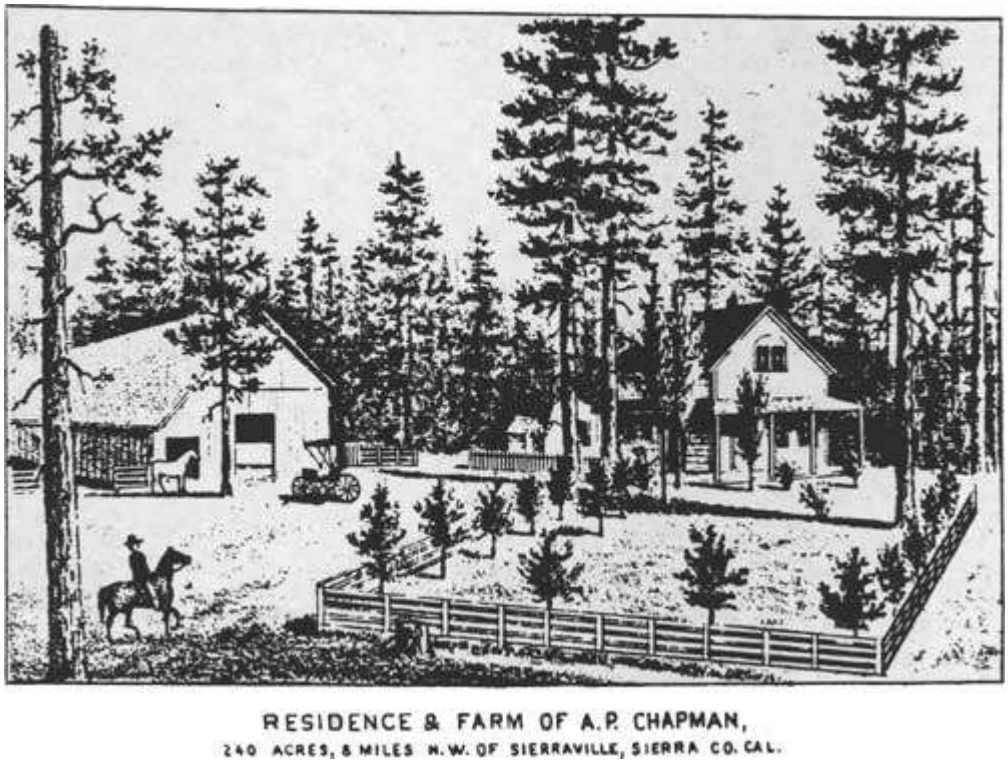
Such high costs reflected the lack of facilities and equipment. In such a situation many avoided mining and went into some other business. Some bought and sold gold dust; others provided primitive banking services; others used what gold they had to begin farming, teaming or packing into the mines (Wiltsee 1931: 7).

One stimulus for the development of freighting and express companies was the desire of miners for news from home and the outside world. The miner's "thirst for tidings seemed increased in proportion to his remoteness" (Wiltsee 1931: 15). The mails would be delivered to "basetowns" like Marysville and Sacramento by national express companies, and then transferred to smaller express companies that served the mining camps within specific areas. Only after towns in the mining region proved their permanence (e.g. Downieville, Nevada City, Alleghany, etc.) did the major express companies begin to establish their own routes and offices (IBID: 22-23).

The topography of areas within the Forest was a major determinant in locating and constructing wagon roads. In the area drained by the American River, the somewhat less rugged nature of the hills and canyons allowed wagons to travel into the area early; in fact before roads as such were built (Rowe 1974: 103). Goods transported to Sacramento were taken up to Auburn, and then sent into the mining region by two trunk routes. The first led up the divide between the Middle and North Forks of the American River, to Grizzly Bear House, Butcher's Ranch and Yankee Jim's. From this point the road split, one heading to Forest Hill and Michigan Bluff and the other south to Todd Valley. The other road out of Auburn followed the divide between the North Fork of the American and Bear rivers through to Alder Grove (later Illinoistown) just below modern Colfax. Goods taken to this point were transferred to pack trains heading farther up into the mountains. Goods from Sacramento also supplied Rough and Ready, Grass Valley and Nevada City (McGowan 1949: 415).

The Yuba River basin, with more precipitous canyons and rugged terrain, was supplied until late in the 1850s largely by pack trains. By 1851, as many as one thousand mules a day left Marysville with 100 tons of goods for the mines (McGowan 1949: 209). The Marysville *Herald* (3/29/1851) reported that "all along the Yuba road at any hour of the day droves of pack mules can be seen on their way into the hills." Most of the early pack train owners and operators were Mexican; their profits stimulated Americans to invest in pack operations and hire Mexican drovers in 1850-51 (McGowan 1949: 209).

There were a number of trails out of Marysville, the most heavily used following creeks to the divide between the Yuba and Feather rivers, and then turning either toward Downieville or Onion Valley. There were also trails leading into the Yuba-American river basins, but these were not of major importance (IBID: 213). The main trail from Marysville to Downieville ran alongside the main Yuba to Hermitage, then up to Foster's Bar via Galena House, Stanfields, Dry Creek, Keystone and Oregon Creek. The road then crossed the North Fork of the Yuba and followed the ridge between Oregon and Willow creeks to the summit between the North and Middle forks of the Yuba, passing Camptonville and Oak Valley. In 1850 this trail continued up the ridge to Galloway's Ranch above Downieville before descending into town; later routes went by way of Mountain House and Goodyears Bar to avoid the steep grade. The road from Marysville to Downieville via Goodyears Bar was sixty-five miles long *(Sacramento Union* 6/17/1852; McGowan 1949: 214-15). Improvements on this pack trail allowed wagons to reach Fosters Bar by 1850, and by 1853-54 a road connected Camptonville and North San Juan. Trails leading into the Slate Range mines left the Marysville-Downieville trail at Keystone, passed Indian Ranch on Dry Creek, went up Dry Creek to Challenge, Woodville and Orleans, and then off the forest (McGowan 1949: 216, 218, 373).



RESIDENCE & FARM OF A.P. CHAPMAN, 240 acres, 8 miles N.W. of Sierraville, Co. Cal. (Fariss & Smith 1882)

Other smaller trails radiated out from mail trail destinations like Downieville, Auburn, Nevada City and so on. An early trail linked Downieville with Sierra City, built along the north side of the river. Pack mule trains extended this route into Sierra Valley in 1851, crossing the mountains by way of Bassett's to Chapman's Creek, through Chapman's Saddle and on into the Valley past Chapman's Ranch. Isaac Church, a Vermonter who arrived in California in 1850, established a pack mule service between Marysville and Sierra Valley in 1851. His service ran for ten years (Sinnott 1976: 32). Samuel W. Langton operated several express companies in the Yuba mines in the 1850s. His first, "Langton's Yuba River Express" ran in 1850 from Marysville up the Yuba and served Nevada City, smaller camps, and on to Downieville. He reorganized the company several times until 1855 when he established "Langton's Pioneer Express" which he ran until his death in 1864; by 1865 Wells Fargo purchased it from his heirs (Siltsee 1931: 53).

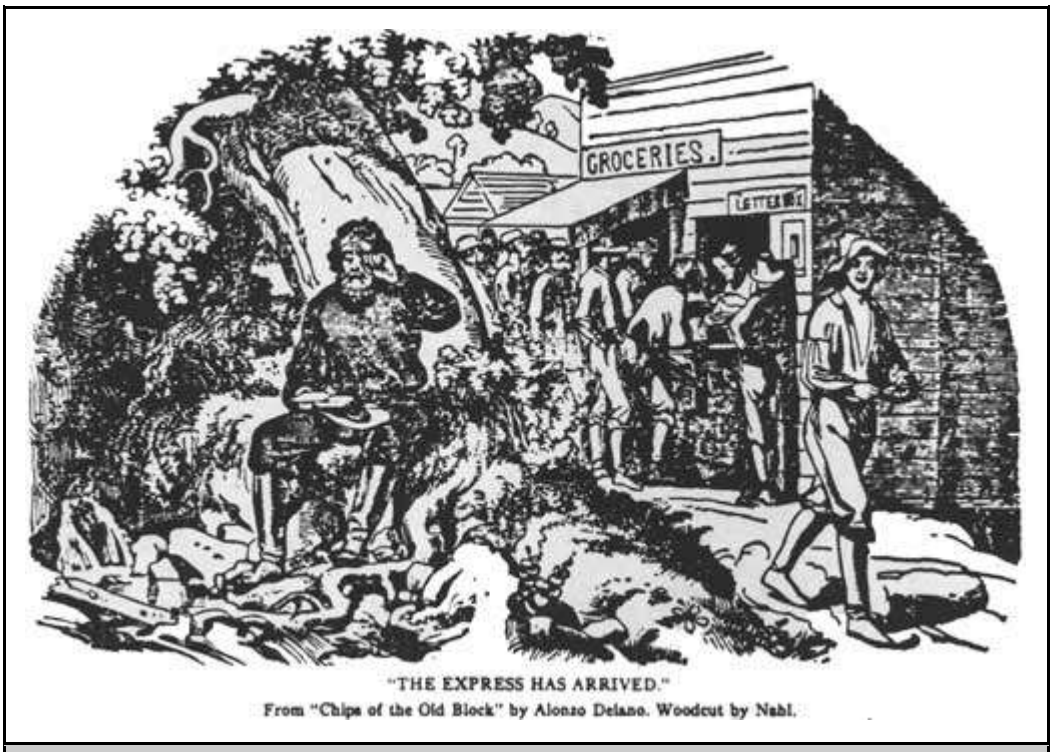
Pack trains operated before roadhouses, inns and way stations were built, and the packers would camp out in a clearing or meadow that had grazing, wood and water. These gradually became regular stopping points. Mules were unpacked and their loads arranged in a row or circle, with each pack saddle next to its load. Mules were put out to pasture nearby. The mountain trails were dangerous for the mules; some were only "as wide as our feet," with wall on one side and steep slope on the other. The mules hugged the wall, the packs grazing projections. Descending steep slopes was dangerous, hard work for the mules and drivers. From the ridge top to Goodyears Bar the slope descended 2,000 feet in four miles (McGowan 1949: 184-7)

By the mid-1850s, a road was established to Brandy City, northwest of Indian Valley. It had been connected to Oak Valley and Camptonville by a mule trail that descended the western ridge of Cherokee Creek, crossed the Yuba on a bridge near the creek mouth and then ascended the mountain into Camptonville (Sinnott 1972: 15). Part of this trail had a grade of forty percent (McGowan 1949: 182). Other towns like Forest City were served throughout the 1860s by pack train (Fariss and Smith 1882: 474).

The early pack train express companies carried a wide variety of goods into the mines. Mail was one of the most important items, and it was often the case that the express companies moved the mail faster than the post office (Wiltsee 1931: 71-73). Food included flour, jerked beef, salt pork, beans and coffee. After 1849, rice, sugar, and dried apples became available. Fresh vegetables were usually purchased and consumed in the Central Valley towns on the way to the mines before they reached the miners. In 1848-1849, only potatoes and onions were available, and were sold for $1.00 each to miners suffering from scurvy. Dairy products, green vegetables, butter and eggs were rare until after 1850. Selling food in the mines was highly speculative, heavily competitive and often quite lucrative (Margo 1947: 11-15, 26). Besides foodstuffs, dry goods, furniture, and even iced snow was packed in and out of the

mountains. Daniel Dancer, a famous Marysville-Downieville packer, brought a grand piano into the mountains on mule back (McGowan 1949: 189, 191).

Some Sacramento and Marysville merchants opened branch stores in mining towns. The Stanford Brothers stores were an example of this system. Josiah Stanford, the first of the brothers to arrive in California (in 1850) began a store at Mormon Island on the American River, and as each brother came out he set them up in various mining towns. As mentioned earlier, his brother Leland ran the store in Michigan Bluff (Margo 1947: 44-45; Kraus 1969: 14). Some of the chain-store operators had their own pack teams or trains, but most hired packers to transport their goods by contract (Margo 1947: 45).



"THE EXPRESS HAS ARRIVED." From "Chips of the Old Block" by Alonzo Delano. Woodcut by Nahl. (Wiltsee 1931: 13)

As mining camps developed into more permanent towns, wagon roads, as distinct from pack trails, were built to connect them with valley supply centers. Roads were built first where topography allowed. As roads gradually were extended into the mining region, pack trains continued to operate from "terminals" at the head of "wagon navigation." Towns like Marysville became more and more stations for teamsters rather than muleteers. The packers loaded up their animals at the road terminals and operated between these points and remote camps (McGowan 1949: 225).

Interest in roads was great in all of the mining towns within the Forest, and roads were sometimes built to try to attract the freight business into an area. In 1852, an "Emigrant Road" was built from Yankee Jim's through the central Sierra Nevada to the Washoe Valley. It cost $13,000, was poorly made and virtually ignored by immigrants who used the Carson Route over the mountains (Thompson and West 1882: 283). Placer County was largely bypassed by the major wagon routes until the 1860s; this road represented an early attempt to pull immigrant traffic through the county.

By 1854, wagon roads extended into the Yuba basin mines. The *Sacramento Union*(11/28/1854) noted that where pack trains had been encountered in the past were now heavy wagons "at intervals of almost every ten minutes. . . . Teamsters and others are mainly indebted to individual enterprise for these changes which have cut down the hillsides and blasted through solid rock, to secure them one of the best and safest thorough-fares anywhere to be found in this region of the country." Robinson and Company's $12,000 wire-fastened bridge over the South Fork of the Yuba and seven miles of road were noted, as well as the efforts of Mr. Emory to extend the road across the high ridge beyond the Middle Yuba crossing, at a cost of $10,000. The *Union* also noted settlers and improvements along the route; sawmills were built and "houses by fifties." As government was unable or unwilling to finance road building, individuals or companies undertook the construction projects and operated the thoroughfares as toll roads. The Nevada County Recorder's *Book of Corporations #1* listed nine men as shareholders in the Alpha and Washington Toll Road in November, 1855. Toll bridges were erected wherever rivers were too deep for fording. Toll bridges were built along the South Fork of the Yuba River above and below Washington in the early 1850s (Slyter 1972: 37, 45). The original toll bridge across the North Fork of the Yuba was built in 1859 as a part of the Sierra Turnpike. The piers of this bridge were still visible in the 1900s (Tahoe National Forest Historical File). Toll roads and bridges were also built in Placer County, including at least two on the forest. One, named the Volcano Canyon Turn-Pike, traversed Volcano Canyon from Baker's Ranch to Michigan Bluff. J. A. Matteson built this road in 1856. Two years later he constructed another road from Bath to Michigan Bluff at a cost of $12,000; obviously Matteson expected enough traffic to recoup his investment (Thompson and West 1882: 288).

Placer County continued to be interested in a road across the Sierra Nevada, especially as other areas began building or promoting such roads. In 1856, Thomas A. Young and a party of six surveyed a route from Forks House to Secret Spring, through Robinson's Flat to the crest, down Squaw Creek to the Truckee River and on to the Washoe. Young submitted a report on this route to the State Surveyor General, but other routes appeared more practical and the route was never developed (Thompson

and West 1882: 284-285). Similar surveys were filed regarding the Henness Pass and Beckwourth routes (Surveyor General 1856: 191-192; 193-194). In contrast to the Placer County route, these were eventually built, largely to provide service to teamsters and miners heading toward the Washoe after the Comstock discovery in 1859 (Jackson 1967: 22-23).

The road that became known as the Sierra Turnpike, connecting Camptonville and Downieville via Goodyears Bar and Mountain House was completed on July 4, 1859. The day was one of great celebration:

. . . The stage came up from Camptonville, decorated profusely with flags and banners, and the horses decked out in proper colors. This was a great day of rejoicing in the mountains, for it meant the abandonment of the time-honored pack-mule, who had painfully threaded the narrow trails for so many years, and the establishment of a closer communication with the outside world on wheels greatly more indicative of a country civilized and prosperous. Praises went up from all sides to Colonel Platt of Forest City, to whose untiring efforts, with voice and brain, were largely due the successful issue of the enterprise. (Fariss and Smith 1882: 469)

LODGINGS ABOUT 1855 (Cross 1934: 204)

A road connected Forest City to the Sierra Turnpike in 1860, and a tri-weekly stage service was begun (IBID: 474).

Most of the early teamsters were former gold seekers who had crossed the plains and thus had wagons at their disposal (McGowan 1949: 279). The *Sacramento Union* (6/16/1858) estimated that seventy percent of the teamsters were from Ohio, Michigan, Indiana, Illinois, Iowa and Missouri, with Ohio and Missouri supplying the majority. Many left the business as soon as they had enough money to buy a ranch, toll-bridge or ferry.

The earliest teamsters used any available cart or wagon, but by the mid-1850s wagons specially designed for mountain freighting came into general use. Wagons brought in from the east were usually too heavy, unable to carry heavy cargo or withstand the wear-and-tear of constant hard use. The mountain wagons were made of pine, "shaped very much like and old-fashioned bread trough." They carried 9,500 pounds, weighed 3,800 pounds empty, and required teams of eight mules to pull them (Margo 1947: 51).

Teamsters generally took lodging in roadside inns that had developed during the pack train era. As teaming became more important, the number of inns increased. Typically, there was an inn or way station about every three miles on the main routes. During 1849 and 1850 these were often nothing more than shanties or tents set up near water and grass. Such places usually furnished a meal and a place to sleep. After 1851, inns became more elaborate as competition between the growing number of stops forced proprietors to offer better fare. As a result, large, permanent structures replaced shanties and tents (McGowan 1949: 299-302).

Occasionally teamsters combined their freighting operations with other businesses. Daniel Cole, with his partners Warren Green and John Sharp, ran a daily stage from Marysville to Sierra City. Cole also owned a hotel, lumber company, and other businesses at Mountain House (White 1961: 70).

With the construction of permanent, improved roads after 1851, roadside buildings became "more substantial and pretentious," their architectural styles reflecting the builder's place of origin. Two story buildings with a complex of outbuildings appeared, and these depended more on travelers and teamsters than local miners for their clientele. The typical inn was located close to the road, and offered a barroom and dining room. "There were no tablecloths, and the individual's equipment consisted of a tin plate, a cup, knife and fork." Bedrooms were in an annex or on a second floor. The kitchen typically had a stove or fireplace. The inn often provided a barn or corral for animals, and occasionally had a range for grazing. Outbuildings included a roothouse, usually partially or totally underground with a thick sod roof; a milk house

"built, whenever possible, over a running stream or spring" or in the inn's cellar; a smoke house with no openings but a small door, and a firepit and poles for hanging meat; and the inevitable pigsty and privy. "Apart from economic strategic considerations, the wayside inns were always located with an eye to water and fuel" (Cross 1954: 10-13). Inns also often cultivated kitchen gardens for fresh vegetables and fruits (McGowan 1949: 303).

Inns and hotels were described in a variety of terms. The *Sacramento Union* (11/28/1854) outlined the different conditions prevailing. "Nearly every stopping place is an inn of entertainment, some of them noted for keeping execrable beverages, which are partaken of at the imminent risk of a sick stomach; others offering the inducement of an excellent dinner or . . . a clean bed." These stations dotted the wagon roads and pack trails within Tahoe National Forest. Among the more famous of these were the Mountain House, located at the junction of the trail to Goodyear Bar and the trail to Henness Pass Road at the crest of the Mountain House Grade; Sleighville House two miles east of Camptonville (TNF Historical File); and Plum Valley Ranch, three miles from Forest City *(Sacramento Union* 11/28/1854).

The building of roads and bridges greatly aided the economic development of the mining region, and made possible much more convenient travel and communication. Roads were rough. However, despite rugged conditions, toll bridges and uncivilized inns, these roads provided the means to more easily supply the mining towns within the Forest, and resulted later in gradual development of industries not totally dependent on mining.

Logging and Agricultural Development.

Logging and agriculture within Tahoe National Forest during the decade 1849-1859 were tied closely to, and served primarily, the mining industry. Both found local markets for goods produced; little that was produced on the Forest left the area. It was not until transportation systems like railroads were built through the region that many of the products of the Sierra Nevada foothills and eastern Sierra Nevada valleys could be economically transported to distant markets.

The use of timber resources began in the Forest with the arrival of the first miners, who felled trees and used them to build crude cabins and other shelters. John Potter cut trees near Downieville to build a cabin in December, 1849; others soon followed (Fariss and Smith 1882: 456). The trees were apparently cut down by the miners themselves. Miners in other areas of the Forest availed themselves of trees and brush for early shelters as well.

Sawmills as businesses did not begin appearing until 1850. The first sawmill in Sierra County was built in the fall of 1850, more than a year after gold was discovered at Downieville and nearly two years after miners entered the region. The preoccupation of people with mining, the lack of adequate transportation facilities for access to market, and the small local demand explained the gap in development (White 1961: 40).

This first lumber mill in Sierra County was built by James Durgan on Durgan Flat near Downieville in late 1850. His lumber was used to build cabins, cradles, flumes, long toms and other mining equipment. Sawmill machinery was not manufactured at this time in California; thus blades and other equipment were imported from the east (IBID: 42, 6). Durgan's mill was soon waterpowered; however, before the ditch system was completed the mill had been operated by hand. One man was stationed below the log in the sawpit, another stood above, and the two worked the saw in concert with logs braced in a rack. The saw's teeth were set to cut in only one direction. In time water was piped to the mill through log sections which had had their centers augered out (IBID: 48).

Durgan's operation was quickly imitated by others.

In 1852 Craycroft and Cheever had built a sawmill above the town, which was in operation; and in 1852 Philo A. Haven erected another farther up the East Fork. Haven's flume headed two miles above Downieville, carrying water and lumber right into town . . . Mr. Haven sold to John Cummings and John Angle, in 1854.(Fariss and Smith 1882: 459)

Sawmills were also built in the early 1850s around the Nevada City mines (Bigelow 1926: 8). The 1852 census listed Nevada County as having $129,000 invested in sawmills (Vivian 1890: 462). "Later the development of the mines over the whole of the lower elevations in Placer, Nevada, Yuba and Sierra counties and the building of Nevada City, Grass Valley, Dutch Flat, Downieville and other older towns along the boundary of the forest (Tahoe National Forest) took its toll on the forests" (Bigelow 1926: 8).

The mines in the area around Dutch Flat were served by a waterpowered sawmill built in 1854 by Hamlet Davis. Located a short distance above the town, the Davis mill had a capacity of 5,000 feet per day. In 1859, the Towle Brothers purchased the mill *(Sacramento Union*6/16/1882).

The number of sawmills within the Forest grew rapidly during the 1850s, and the mills were bought and sold frequently as millers turned to mining or other pursuits (White 1961: 54). The *Sacramento Union* (12/14/1854) noted sixteen active sawmills

in Sierra County in December 1854. Powered by water or steam engines, the mills had capacities ranging from three to five thousand feet per day. In 1855, the *Daily Alta California* (8/18/1855) listed thirty-four sawmills in Nevada County; most of these were in Nevada City or Grass Valley, but ten were located on or near the Forest. The *Alta* also listed thirteen sawmills in Sierra County, all but one within the Forest. The newspaper did not mention any sawmills east of the Sierra Nevada. Nevertheless, there were sawmills in Sierra Valley or the mountains around it in the mid-1850s. One of the first was a mill built by John Craycroft on his ranch located on the northwest side of the valley between Beckwourth and Sattley. Other mills were erected later in the 1850s by Day and Geyer (two miles west of Randolph near the base of the mountains, one quarter mile south of the present Louis Maddelena Ranch) and by George F. Fletcher near Sattley. Until the early 1860s these mills produced lumber used in the construction of homes, farms, outbuildings and fences (Sinnott 1976: 74).

By the late 1850s sawmills scattered around the area of the Forest were producing millions of board feet. The Assessor of Sierra County reported twenty steam-powered mills and sixteen water-powered mills with an output of twenty million feet in 1858; the year before there had been twenty-four. By 1859, there were thirty-two operations, twenty-one steam and eleven water powered, with an output of sixteen million feet. The reduction in milling in 1859 may have reflected the fact that many miners left the Sierra Nevada mines for the Washoe Valley (White 1961: 58-60). The Nevada County mills expanded into others areas; in 1858 two mills were in operation near Washington (Slyter 1972: 86).

Sierra County Sawmills

1850	1	1857	21
1851	3	1858	36
1854	16	1859	32
1855	13		

(White 1961: 55-59; *Sacramento Union* 12/14/1854: 2/2)

Water-powered sawmills were cheaper to build than steam mills, and simpler to maintain and operate. In general, water-powered mills were located adjacent to year-round active streams and rivers like the forks of the Yuba River, Canyon Creek, forks of Grizzly Creek, and the forks of Oregon Creek near Forest City. Other areas that needed mills but had insufficient water supply had water delivered by flume. Sierra Valley mills and those at Mountain House, Pike City and Negro Tent were supplied by flumes. The flumes themselves were, of course, a market for the mills, as were the mines and mining towns. This was particularly true after the mid-1850s, as towns

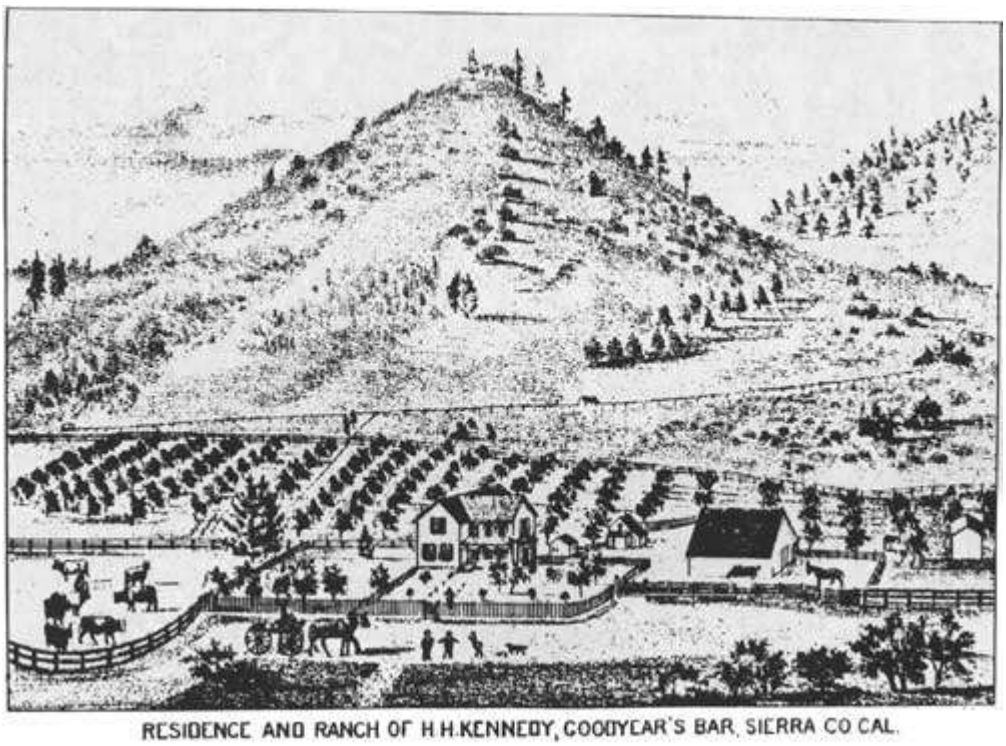
became more permanent and construction of frame buildings increased demand for lumber (White 1961: 59-62, 79-82).

Agricultural activity within the Forest paralleled the lumber industry. Farmers and ranchers produced food for miners and the mining towns. As with the lumber industry, farm production for outside markets came later, and was dependent on the development of better transportation systems.

With the discovery of gold, California became almost completely dependent on imported food, most coming from Oregon, Hawaii, Chile, and other Pacific areas. Cargoes arrived in San Francisco and were sent to valley distribution points like Marysville and Sacramento. In 1849, a gradual change occurred as unsuccessful, disenchanted or opportunistic miners with farming experience turned to agriculture. Starting in 1850, valleys around San Francisco Bay and Sacramento began to produce crops in large quantities. After 1851, agriculture on a commercial scale was initiated nearer to mining areas. Much of the best farming lands of Nevada County were taken up at an early date by ex-miners. Ranches along the Yuba River bottoms produced wheat, grains, vegetables and melons. Cattle, which before 1848 had been raised only for hide and tallow, became increasingly valuable as a food source. The pre-gold rush price of $4.00 per head quickly rose to $75.00 or higher. Cattle were driven north to the mines from coastal and southern California ranches; cattle and sheep were also imported from Texas and New Mexico. Cattle purchased in Texas for $5.00 to $15.00 per head sold for $60 to $150 in California; sheep worth $2.00 to $2.50 each in New Mexico brought $12.00 to $16.00 in the mines. Many of the cattle sold in the mines were loose cattle brought in by immigrants, but many more animals (cattle and sheep) were brought in by herdsmen who returned to their native states after the drive. The importation of animals reached its peak in 1854; by the end of the population explosion in the mid-1850s demand lessened and prices eased as the requirements of mining towns stabilized (Margo 1947: 62-66, 78, 85-89, 102-106).

For the most part, crop-producing areas were located off the forest, in the lower western foothills of the Sierra Nevada. Some limited, small-scale agriculture was undertaken in choice locations within the forest boundary, but the Assessor of Placer County noted in 1855 that "there are a few ranchers in isolated spots scattered through other sections of the country — on the mountains and rivers — but generally speaking agriculture is confined to the valley section" (Thompson and West 1882: 241). In the higher elevations, settlers grew fruit trees. In fact many early pioneers planted fruit trees as one of their first actions upon arriving. Mrs. Maria Wills was listed as having arrived in California in 1849 settling at Michigan Bluff, and raising fruit on her 146 acres (Thompson and West 1882: 416).

Small ranches were established on the west side of the mountains in the early 1850s. One Christopher Columbus Cooper purchased the Oak Ranch in 1852 from David Webber, who had established it in 1851. Webber later established the resort at Webber Lake *(Mountain Echo*3/26/1853). At St. Joe Bar "a family named Hobby had a ranch . . . and operated a store." The Peter Kuder Ranch was established on lower Goodyears Creek around the same time, and "was noted in early years for the fine walnuts produced." The ranch is now the Drury Ranch. Later in the 1850s Jason Campbell set up what has since become known as Kennedy Ranch at Goodyears Bar (Tahoe National Forest Historical Files).



RESIDENCE AND RANCH OF H.H. KENNEDY, GOODYEAR'S BAR, SIERRA CO., CAL. (Farris & Smith 1882: 420)

The most extensive area of agricultural development within the forest was in Sierra Valley. The valley was first called Beckwourth Valley after its discoverer James P. Beckwourth who found it while prospecting for the fabled "Lake of Gold" in northeastern Sierra County. The earliest ranchers in the valley came in from Downieville, and included A. P. Chapman, Joseph Kirby, I. K. McClannin, John Gardner, and C. and B. F. Lemmon, all of whom filed claims in 1851. Chapman and McClannin had come to the valley in the summer of 1851, as did the Lemmons and Ezra Culver, who located sites near Randolph. Beckwourth established a trading post and hotel at the site of Beckwourth in the spring of 1852. He led immigrants through

the area that year and built a wagon road through Beckwourth Pass (Sinnott 1976: 1). The *Sierra Citizen*, in April, 1854, reported that several hundred acres in the valley were ready for cultivation. Vegetables, potatoes and "many tons of excellent hay" were produced between 1852 and 1854, and taken to Downieville for sale. The article noted five or six families and fifteen to twenty single men claiming ranches *(Sierra Citizen* 4/15/1854). Corel and Ordelle Howk established a ranch near Campbell Hot Springs in 1853. David Fenstermaker operated a hotel at the hot springs in the late 1850s (Sinnott 1976: 4-6).

As early as 1852, the Sierra Valley farms shipped hay to Sierra City, Downieville and Goodyear Bar where it was fed to the mule trains. By the late 1850s beef butter, hay, barley, oats, poultry products, and hogs were produced in the valley and sold in the mining communities of the Yuba Basin (Sinnott 1976: 5-6). Sierra Valley's period of development and diversification came in the 1860s, as the demand for food and fodder in the Washoe Valley, along the route of the Central Pacific, and on wagon roads stimulated production.

Thus, logging and agriculture in the 1850s were industries tied closely to the gold mines and mining towns. Like transportation and its growing system, development depended on the market in the mines. Development after 1860, and especially after the building of the railroad and good wagon roads, led to logging and agriculture being freed from reliance solely on the miners and the beginning of access to markets away from the mines.

Without question, activity in Tahoe National Forest during the years 1848-1859 centered around gold mining. One historian assessed the economy of gold rush California as "closely tied with the fortunes and misfortunes of the miners. Stockraiser, farmer, importer, merchant, steamboat captain, teamster, packer, and trader — all were concerned, directly or indirectly, with supplying the gold miners with the vitally needed provisions and were affected by the prosperity or lack of it in the mining regions" (Margo 1947: 60). To this list certainly could be added loggers and lumbermen.

The next phase of development within the Forest came after a number of events and processes changed the nature of economic activity. The completion of the transcontinental railroad in 1869 opened markets for goods produced in the forest that were essentially inaccessable earlier. The discovery of the great silver deposits of the Washoe and Comstock Lode, (1859-1876) provided a new focus for activity, especially in the areas east of the Sierra Nevada. The Washoe and Comstock also made other contributions to development in the forest besides providing a market for food, lumber, and fodder. The mines of Nevada also produced experienced miners and mining engineers who could exploit the deeper and more inaccessable deposits in

California, and had the money to develop them. Outside capital entered California mining in greater amounts than ever before, and stimulated the growth of large mining, water, and processing concerns. It is the entry of big business into mining, transportation, logging and other activities in the Forest that is typical of the years 1859-1906, and is the subject of the next chapter of this study.

CHAPTER IV
Era of Development and Diversification, 1859-1906

During the years between the discovery of silver and gold in the Washoe in 1859 and the establishment of Tahoe National Forest in 1906, the economic activities begun in 1849 changed in their scale and focus. New mining technologies, coupled with refinements of systems invented before 1859 and the influx of outside capital for financing changed gold mining from the nascent industrial form that had been established earlier, to a modern industrial system dependent on technical skills, scientific knowledge and processes, and a permanent, trained work force. In drift, hydraulic, and quartz mining such development altered the mining system forever.

The entry of outside (i.e. San Francisco, New York, or London) capital contributed to the development of other industries in the Forest. Initially investing only in mining, capitalists now poured their money into logging, transportation and water development. Each had reached a plateau by 1859, and thereafter was primarily advanced by the entry of new sources of money to aid further development. While large scale capital did not directly effect agriculture, the new markets for agricultural goods in the Washoe, and those opened by the Central Pacific Railroad, led to greater agricultural development within the Forest. Increased agricultural production required more intensive use of resources, and led to the system of irrigation and grazing on the public domain present today.

The period of development and diversification of industry and economic activity on the Forest also affected community development. As we have seen, the early transitory mining camps that sprang up in the early years of the gold rush were replaced by more permanent towns based on deep deposits or favorable locations. Industrial mining after 1859 continued this process. In addition, new communities developed independent of direct ties to mining. Settlements identified with railroad stations, logging and lumber industries, and agriculture expanded during these years. There was greater stability in population. The periodic "rushes" and mining excitements, with a few exceptions, ceased, and the great population fluctuations associated with the gold rush decade were tempered. As mining and other communities became more "family" oriented, a higher percentage of women and children were present than in the earlier settlements.

LOCATION OF GOLD DISTRICTS

The Mining Industry on the Forest.

Mining for gold and other minerals on Tahoe National Forest during 1859-1906 was largely carried on in the areas developed during the first decade of the gold rush period. For example, mines in Alleghany and Michigan Bluff, located in the early 1850s, remained active throughout this period. Some locations, uneconomical in the early years, became valuable producers after new technologies aided access to gold deposits (MacBoyle 1918: 5). Mining methods depended on the type of gold deposits mined — placer gravels or quartz lodes — and production was affected by technological advances such as the introduction of practical electrical power in mining and milling (State Minerologist 1894: 413). Knowledge gained in the deep Comstock Lode mines proved valuable as California miners tunneled to greater depths. "Once back in California, the former Comstockers quickly demonstrated the necessity for sinking shafts to greater depths than Californians had believed financially feasible, and when they proved their point on that score, they automatically forced Californians

to give attention to methods of underground ventilating, to adopting better hoisting equipment, and to replacing hemp rope with steel or iron cables" (Paul 1947: 289-290). Shafts formerly 100 to 200 feet deep were dug and blasted to below 1,000 feet (IBID: 290). New methods allowed for continued development of mines like those at Sierra Buttes, discovered in 1850, well into the twentieth century (Sinnott 1976: 217). The new methods also prompted rushes to areas hitherto untouched, like the Meadow Lake and Squaw Valley areas, in the 1860s (Fatout 1969: 25; Gudde 1960: 74, 108, 188, 237, 345). The development of more sophisticated hydraulic mining methods also led to the development of gravel mines at North Bloomfield, and in the Washington vicinity during the 1860s (MacBoyle 1918: 99-105). Hydraulic mines were scattered on the forest wherever there were deposits that could be worked by this method and water was available (Clark 1970: passim). Drift mining, discovered and used before hydraulicking began, regained a prominent place in mining industry, especially after the end of widespread hydraulic mining in 1884 (Vivian 1890: 427).

A change in the organizational structure of gold mining was necessary in order that gold mines could develop industrially. As we have seen, miners banded together as technological improvements altered mining methods. The gradual result was the employment of hired miners on claims. This practice started largely with river bed mines, worked at first as cooperatives and later with miners as employees. Miners also cooperated to dig mining water ditches. This business later became, like mining, industrialized. Financing shifted from the miners to local businessmen and finally to capitalists from outside the mining region. This fact had its effect on mining communities. The Nevada City *Gazette* noted in May 1869 that

Grass Valley lives not off the mines, but the miners — an important distinction. The wealth of the mines all goes to San Francisco. The wages of the miners are spent here . . . (quoted in Lingenfelter 1974: 87)

The investment of large sums of outside capital required claims large enough to ensure a profitable return. As rules were gradually changed in the 1850s to allow larger claims such investments became more practical. By 1872, the United States Mining Law allowed placer claims of twenty acres per person, or 160 acres for a single association of at least eight (Pagenhart 1969: 109-110). Similar changes were made in quartz mining law assuring capitalists that their claims would enjoy legal protection sufficient to allow for safe investment (Paul 1947: 226-227; 237-238). For consolidation of claims and codification of mining law resulted in economies of scale and made potential investors more willing to risk their money (Pagenhart 1969: 110).

During the last four decades of the nineteenth century, most of the major mines on the Forest were operated by miners using investment capital from outside the gold region. The Malakoff Mine at North Bloomfield, for example, was organized in 1865 by Jules

Poquillion, and by 1866 was established as the North Bloomfield Gravel Mining Company under the leadership of Lester L. Robinson and a group of San Francisco businessmen. Within eight years there were thirty shareholders with $3.5 million invested in the mine (California Department of Parks and Recreation 1979: 14). A similar situation prevailed at the Bald Mountain Drift Mine at Forest City. Located at first by a group of miners who tried and failed to mine it cooperatively, it eventually fell into the hands of M. Redding. By 1869, new stock was issued, tunnels were dug and the mine became quite profitable (Fariss and Smith 1882: 478-9). Mining shares were sold in San Francisco, Stockton and Sacramento in the early 1860s; very rapidly thereafter "Easterners and Europeans . . . began sending their capital to the Pacific Cost for investment" (Paul 1947: 183-4). In fact, the need for capital in California and Nevada was such that by the mid-1860s, a major change in California banking practice was necessary to make them able to meet the heavy demands put on them by mining. Money from British sources began to arrive and the banks became eventually of great significance as channels through which foreign funds were directed into Pacific Coast investments (Paul 1947: 184-186).

The mining and milling of gold bearing quartz required deep tunnels, heavy machinery a transportation network, stamp mills to crush the ore and a reduction plant to process the gold itself. Large numbers of miners were needed to work deep mines, and skilled engineers and chemists to design the mines, equipment, and process the ore (Wiltsee 1931: 4; Spence 1970: 79, 144). The *Mining and Scientific Press* (11/21/1903: 332) noted this change in 1903 in an article entitled "Advantages of Technical Education."

Within the past twenty years this old-time practical miner has been slowly forced into the background and in his place is found the technically educated man, who with a worldwide knowledge of his business is equal to almost any emergency . . . The western U. S., Australia and South Africa have furnished a practical school, where unusual conditions were found and had to be met — novel situations in mine and mill. The old-timer would have undertaken these varied problems in the old time manner and he would have failed, or at best would have made but a moderate success.

Similar technical skills were needed in the development of deep drift mines, as many of the same problems were met as in quartz mining. Hydraulic mines, while not always as technically complicated in an engineering sense, required vast capital outlays for construction of adequate water systems (Kelley 1959: 34-41 passim). Water companies developed parallel to hydraulic mining as some miners got out of mining and went into water instead (Pagenhart 1969: 85-88). The South Yuba Canal Company is an example of such a company.

After 1859 emphasis was placed on drift, hydraulic, and quartz mining. To be sure, other methods of mining still went on; as late as 1880 Chinese miners still mined river beds and reworked mine tailings (Public Lands Commission 1880: 17). Other groups or individuals were still prospecting or working small claims, but the bulk of production was in the large industrial placer and quartz lode mines.

Drift mines represented one of the largest producers of gold, mostly because this form of mining, like quartz lode mining, survived longer than did hydraulicking. As mentioned earlier, drift miners initially followed the Tertiary Gravels into the hillside and mined the deposits in a manner similar to quartz mining. Gold bearing gravels were shoveled into hand cars, removed from the mine and washed in long sluice systems. When the gravel was compacted into cement, stamp mills were employed to crush it (Vivian 1890: 428). Drift mines, with their long tunnels, used large amounts of timber. At the Bald Mountain Mine at Forest City, "enormous quantities of heavy timber are required in the tunnels to support the vast masses of loose gravel above" (Fariss and Smith 1882: 479). Hand cars, mule cars and small locomotives pulled ore out of the mines. The Hidden Treasure Mine, near El Dorado Canyon in Placer County, replaced its mule cars with a locomotive from Philadelphia in 1882 (Thompson and West 1882: 220). The Paragon Mine, owned by Abraham Breece and Judson Wheeler, near Bath in Placer County, had a tunnel into the gravel deposit three quarters of a mile long; the Mountain Gate Mine at Damascus "struck the blue gravel after running a tunnel of seven thousand feet" under a volcanic cap. Hand and mule cars carried the ore from the mines. Some of these mines employed a few men; the Paragon, despite grossing $13,000 per month in the 1880s had a small crew (IBID: 219, 230-231). Most of the more productive mines had much larger operations. The Bald Mountain Mine supported a town of 800 (Public Lands Commission 1880: 17). The Bald Mountain Mine was described in 1882:

The main tunnel is now a mile and three-quarters into Bald Mountain, at one place being thirteen hundred feet below the surface. Side tunnels from one hundred and fifty to five hundred feet in length extend on either side, at an average of eighty feet apart, of which there about two hundred and fifty, the intervening gravel of the channel being excavated as they proceed. The limit of the claim will be reached at a distance of two miles from the mouth, and the coming summer will see its completion, when all the pay gravel will be cleaned up, and the pillars taken out. Tracks are laid in all the tunnels being worked, over which an engine, christened 'H. K. Wallis' in honor of the superintendent, makes hourly trips both day and night, carrying cars to and fro in the long interminable corridors. The main tunnel has a total raise of 207 feet from the mouth inward to the locomotive station, as it follows the course of the channel, creating a perfect system of drainage. Four hundred and forty-one acres of mining ground are owned by the company, four miles of creek, two flumes of a half a mile

each, a mile and a quarter of washing flume, and at the bottom of the latter flume tailing claims 8,000 feet in length. Two dumping yards, double-planked, with a capacity of 25,000 cubic yards each, receive during the summer, when water is scarce, the gravel to be washed . . . At present the number of men on the payroll of the company is 140, the number having reached as high as 230. Nearly all the gold found in the great blue lead is very coarse, the largest piece ever taken from this mine weighing over seventy-five ounces. The yield of the mine for the last ten years has been about $2,000,000, of which $795,000 were paid in dividends. (Fariss and Smith 1882: 478-9)

Of course, drift mines were not usually as large or productive as the Bald Mountain. Other drift mines of such size included the Hidden Treasure (or "Sunny South") northeast of Michigan Bluff, employing seventy men in 1882, with a "school house, two hotels, and two stores, and numerous cozy and well-furnished family cottages" located nearby. The mine produced $114,168 in 1880 (Thompson and West 1882: 220, 388). By 1890, the mine had a crew of 135, whites and Chinese, as well as 1,000 feet of sluices and an 8,000 foot tunnel (Vivian 1890: 430). The Mountain Gate at Damascus was worked by about twenty miners but supported a community of 150 that boasted a school with "about twenty-five scholars," plus cottages with gardens, a store and a "large hotel." The mine yielded $1,000,000 between 1860 and 1882 (Thompson and West 1882: 378). Drift mines were also located around Downieville the Duncan Peak district in eastern Placer County near the Greek Store Station, at Damascus, and in Nevada County in the Relief Hill, Grizzly Hill, Graniteville and Lowell Hill districts (Clark 1970: 44, 43; MacBoyle 1918: 92, 94-96, 99, 11, 30-31). Valuable drift mines were also found on an ancient channel running from Minnesota, Chipps Flat and Alleghany through Monte Cristo and on into Plumas County, as well as in the Slate Creek region in Sierra County and above the Bear River at Liberty Hill (State Minerologist 1882: appendix 174). The North Bloomfield and Derbec drift gravel mines in 1888 employed twenty-five and one hundred men, respectively, and were among the largest in Nevada County (State Minerologist 1888: 454-458). Other drift mines were located near hydraulic mines and references often combine them under the heading of "placer" mines, making it difficult to know which mines used the drift method (Clark 1970: passim).

HIDDEN TREASURE MINE, SUNNY SOUTH PLACER COUNTY, CAL. (M H POWER)
(Thompson & West 1882: 224)

Drifting, in 1890,

. . . is of most importance now in Placer, Nevada and Sierra Counties. It is a revival, having been pursued to a considerable extent early in the history of the State, and then abandoned for the hydraulic style . . . (it is now the) most safe and certain branch of the business extant. (Vivian 1890: 427)

The report noted that while some mines employed 100 to 200 men, most were worked by ten to fifty. The Forest Hill Divide region was noted as being especially rich in drift mines.

The major drift mines were operated by mining companies for the benefit of stockholders (Fariss and Smith 1882: 478-9). The shares of stock were sold as far away as England; in 1882, the State Minerologist noted the failure of an English-owned drift mine at Whisky Diggings in Sierra County. Ironically the mine produced well after the disappointed English investors pulled out (State Minerologist 1882: appendix 180). Money invested paid for wages (in 1888, $2.50 to $3.00 a day in most mines) as well as equipment, including water wheels for compressed air, hoists, cars, drills, stamps, pumps, boilers, sluices and mills (State Minerologist 1888: 454-475 passim).

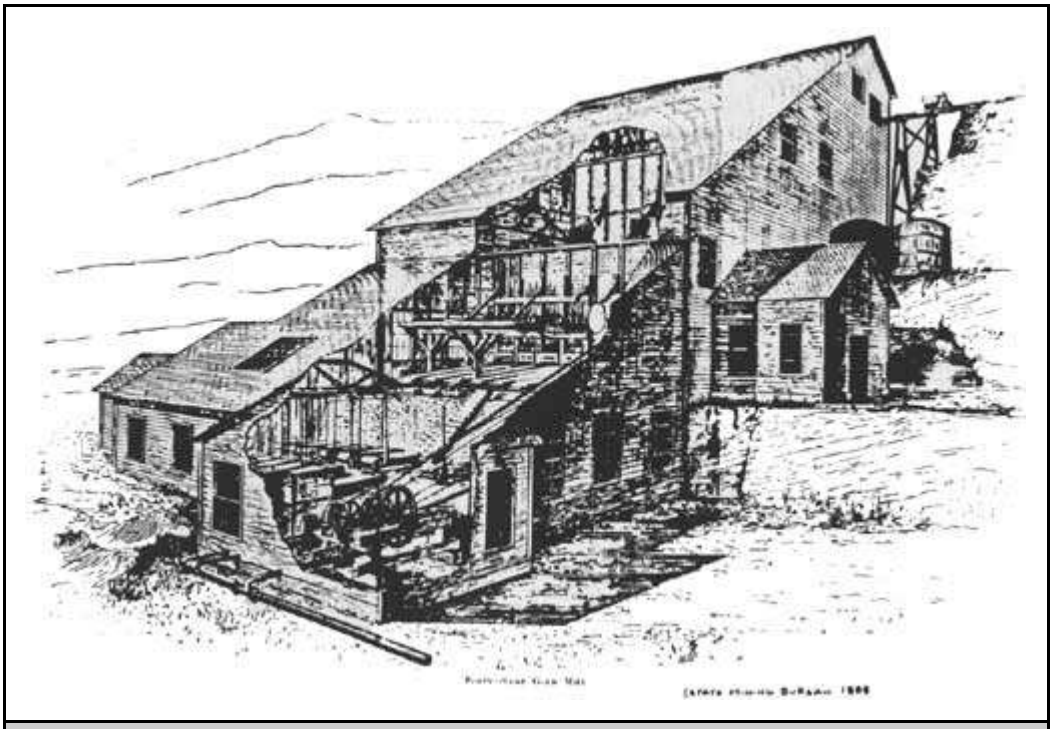
Quartz mining was also a productive form of mining undertaken on the Forest; however, it was also the most technically difficult in terms of mining and milling the gold ores. Quartz mines operated by digging into a quartz vein, aided by drills and blasting powder, and shoring up the tunnels and shafts as mining proceeded. Ore was removed by hand or mule cars, and processed in stamp mills where the gold would be freed from the surrounding native rock. California miners made improvements on early mill designs and produced the California Stamp in 1851. Such mills replaced the animal-powered arrastres and Chili mills that had been used earlier. Improvements in mills over the years gradually made the more dependable and effective at crushing ore, and methods for automatically feeding ore into the stamp mill were developed. While early machines were wasteful (as much as sixty to eighty percent of the gold was lost in the early years), improvements in refining led to a greater percentage being saved. The chlorination process introduced in 1858 and largely perfected in 1860 solved the problem of separating gold from sulphide ore, something mercury had been unable to do (Paul 1947: 135-142). The combination of better milling and refining methods and the exhaustion of placer gold in many areas had made quartz lode mining attractive in the late 1850s, especially as there were "untouched quartz veins" in the foothills. Miners knew that "the history of other parts of the world had shown that a good vein would last for a greater number of years than any other type of deposit" (IBID: 143).

Quartz deposits were found as high as the Sierra Buttes and as low as Auburn. Within the Forest quartz mines were located largely on the western side of the Sierra Nevada, with the exception of small mining activity around Sierra and Squaw valleys (Sinnott 1976: 129; Gudde 1960: 237, 345). Quartz lodes were discovered in Humbug Canyon in Placer County by James Lynn and others in 1853; however, as noted, mining in the quartz deposits throughout the Forest reached its peak after 1859 (Thompson and West 1882: 217-218).

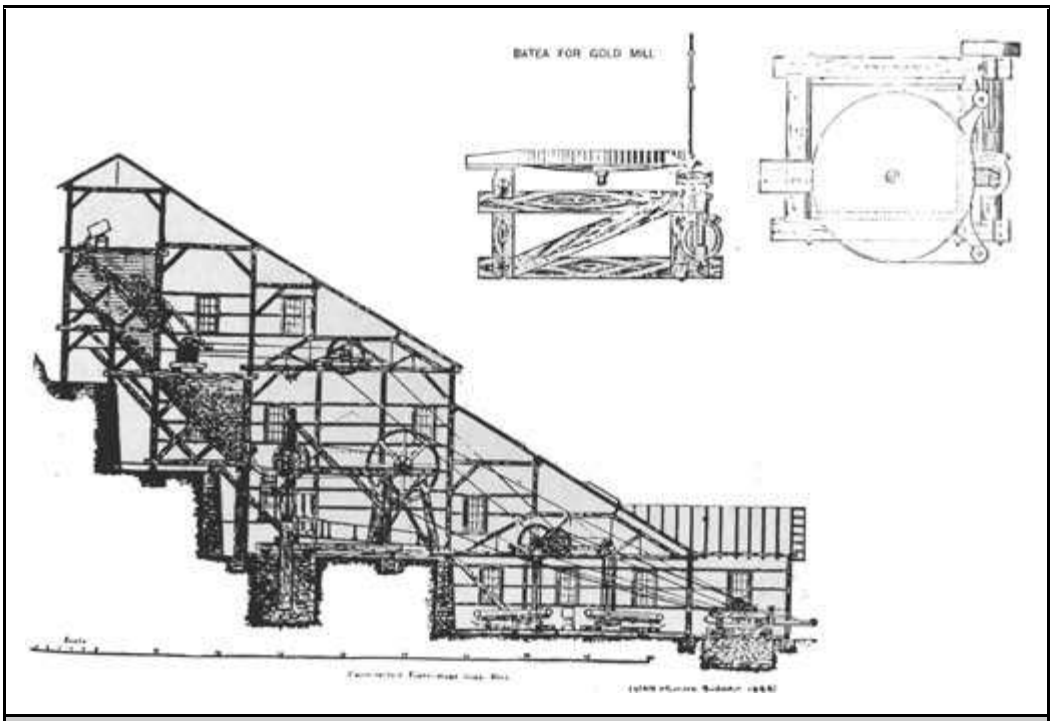
The mine manager was expected to be familiar with all phases of the mine operations.

Basically, his task was to take charge of a property, direct exploration and development, and make provision for the extracting, processing, and even sale of its ore. In finding and extracting ore, he had to have some knowledge of geology, minerology and surveying. Extracting required knowledge of tunneling, drifting, and shafting. He had to be skilled in mechanical engineering to plan for installation and use of hoisting, ventilating, or draining equipment, and an underground transportation system. Chemical and metallurgical skills were necessary to supervise ore treatment . . . (he) must understand milling, reducing or smelting machinery. A manager also frequently had to assume the role of civil engineer to build roads, tramways or flumes. He was a business manager . . . and supervisor of a large work force and responsible to his employer or corporation board. (Spence 1970: 144)

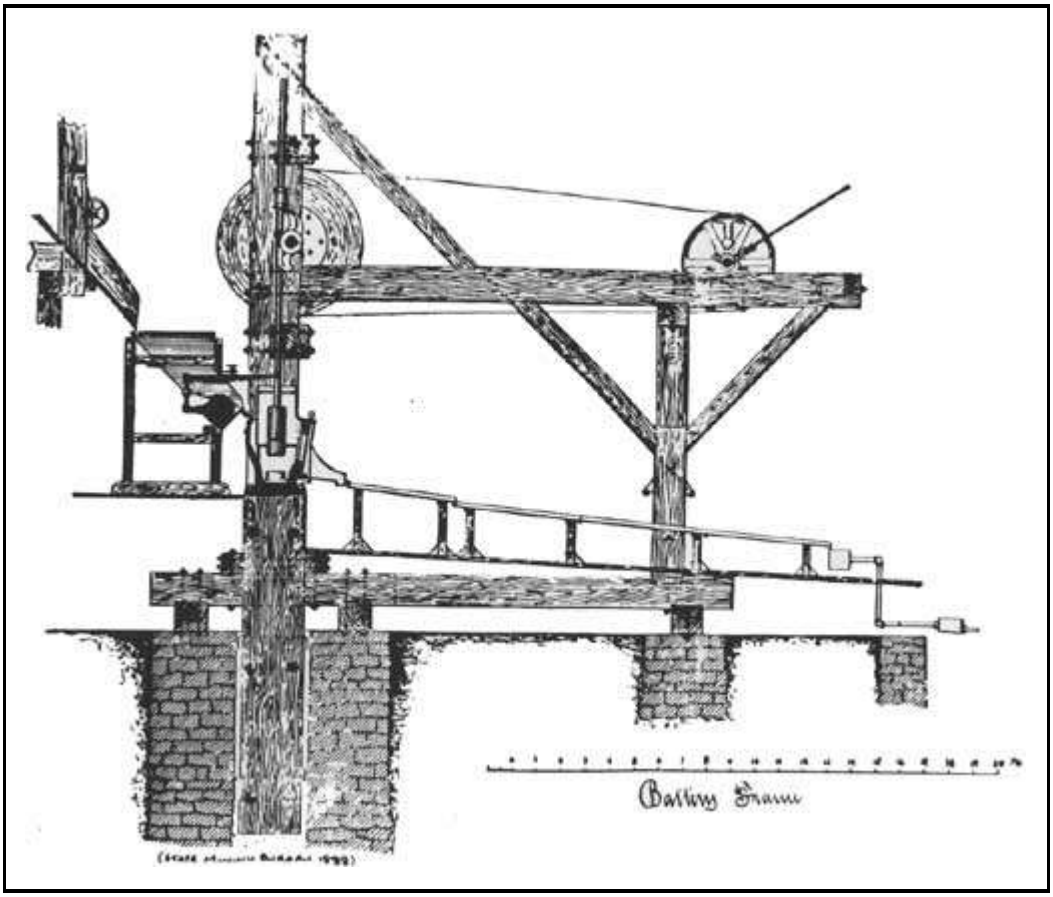
Large mines had a compliment of subordinates, including mill and mine superintendents. Deep complicated mines often had assistant superintendents at each level, as well as shift bosses, mechanics, and others. A shift-manager's success was determined by the efficiency of production. Labor costs often represented sixty to seventy percent of underground expenses. By the 1870s U. S. universities were beginning to graduate mining engineers, who over time became influential within the mining industry. Many became managers of mines, technical consultants to owners, investors and promoters, or expert witnesses in litigation (IBID: 79, 144, 168).



FORTY-STAMP GOLD MILL (State Mining Bureau 1888)



CROSS-SECTION FORTY-STAMP GOLD MILL (State Mining Bureau 1888)



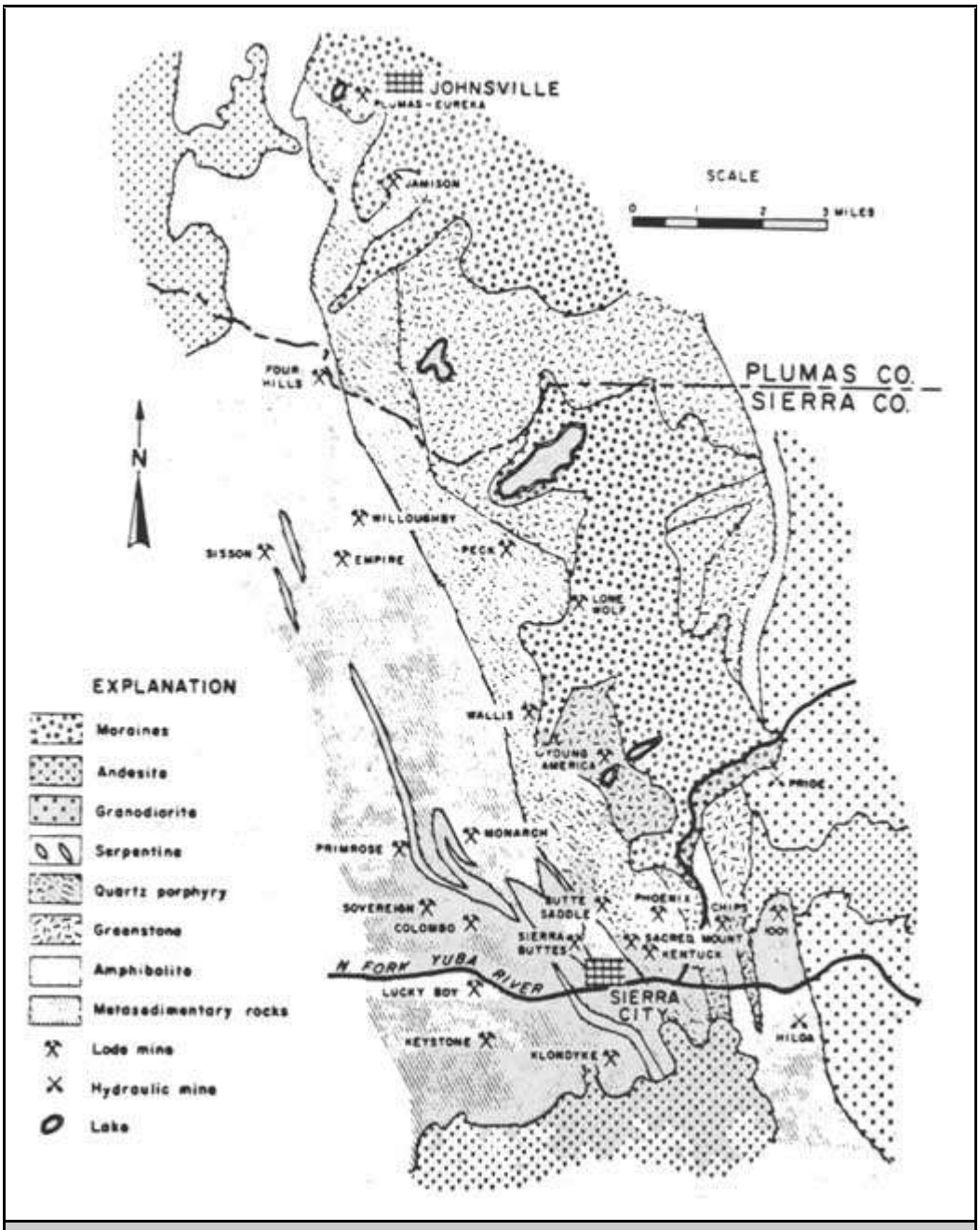
(State Mining Bureau 1888)

Deep mines also required a skilled work force. California's quartz mines were manned by miners who had become experienced in mining elsewhere. Some had worked in the Nevada mines; others came from areas in the U. S. or Europe where mining had been practiced for many years. Among the most famous group of deep miners were the Cornish. Some had arrived early in the gold rush, but "their regular introduction into mining proper was a subsequent phase: they came in continuously after the original impulse of the gold-rush had ended in the mid-fifties, and thousands — miners and non-miners — had left with their takings, or without. Those who came in were professional miners . . ." (Rowse 1969: 257). Some mined briefly before opening other businesses or ranching; others stayed in mining. "Samuel Blight (who came to Grass Valley at eighteen) after many years of both quartz and hydraulic mining became captain of various mines in the district" (IBID: 262). John Tamblyn combined a variety of careers. He arrived in California in 1864, became foreman of a mine in the Owens Valley, and then traveled to Sierra City where be built a chlorination plant. He raised fruit on a small ranch, and in 1875 became a Methodist minister whose circuit included "the mountainous counties of the state" (IBID: 259). The Cornish became especially important in the mines around Grass Valley and Nevada City, where by 1861 most of the mining was done by the Cornish (Paul 1947: 323). Cornish miners later formed the first miners' unions in the area in 1869, largely over the issue of the use of one-man drills and dynamite, which the miners said were unsafe (Rowe 1974: 120-124).

By the 1860s most of the necessary preconditions for the development of deep quartz mines had fallen into place. Refining processes allowed more efficient recovery of gold ore, experienced miners and managers were available, and capitalists began to invest in the mines as confidence in them recovered from the damage done in the 1850s (Paul 1947: 300-302). This renewed interest stimulated the quartz mining industry and expanded production but it did not insure success. Some areas developed deep, long-lasting productive mines that operated well into the 1900s; others were prospected, mined, and gradually abandoned; still others were prospected, mined, and produced spectacular failure.

One of the most famous of California's deep quartz mines was the Sierra Buttes Mine near Sierra City. The ledge was located by Italian miners in 1850, and was worked through the rest of the century. The Reis Brothers soon bought out the original owners. In 1864, they built a seven mile ditch around the Buttes to the mine at a cost of $20,000. The Reis family sold the mine in 1870 for $1,000,000 to a London-based group who called themselves the "Sierra Buttes Gold Mining Company" (Fariss and Smith 1882: 481). A developer of many other Sierra mines, the company had

substantial capital investments and experience in California mining. It operated the Sierra Buttes mines for the rest of the century and made significant improvements in its operations (Jackson 1968: 141). In 1870, the mine had five tunnels. By 1882, four more were dug, as the original five were played out. In 1882, the mine's three mills had ninety-six stamps in operation. A snowslide in March, 1882, destroyed a thirty-stamp mill worth $40,000, with its water-powered turbine wheel power plant. The accident caused twenty men to lose their jobs and the monthly tonnage of ore crushed dropped from 5,600 to 300 tons. Nevertheless, the company was able to overcome this adversity (Farris and Smith 1882: 481). In 1888, the State Minerologist noted that the company had built nine miles of road to the mine to transport "ores, timbers, fuel, etc." Besides the stamp mills, "there are several arrastres in operation here . . . working on a lot of old tailings and not of recent production" (State Minerologist 1888: 573-74). The entire establishment was illuminated with incandescent electric lights powered by water turbine wheels. The mine employed 209 men at an average wage of $50.00 per month with board (IBID: 576-7). The company provided boardinghouses or cottages to house the workers near the mine (Farris and Smith 1882: 481).



GEOLOGIC MAP OF SIERRA CITY AND JOHNSVILLE DISTRICTS, SIERRA AND PLUMAS COUNTIES. *After Turner, Downieville folio, 1897.* (Clark 1970: 116)

Other large quartz mines in Sierra County were noted in the Minerologist's report in 1888, including the Young America near Sierra City; the Rainbow and Eagle mines at Chipps Flat; the Myrtle and Gold Bluff mines near Downieville; the Buffalo in the Hog Canyon District; and the Rising Sun Mine in the Alleghany District (State Minerologist 1888: 478-580).

The Sixteen-to-One Mine at Alleghany in Sierra County was another of the important quartz mines of the period, and produced from 1896 through 1965, which made it the last major gold mine to close in the state. It produced an estimated $35 million during this time. In fact, the Sixteen-to-One was a consolidation of a large number of smaller mines and claims, including the Ophir, Rainbow, Rainbow Extension, Red Star, South Fork, Tightner, and Twenty-One. The Sixteen-to-One was named in "honor of the silver-gold ratio of U. S. coinage, as proposed by William Jennings Bryan in his campaign speeches" (Clark and Fuller 1981: 54-55). The activity around the Sixteen-to-One increased after 1890, and especially after the main claim was located in 1896. The mine was expanded through the rest of the century, and by 1907 the mine, and its consolidations, was known for the richness of its ore. Henderson L. Johnson, a former teacher and miner in Colorado and New Mexico, was the driving force behind the mine (IBID: 55). Much of the mine's later development came after the establishment of Tahoe National Forest.

There were a large number of important quartz mines within Nevada County, many of which were clustered around Grass Valley and Nevada City. Within the Forest, quartz mines were located in the Washington, Canyon Creek, Meadow Lake and Eureka districts. Mines in the Washington District included the Yuba, three miles above Washington; the Blue Bell, near Ormonde at the mouth of Canyon Creek; the Grafton and Eagle Bird, near the Blue Bell; the Washington Mine at Ormonde; the Champion at Maybert on the South Fork of the Yuba; and the Spanish Mine three miles north of the town of Washington (State Minerologist 1888: 435-442). The Spanish Mine was located in 1883 and the company formed in 1884 after consolidation of ten mining claims. By 1888, the mine had a tunnel 1,200 feet long, as well as other smaller tunnels. "The mine employs, besides a foreman, two white men and eight Chinamen, who extract about four thousand tons of ore per month, enough to keep the mill steadily occupied." Cars were hauled into the mountain by mules and traveled out by force of gravity. The mill employed six men; as was customary, the Chinese wages were about one-half that of the white miners (IBID: 442-444).

In the Eureka District, the major mine was the Gaston Ridge Mine, four miles south of Graniteville. The mine employed thirty miners and six mill hands. The mill was powered by a steam engine, its wood fuel delivered to the mine "by floating in the North Bloomfield Ditch." Workers were paid $3.00 per day (IBID: 448-450). Other mines in the district included the Rocky Glen, one and one half miles south of Graniteville, and the Gambrinus and Baltic Mines near Eureka.

The Canyon Creek District, running between the mouth of Canyon Creek and Bowman Dam, had three mines, the Chase Claim, Blue Jay and Canyon Creek (IBID: 452-3).

Deep mines were also located in Placer County, although most were centered west of the boundaries of the forest, in the area around Auburn and Colfax. The Sterrett Mine on Sailor Canyon was "on an immense lode of gold bearing quartz" (Thompson and West 1882: 218). The mines within the Forest boundary in Placer County were mostly drift or hydraulic mines. In 1890, Nevada, Amador and Sierra counties were the top quartz mining counties in the state. Placer County was far down on the list.

MEADOW LAKE MINING DISTRICT (after Fatout: 1969)

Of all of the Forest's mining districts, Meadow Lake has had perhaps the most varied history, demonstrating clearly the boom-bust cycle so familiar in mining. In the spring

of 1864, news of a gold discovery at Meadow Lake caused a rush to the area. Gold was found as "thin flakes of free gold in the spongy decomposed rock on the surface" and in ledges two to eight feet thick. Unfortunately, the area was rugged and exposed. It was located on the crest of the Sierra Nevada at an elevation of 7,000 feet and was forty miles distant from Nevada City in a relatively inaccessible area between the Henness Pass and Dutch Flat routes to the Washoe Valley (Fatout 1969: 25-28).

Henry H. Hartley, a former bookstore clerk turned hunter, trapper and prospector was the person who had discovered gold at Meadow Lake in 1863. Hartley, with two others, formed the Excelsior Company and staked off claims the following year. The California Company also made claims, calling them the California Knickerbocker, Indian Boy and Indian Queen. By June, 1865, machinery for four quartz mills was on the way to the lake. Within a month there were 250 men and twenty women in the camp. Businesses quickly sprang up to serve the settlement, including sawmills, an assay office, a pony express carrying mail and newspapers three times a week to Nevada City, several butcher shops, a hotel and two saloons. In late June, the town site of Summit City was laid out on the southwest side of the lake, with wide streets set at right angles and named A, B, C, and First, Second, Third, and so on, with blocks of uniform size. Shortly thereafter three other "towns" were laid out — Richport, Lakeville and Baltimore City. By mid-August newcomers were arriving at the rate of one hundred per day. A "corps of hurdy-gurdy girls" migrated from Downieville, and a daily stage line from Gold Hill was established. By late August, there were stores, restaurants, boarding houses, saloons, three hotels, a brewery, bookstore, cigar shop and real estate office (IBID: 31, 35-40). The Marysville *Appeal* noted on August 20, 1865, that "seventy-five houses have been erected, a hurdy-gurdy establishment is in full blast, and a number of gambling houses have opened, and other indications of civilization are becoming apparent."

The onset of winter weather reversed the flow of population, but with the next spring a boom larger than the first began. Eventually eight "towns" existed in the area. Optimistic Meadow Lake citizens opened a stock exchange, and a newspaper (the *Morning Sun)* began printing in June, 1866. Despite the activity, only 300 miners were at work, and a lot of "dead-work" — road building, setting up mills, and so on — was yet to be completed. The newspaper noted that to get the rich ledges would require the aid of capitalists. "Individual efforts may *prospect*,but companies, regularly organized must *develop* mines," cautioned the editor of the *Morning Sun.* Such development capital was not available, especially as miners began to return from the area describing it a "humbug" and "the biggest bilk in the world . . ." (Fatout 1969: 68-77, 84).

Early in 1869 only seven families "rattled around" the 300 or so empty houses. By June the population was only forty or fifty people. Between 1869 and 1893 sporadic

mining and attempts to deal with the high sulphur content of the ore came to little. In 1893 the winter passed with no one in the city; Hartley died in 1892 of opium poisoning. By the 1940s no buildings were left at the site, only faint outlines of streets and the Plaza (IBID: 109, 140-46).

Meadow Lake as a mining district was a failure, and thus compares unfavorably with successful mining districts like Alleghany or Sierra Buttes. The district does however reflect the boom-and-bust pattern of mining in the West. The miners dreamed of great strikes, help from outside capitalists, or new processes to help them through the lean years; in the end there was only disappointment. The town was virtually a prisoner of winter weather, which forced many to leave. Mining continued in the face of low grade deposits, bad weather and isolation, but the lack of sufficiently valuable ores eventually caused the town to die like so many other mining camps and towns in the West built on hope or on less valuable deposits.

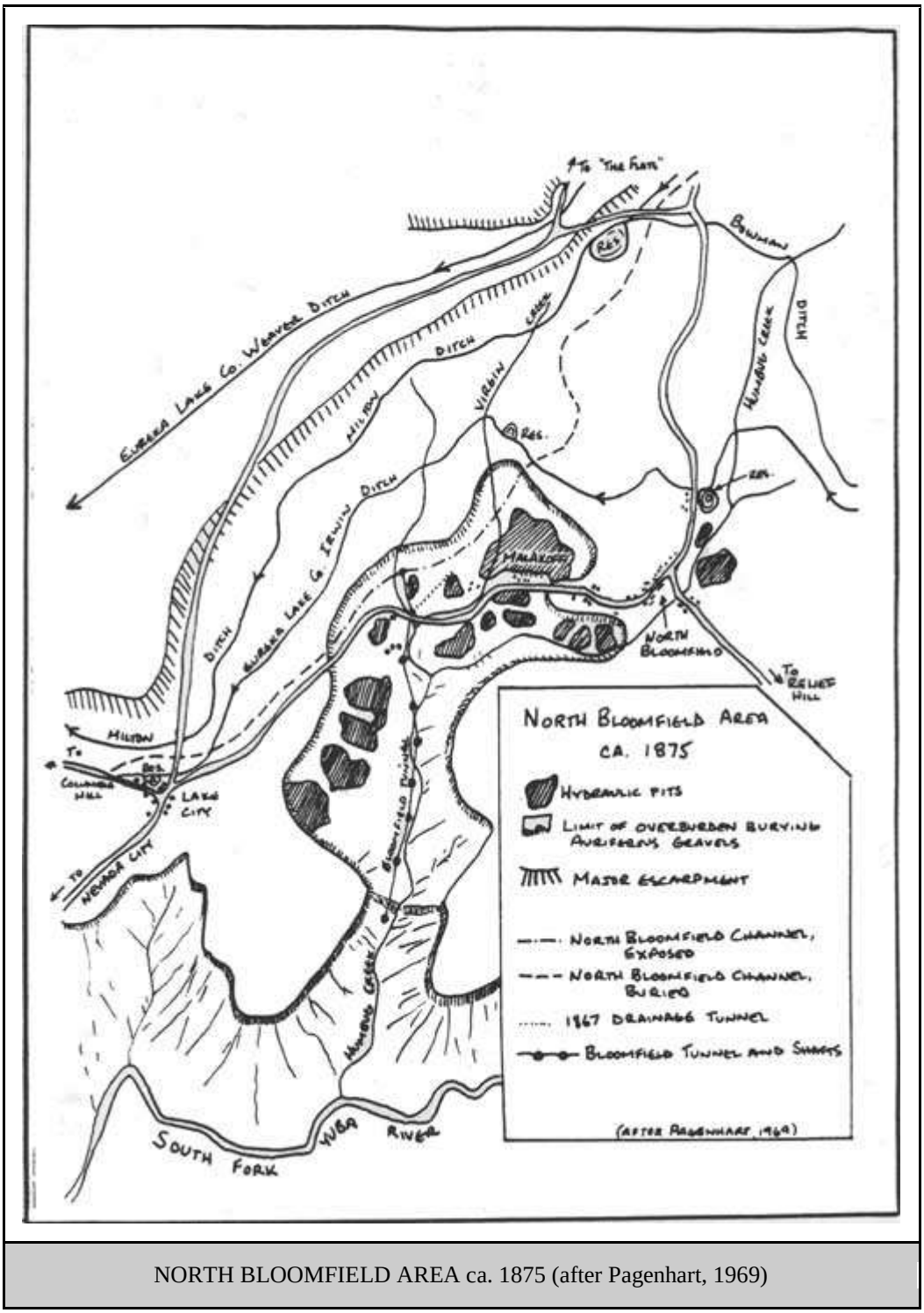
Hydraulic mining is the remaining significant gold mining technique used on Tahoe National Forest during the latter nineteenth century. More than any other kind of mining, hydraulicking has left permanent and massive scars on the landscape that remain visible today. All mining methods were to a greater or lesser extent environmentally destructive; hydraulicking was the most devastating of all. The process "eroded hills, wrecked roads, inundated buildings, clogged streams with debris, flooded grazing and agricultural land, and obliterated whole towns" (Fatout 1969: 23). Hydraulicking has left pits, debris fills, abandoned flumes and canals, tunnels, and dams on the Forest.

Hydraulic mining was developed early in the gold mining period. Between 1853 and 1868 the process underwent a period of experimentation during which many of the production problems were ironed out. Major innovations discussed earlier included the change from canvas hose to iron pipe to tolerate higher water pressures starting in 1853; improvements in stilling and measuring devices; more powerful nozzles, usually called "giants" or "monitors" able to direct the jets of water under extreme pressure; the use of explosives to break up cemented gravels; and improved sluicing systems (Pagenhart 1969: 101-104). By the later 1850s, hydraulicking was in wide use, wherever conditions allowed it. In 1858, a writer for the *Alta California*traveling through the northern mining districts witnessed hydraulic mining and tunneling operations that were "conducted on a gigantic scale." In western Sierra County, he observed "multifarious bank claims supplied with water from ditches and flumes which cross then recross the county in every direction . . . in fact the hills and flats are grid-ironed with long lines of boxes, conveying the indespensible element to the dry diggings" (White 1961: 84). Flumes and canal systems designed to provide water for long toms and sluices were unable to meet increased demand for water once hydraulicking began. It was a popular mining method, "so effective that from that day

forward no other form of placer mining was attempted if hydraulicking were at all possible" (Pagenhart 1969: 101). Invented in California, hydraulic technologies rapidly expanded to other areas in the West. Charles Yale, in *California Mines and Minerals* in 1899, stated that "it may be considered exclusively the product of California" (quoted in Pagenhart 1969: 101).

The years 1859 through 1864 were depression years in the hydraulic mines of the Yuba-Bear basins because of "desertions" to the Fraser River and Comstock mining areas. In Nevada County only North Bloomfield and Omega mines were active because they were adequately supplied with water — North Bloomfield with water from the Irwin Ditch of the Eureka Lake Company, and Omega from a branch of the South Yuba Canal Company ditch (IBID: 116). Draught also severely hindered all hydraulic operations between 1862 and 1864. However, after 1864, hydraulic miners found that both water and finance capital was available for expansion as the draught ended and the Comstock excitement generated renewed interest in mining investments (Kelley 1959: 33-34).

As hydraulic mining gained in popularity its debris and tailings began clogging up small creeks. Only those mines operating near major river channels could economically remove the mountains of debris. Thus, many small operators and those with unfavorable locations were forced out of business. Between 1867 and 1870 these problems were basically worked out, as new drills and dynamite eased construction of drainage tunnels to remove debris (IBID: 41-42). By 1870, W. A. Skidmore, a mining expert, could assert that "hydraulic mining has made such rapid strides on the road of progress, and assumed such monster proportions in the past year or two, that now the vast magnitude of its operations serves to almost totally eclipse every other branch of mining industry (IBID: 45).



NORTH BLOOMFIELD AREA ca. 1875 (after Pagenhart, 1969)

Hydraulicking required tremendous amounts of water. Water was sold by the "miner's inch," which varied in many areas at first, but became relatively standardized at about seventeen thousand gallons in twenty-four hours. The North Bloomfield Company's ditch system had a capacity of 3,200 miners inches, or 5,440,000 gallons per day

(State Minerologist 1888: appendix 152, 161). In 1879, the North Bloomfield mine used over fifteen billion gallons of water (State Minerologist 1882: appendix 172). Other necessary resources included lumber for flumes, dams, and general construction; pipe and monitors; stamp mills to break up cemented gravels; sufficient sluicing to recover the gold; a system to remove the debris; a sufficient work force to operate the mine; and enough financial strength to get the mine started and operating smoothly before pay dirt was reached, as well as enough to enable the company to develop the necessary water transportation system. Interestingly, hydraulic mines and mining water companies were among the first to use electric lights and telephones as a part of their operations. "In 1878 the North Bloomfield, the Milton, and the Eureka Ditch Company built the first long distance telephone line in the United States, stretching from French Corral up the San Juan Ridge to the various ditches and dams of the three companies in the high Sierra." The system cost $6,000 to build and had its main office in North San Juan. The line connected twenty-two stations, and was used to monitor flows and watch for breaks. It replaced an earlier telegraph system. By 1880, the company introduced large electrical lights enabling the miners to see as mining went on twenty-four hours a day if water was available. The electrical system used power generated by water wheels and was one of the first industrial uses of electric lights in the nation (Jackson 1967: 50-51).

Hydraulic mining was, in essence, a grand form of sluice mining. Water under great pressure washed overburden and pay dirt through debris removal systems and complicated sluicing arrangements. Every so often the sluice was cleaned out; usually after running for several weeks or months. The system varied in size or scope rather than in technique.

All of the counties within Tahoe National Forest have hydraulic mining sites within their boundaries. These were on the west side of the Sierra Nevada, usually on the western (or lower) edge of the Forest.

Perhaps the most famous of all these mines was the Malakoff Mine of the North Bloomfield Gravel Mining Company. The area had been prospected in 1851 or 1852, when "a prospecting party consisting of two Irishmen and a Dutchman" found a rich placer deposit. After news leaked, a small rush to the location ensued; disappointment led many to call it a "humbug," thus naming the creek and camp in the area. Mining continued and in 1853-54 a number of miners began employing the hydraulic method. A small dam was put across Humbug Creek, and ground sluicing was done from 1855 through 1863. Miners made money, but were unable to get at the deep gravels in the area (IBID: 1-2).

After a period of relative quiet around the area from 1861 through 1865, mining at North Bloomfield picked up. There were fourteen hydraulic mines, one employing

thirteen men; but the lack of proper drainage made working the claims difficult. As hydraulicking began to produce more gold, interested capitalists began investing in the development of the big mines around North Bloomfield (IBID: 4-5). In 1865, Jules Poquillion purchased several claims in the area. A year later he organized the North Bloomfield Gravel Mining Company with Lester L. Robinson and other San Francisco capitalists (California Department of Parks and Recreation 1979: 14). The company eventually owned 1,585 acres, with an estimated $69,600,000 in gold in the gravels therein.

Lester L. Robinson was typical of the entrepeneurs who assumed the direction of the hydraulic mining industry. He came to California in 1854, at the age of thirty, after a successful career as a railroad engineer in the East. He was responsible for building the Sacramento Valley Railroad . . . the first railroad on the Pacific Coast . . . (he became) an active partner in the Pioche firm (Pioche, Bayerque and Co.) and he turned his talents to a wider field of investment. (IBID: 6)

Robinson was also a director of the Giant Powder Company and several mines in California and Mexico; he was involved in irrigated agriculture near Riverside, and invested in tin, insurance companies and oil wells (IBID: 6).

Realizing that they would need more water and better drainage to work the mine, several projects were considered. A proposed canal from the Little Truckee River was never built; but the company did purchase Rudyard (English) Dam at the head of the Middle Yuba River in 1868. This dam was the largest in the state at that time. The company also began to look for another site, and in July 1868, they engineered and began construction on a canal from North Bloomfield to Poorman Creek using a force of "800 Chinamen and 300 hundred white men." From August 7 to December 21, 1868, they built twenty-seven miles of ditch. The next year seventeen miles more were built to connect the canal to Big Canyon Creek; the canal system became known as the best in the state. When completed the ditch was fifty-five miles long, three and a half feet deep, 8.65 feet wide across the top and five feet wide at the bottom. "The ditch and distributors cost $422,106.14" (IBID: 10-11).

To fill the ditch the company built a reservoir and dam at Bowman's Ranch on Big Canyon Creek in 1868-1870. The dam was sixty-five feet high and 215 feet long, and built of timber ballasted with rock. A small diversion bay below the main dam put water into the canal. The dam burned in October 1871; it was temporarily repaired, rebuilt in 1872, and raised in 1876 to a height of 100 feet (IBID: 12-15).

In order to drain the mine the company built a bedrock tunnel 7,800 feet from Humbug Creek to a point 200 feet below bedrock level, allowing the gold gravels to

be drained. The tunnel cost $275,574 (California Department of Parks and Recreation 1979: 15).

By 1876, the company was ready to begin full-scale activity. In July, 1876, the mine ran seven four- to eight-inch monitors twenty-four hours a day. As was the case in most hydraulic mining towns, North Bloomfield had a large number of Chinese; almost half of the miners in town in 1878 were Asian. Besides mining, the Chinese in North Bloomfield grew fresh vegetables for market. By 1880, the population of the town reached 1,229. With the end of hydraulic mining (1884-1893) the population dropped rapidly; in 1900 there were only 730 left (IBID: 16-19).

There were many other hydraulic mines in the Forest, most of which were smaller than the operations of the North Bloomfield company. Hydraulicking went on in Placer County at Dutch Flat, Emigrant Gap, and Michigan Bluff; in Nevada County in the Washington District at Alpha and Omega, and at Relief in the North Bloomfield District (Clark 1970: 45, 46; MacBoyle 1918: 45, 99). Sierra County was also the scene of extensive hydraulic mining at Morristown, Monte Cristo, Craigs Flat, Excelsior (near Monte Cristo), Eureka District, and near Downieville *(Mountain Messenger* 9/18/1880; Sinnott 1972: 190, 171, 195; Clark 1970: 46; Fariss and Smith 1882: 480).

One of the most extensively hydraulicked areas of Sierra County was around Brandy City. As early as 1854, the *Sierra Citizen* (3/4/1854) noted 150 miners at work with sluices in the dry diggings. The dry winters of the early sixties and a general "petering out in the diggings" caused hardships for many miners, a number of whom left the Brandy City area in 1864 *(Mountain Messenger* 8/6/1864). New finds led to renewed mining in 1867, when the *Mountain Messenger* described some of the mines near the city.

Everyone is piping away in a lively manner, making the best use of the water while it lasts. Van Ransalair and Co., Morgan, and Arnott and Co. are all piping away in a lively manner and the prospects are flattering for good returns. (Mountain Messenger 5/25/1867)

The main portion of the town's water supply came from a flume that connected the town and the mines to Canyon Creek, ten miles away. Known in the 1860s as the Hoosier Ditch system, it later became the Brandy City Ditch. The flume rounded a rock outcropping above Canyon Creek where iron bars supported it. The bars were still visible in the 1970s (Sinnott 1977: 150). Hydraulic mining in the vicinity of Brandy City flourished into the 1880s. The Brandy City Mining Company in 1883 began construction on a 3,400 foot long sluice tunnel scheduled for completion in 1885. The company brought in tunnel digging machinery on the first teams and

wagons ever to arrive at the town from the outside world. With the new machinery in place and the tunnel near completion, the future looked bright for the mining company *(Sierra Citizen* 7/19/1883; 9/6/1883). Unfortunately the mines were effectively shut down by the Sawyer Decision in 1884. Several years later, the *Mountain Messenger* discussed its impact on Brandy City:

Times are very dull at Brandy City, but we are living in hopes that the mine will be allowed to run, which will change matters greatly. The Company will continue working the mine if the debris case, which is now before the U. S. Circuit Court, is decided in their favor. (Mountain Messenger 7/23/1892)

Despite the fact that the appeal was unsuccessful, mining continued in limited fashion at Brandy City throughout the century. In November 1907, the Brandy City Mining Company was planning to resume hydraulic mining operations. Renewal of hydraulicking enabled Brandy City to hang on as a mining settlement for several years. In 1911, the county newspaper stated that the town was "going along nicely" *(Mountain Messenger* 11/16/1907; 4/22/1911)

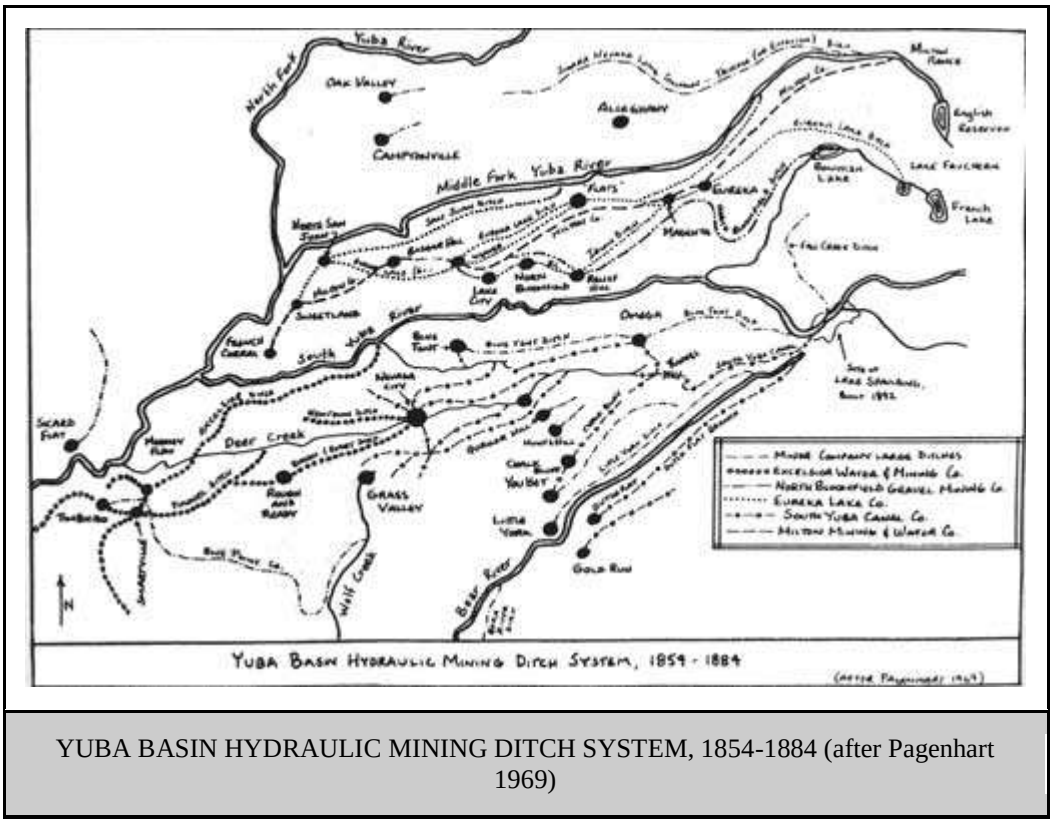
One of the most important aspects of hydraulic mining everywhere was the water delivery systems that developed around it. The canals, ditches, flumes, dams and reservoirs represent a complicated part of the hydraulic mining industry, and are among the most prominent existing historical resources on the Forest. Additionally, these water developments have served more than just mining, and have become important in irrigation and hydroelectric power generation for mines and towns. Some mining companies like the North Bloomfield Gravel Mining Company owned their own systems; more often miners bought water from water companies. These organizations, and the men who built them, often gained more gold than did the miners. Like the mining companies, they were capital-intensive, and often headquartered in San Francisco or New York (Pagenhart 1969: 6; Paul 1947: 297).

One writer has described the three "single purpose systems" that developed in the Yuba and Bear River basins; much of what went on there applied to the American River Basin as well. The three systems were hydraulicking, hydroelectric power generation, and irrigation. Hydraulic mining use of water has been discussed above.

The second of these systems, hydroelectric power generation, grew directly out of the accumulated technical knowledge and water supplies that were concentrated in the former mining area. The third system, irrigation, needed support from the beginning, and survived in the Yuba-Bear area primarily because of the change in public attitude that took place at the end of the nineteenth century. (Pagenhart 1969: iii)

Initial construction of water systems began in the 1850s. In Nevada County in the spring of 1852 the Little York Ditch was dug, tapping the Bear River near its headwaters and sending water eighteen miles west to You Bet. In 1858, another ditch was built into the area, and between 1852 and 1855 the Walloupa Ditch was dug fifteen miles up Steephollow Creek (IBID: 94). This early development of ditches also went on in Placer and Sierra counties. In 1855, the El Dorado Water Company had thirty miles of canal and laterals near Michigan Bluff; the *Sacramento Daily Union* (12/14/1854) reported on the ditches of Sierra County in December of 1854. These included Havens and Craycroft Wisconsin Ditch, Minnesota Ditch, Halfway Water Ditch, Chipps Digging Ditch, Walton and Company's Ditch, and the beginning of the Sierra Nevada Lake Water and Mining Company's ill-fated ditch from the Sierra Nevada crest to Minnesota (Thompson and West 1882: 151).

The mines and water companies of San Juan Ridge also grew between 1850 and 1853, and their story is instructive as an example of water development for mining. By 1851, the surface placers of the ridge were "known and claimed," and ditches began to serve the long toms and sluices that mined them. A ditch was run twelve miles from Shady Creek to French Corral in the winter of 1851-1852. By 1853 ditches were noted running from Poorman Creek to Eureka (later Graniteville). Miners and prospectors explored down the ridge from there, having come up the South Fork of the Yuba River to Poorman Creek and up the creek to Eureka. The experienced ditch builders also began the Grizzly Ditch to Cherokee in 1854, which tapped Grizzly Creek and Bloody Run. A branch of this ditch ran from Cherokee toward North San Juan in 1853-1854. The last of the pre-hydraulic mining ditches dug in the area were the Poorman Creek Ditch from Poorman Creek to Eureka and Moores Flat, and the Irwin Ditch from Poorman Creek to Relief Hill and Humbug Creek. The Irwin Ditch had been under construction since 1851 (Pagenhart 1969: 96-99).



YUBA BASIN HYDRAULIC MINING DITCH SYSTEM, 1854-1884 (after Pagenhart 1969)

After hydraulic mining began the demand for mining water grew faster than these early ditches could manage. Mining companies began to look for more certain supplies.

In the early mining days, operations were often completely suspended during unseasonal droughts. The economics of later corporate enterprise, however, made intolerable such unreliable water supplies, and the main reason for the early construction of headwater storage dams. Storage facilities had to be planned for a possible extension of the regular summer drought well into winter. (IBID: 75)

The water systems developed during the hydraulic period (1854-1884), whether owned by mining or water companies, had similar systems of dams and ditches. Water systems usually had three types of dams: diversion, storage, and distribution. Diversion dams were built across a waterway to direct the flow of the creek or river into the mining ditch. These rapidly developed into larger storage dams simply by enlarging the diversion wall. Storage dams were also built to increase the capacity of Sierra Nevada lakes. As early as 1850 rock and flashboard barriers were built across the outlets of White Rock and Upper Peak lakes. This became a popular means of dam building; in 1855 several others were built, and between 1855 and 1865 twelve such enlargements were made. Between 1865 and 1885 nearly twenty-four more were added (IBID: 112-113). Other storage dams were built in narrow canyons or at

strategic locations in headwater valleys. Rudyard Dam was built in 1858 of dry laid stone faced with boards. Bowman Dam was built in 1869 for the first time in the same fashion (Jackson 1967: 10-13). Masonry dams were not built in the Yuba-Bear basins until the 1890s when they were needed "for other and more permanent uses." Wood-faced dams were often poorly built and suffered from rotting wood. By far the greatest number of dams were the small distribution/diversion dams at branch locations or at the end of the canals. These were small, shallow often temporary structures used to store several hours supply of water and to regulate flows toward various customers (Pagenhart 1969: 113).

The ditches and flumes that carried water in these systems varied in size and method of construction. One flume in Sierra County was twelve by eighteen inches; by contrast the North Bloomfield Ditch was three and a half feet deep, 8.65 feet across the top and five feet across at the bottom *(Sacramento Daily Union* 12/14/1854; Jackson 1967b: 10-11). In general, flumes were less expensive than canals in rough terrain. The successful ditches of the mid-1850s were those that had been built early on with sufficient capacity to sell water to the hydraulic mines. Because of the large demands put on the ditches, only those that had been built as big as possible were usable and thus the companies that built them survived (Pagenhart 1969: 114). Ditch tenders, who had cabins or stations along the ditch route, monitored and maintained the canals (Jackson 1967 b: 50-51, 13). Examples of these ditch tenders' cabins still exist within the Forest (Tahoe National Forest Archaeological Site Forms).

Ditches and canals varied not only in size, but in length. Many were small, local ditches used by the smaller placer mines; however, some ditch systems attained massive proportions. The South Yuba Canal Company's system included 275 miles of ditch on the ridge between the Bear and South Fork of the Yuba River; the Eureka Lake and Yuba Canal Company, which had begun operations in 1858, absorbed smaller companies so that by 1875 it controlled 300 miles of ditch, with a main canal running from Lake Faucherie to North San Juan, a distance of some sixty-five miles (Kelley 1959: 4). By 1879, there were 900 miles of ditches in Nevada County, 1,000 miles of smaller ditches were added. The total cost of the ditch system was estimated at $7,000,000. Thus, these large companies rivaled the large corporate mines in size and level of investment.

Some of the flume systems included sections that were considered "engineering marvels." The Eureka Lake Company built two high flumes: the "National Flume," which spanned 1,800 feet and was sixty-five feet high; and the "Magenta Flume" across Cherry Hill Gap, 1,400 feet long and 126 feet high (Pagenhart 1969: 128).

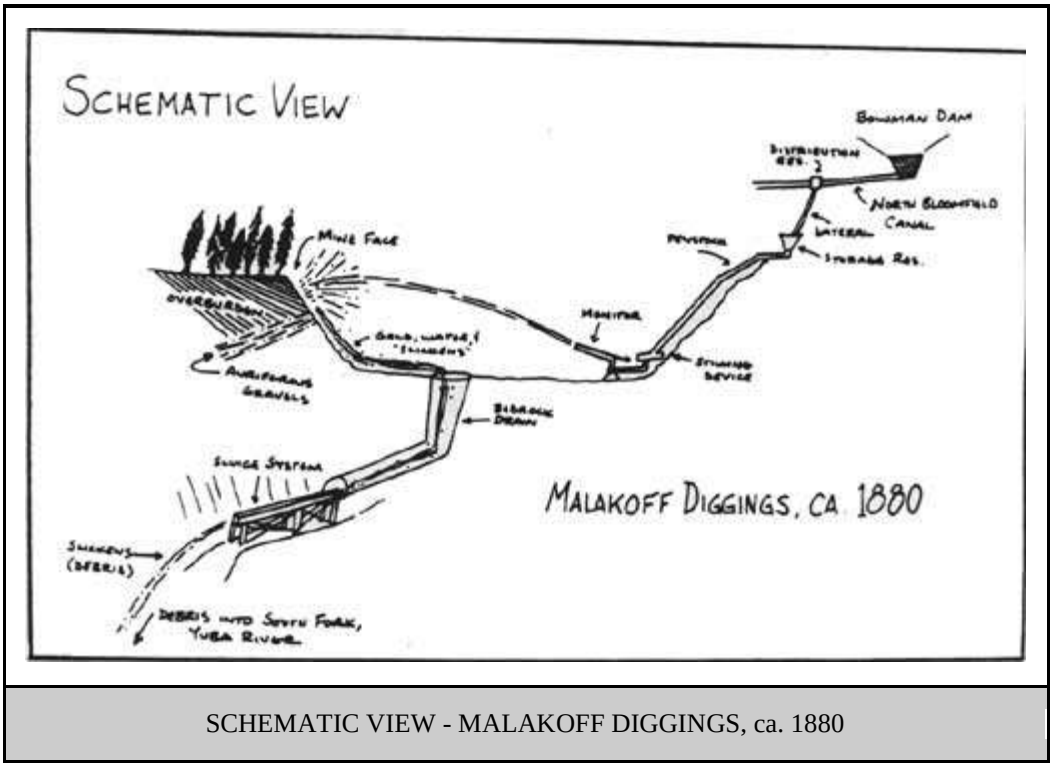
Once water reached the hydraulic mine through the distribution system, it was applied to the mine face. Water ran down iron pipe penstocks to build pressure, through a

"stilling" device to reduce turbulence and catch stones, and then out through the monitors, hitting the mine face with tremendous force. A reporter for the San Francisco *Bulletin* wrote about his visit to the Malakoff Mine in 1879, and described the use of the hydraulic monitor.

. . . The water has done its work here, and washed out all the loose earth and smaller rocks. Now the next thing is to get rid of the large boulders, often weighing tons. They must be blasted into fragments so small that when the water is turned on here again they will be swept down and out through the tunnel. They need not be very small for that. A boulder of six or eight hundred pounds weight goes out like a flash. So here are thirty or forty men, busy with drills, in a great hammering company. It is, at this instant, wild music. After from fifty to a hundred holes have been drilled, and loaded with giant powder and properly prepared with fuses of exactly the same length, the men will take irons of about three feet long, made red hot at one end, and run from boulder to boulder touching the ends of fuse. This being done, they will scud hastily into a grim looking 'block house,' a couple of hundred yards distant, built of old flume blocks and roofed with logs. Then, after a brief space, there will be wild artillery, and much smoke.

We descend into the mine by steps beside a V-shaped trough for sliding blocks down, and turn our steps to the white streams of water which are at the western end of the mine being held against the bank. There is a real pleasure, very distinct, but hard to describe, about this gigantic force. This is the water which left the Bowman reservoir a few hours ago, and has been worried and tumbled and beaten into foam until one might easily believe that it comes out with not merely the force of so much gravity, but also with a wicked, vicious, unutterable indignation. The black pipe, three feet in diameter, leads down the cliff, and across the mine. It becomes smaller, and ends in a jointed, elbow-like pipe, with a movable nozzle. By laying the weight of a hand on the lever, this rim-like nozzle enters the edge of the stream, and the weight of the water turns the machine to any angle desired. It may be dropped till it foams at the operator's feet; it may be raised almost upright, or made to sweep the circumference of a circle. It is not hard work to manage one, but it requires much experience and judgment to know how to use the stream to best advantage, and with greatest safety. Large boulders and lumps of pipe-clay are slowly washed down to the bed-rock for the blasters to handle, but rocks two feet in diameter fly like chaff when struck by the stream. The actual work of tearing down the cliff is hard to see, for there is a cloud of red foam hanging over the spot. You hear little rattling and slipping noises through the incessant roar, and a stream which seems ten times greater than could come out of the pipe, flows down the dripping pile, and so into the rock-channels which lead to the tunnel. (Quoted in Jackson 1967b: 60)

A basic description of the North Bloomfield system at peak usage will help to put the complicated water system in perspective. A gallon of water destined for use at the Malakoff Mine might start from Bowman Dam and be placed in the North Bloomfield main ditch. It would then flow the fifty-five miles to North Bloomfield fairly rapidly because of the twelve to sixteen foot per mile grade (Jackson 1967b: 25). Upon reaching North Bloomfield the water would be transferred by a lateral line to a storage reservoir, where it would then be directed down a penstock, through a stilling box and out the monitor. The water would wash rock, dirt, and gravel off the mine face and into the sluicing system and main drainage tunnel. It would be run down ever more gentle sluice systems in order that the maximum amount of gold be extracted from the gravel before "the thick muddy stream is allowed to find its own way down without hinderance" (San Francisco *Bulletin* 1879, quoted in Jackson 1967b: 61)



SCHEMATIC VIEW - MALAKOFF DIGGINGS, ca. 1880

A large number of water companies provided water for mines within the Forest. Mines from Michigan Bluff in Placer County to Poker Flat on the northern border of Sierra County were supplied either by water companies or by the miners own systems. The history of four of these companies is illustrative of the general trend of mining water development. Of the four, two were able to survive the end of hydraulic mining and shift their activities to hydroelectric power generation and irrigation; the other two did not and have disappeared. All four companies began their operations at about the same time, in the mid-1850s. They were the Eureka Lake and Yuba Canal Company the Middle Yuba Canal and Water Company, the Excelsior Company, and the South

Yuba Canal Company. The North Bloomfield system rivaled these in size, but because it was built by a mining company it has been discussed separately.

The Eureka Lake and Yuba Canal Company, Consolidated, began as a group of small ditch companies on San Juan Ridge that merged in 1853. By 1855, a group of French miners and San Francisco investors led by B. Faucherie obtained water rights to lakes and streams in the headwaters of Canyon Creek. Two storage dams were built, each over forty feet high, doubling the capacity of Lake Faucherie and Eureka Lake. The company planned on a large scale, thus ensuring sufficient supply for hydraulickers. The Eureka Ditch had a capacity of 3,000 miners inches, crossed the saddle between Lake Faucherie and Weaver Lake, and then moved along the north-facing side of the canyon of the Middle Fork of the Yuba River. At Eureka South (Graniteville) all the ridge ditches came together because of the flat at the site, "making it possible to convey water from one side of the Ridge to the other, or to make connections with and transfers from other ditches" (Pagenhart 1969: 127-128). After the Magenta Flume crossed Cherry Hill Gap it connected with the Irwin Ditch; the main ditch went on sixteen miles to Bloody Run and Columbia Hill. By purchasing smaller companies and their ditches the Eureka Lake Company eventually supplied water to all gravel areas on San Juan Ridge as far west as Cherokee. As a part of their operations the company also purchased three mines and laid out Lake City west of the Malakoff Mine. The company's system was expanded by the acquisition of two other ditch companies. In 1859 they bought the Miners Ditch Company, which was formed by a group of miners who laid out and built a canal from the area of Moores Flat to the Middle Fork of the Yuba some twenty miles east in five months during 1855, at a cost of $175,000. The Miners Ditch had a capacity of 750 inches of water, was three feet across the bottom and five across the top. The miners who built it used very little outside capital and apparently were unable to sustain operations. The Miners Ditch Company also operated Grizzly Ditch. A carrying capacity of 750 inches was apparently the minimum necessary to stay in business; the successful companies had capacities running from 750 to 3,000 inches, and typically ended up purchasing the smaller ditches and using them as part of their larger system. The Eureka Company purchased the Weaver Ditch (or "Memphis and Orleans Race") in 1860. The ditch, built between 1853 and 1859, had insufficient capacity and went bankrupt (IBID: 125-130). By 1882, Eureka Lake Company's operation included 163 miles of ditches and flumes with a capacity of 5,800 miners' inches (State Minerologist 1882: 161).

The Middle Yuba Canal and Water Company began operations in 1853, and dug a canal fifteen miles upstream from North San Juan; the system eventually was forty miles long. Once a sufficient water supply was secured, the area around North San Juan became a center of hydraulic mining activity. The Middle Yuba Canal, "with later expansions to the south . . . supplied mines along the entire gravel channels to

French Corral." In 1857, the company purchased the western end of Grizzly Ditch. The Middle Yuba Company eventually merged with the Eureka Lake Company in 1863 (Pagenhart 1969: 127).

The mining water companies exerted great financial pressure on the miners by demanding high prices for their water. The hydraulickers struck in 1854 and again in 1859, refusing to buy any water at all. The strike of 1859 forced rates down temporarily until the water companies agreed to a single water rate. The merger of the two major San Juan Ridge companies in 1863, and their purchase of mines, served to mitigate the power of the miners to affect reductions in water rates (Pagenhart 1969: 127; Paul 1947: 325).

The two other water companies, the South Yuba Canal Company and the Excelsior Company, built their works to serve areas other than San Juan Ridge. The systems of these two companies survived, at least in part, beyond the era of hydraulic mining. They did so by becoming involved in activities other than supplying water to the mines.

The Excelsior Company began operations in the mid-1850s, and by the mid-1860s had grown quite large through mergers with smaller companies. "The Excelsior Canal Company incorporated all water claims and ditch companies south of the South Fork of the Yuba River, except those of the South Yuba Canal Company. Between them, these two giant companies came to share control of the mining and water industry in the entire southern part of the Yuba Basin, from Smartsville to the headwaters of the South Yuba River." In 1861, the Excelsior Company consolidated with the Union Ditch Company and with an extension called the "China Ditch" brought water to Smartsville (Pagenhart 1969: 121). Unlike the South Yuba Canal Company, most of the Excelsior's operations were outside the exterior boundaries of Tahoe National Forest.

The South Yuba Canal Company was founded in the early 1850s to supply water to placer operations near Nevada City. Three miners, Spencer, Rich and Fordyce, ran a ditch from Upper Deer Creek to Nevada City some twenty miles west in 1853-54. Rich and Fordyce surveyed shortly thereafter the upper reaches of the South Fork of the Yuba, looking for diversion sites and securing water rights. In 1855, a merger with smaller companies in the Nevada City area strengthened their operation. Soon thereafter they began their first major project, the South Yuba Canal, which in many places, follows the same route as the South Yuba Canal does today. When the canal was first completed it was called "the most stupendous ditch operation in the state" (IBID: 119). The system required the construction of a flume that ran along the granite shelf, as well as the digging of two bedrock tunnels. When completed, the canal was eighteen miles long and had a capacity of 8,500 inches. Additions to the

system supplied water to Alpha, Omega, Gold Hill Blue Tent and Nevada City (via Deer Creek). Water at first was diverted from the South Fork of the Yuba River near present Lake Spaulding and carried over the Bear River Divide. The company built a large number of distribution reservoirs, and dammed twenty small lakes to increase their capacities. The system took five years to complete. Between 1860 and 1864 the company constructed the Meadow Lake dam; it measured forty-two by eleven hundred and fifty feet and increased by ten times the storage capacity of the lake. Branch canals (laterals) were constructed on ridges that trended north-south and crossed the main canal. One, the Chalk Bluff Branch, ran eighteen miles to Red Dog and You Bet carrying 3,000 miners' inches. In 1864 a branch was run twenty-four miles to Dutch Flat. Water used at Dutch Flat, then, traveled from the headwater area of the South Fork of the Yuba, across the head of the Bear River Valley and worked the mines at Dutch Flat. As the water and tailings were dumped into the North Fork of the American River the canal system completed one of California's earliest interbasin water transfers (Pagenhart 1969: 120). By 1882 the company's canals totaled some 123 miles and had a carrying capacity of 7,000 miners' inches of water (State Minerologist 1882: 161).

The South Yuba Water Company developed out of the South Yuba Canal Company in 1880. As hydraulic mining operations were phased out between 1884 and 1900, the company extended the system to supply irrigation water to foothill fruit ranches in Nevada and Placer counties. Member/owners of the South Yuba Water Company organized the Central California Electric Company in January, 1895, thinking to use the power generated by water dropping from high places along their canals. The construction of Spaulding Reservoir in 1892 with a capacity of about 6,000 acre-feet, covering 216 acres of land, increased their storage. Water was sent to powerhouses, the first built at Newcastle in 1895, and another soon thereafter at Auburn, followed by the Alta Powerhouse in 1901. In 1901 the Central California Electric Company was taken over by the California Electric Company as a part of its larger operation. In October, 1905, Pacific Gas and Electric Company was organized as a holding company to acquire the stock of California Electric Company and other power companies in the state. Since January 1, 1906, Pacific Gas and Electric has owned and operated the systems of the various companies that it bought. Thus, Lake Spaulding passed from the hands of the South Yuba Water Company to Pacific Gas and Electric (Graves to Strong [letter], December 15, 1913). The evolution of the South Yuba Canal Company then demonstrates the historical process of modernization in mountain water development, from hydraulic mining to irrigation to corporate consolidation for the purpose of hydroelectric power generation.

The inclusion of the South Yuba system into the other companies was illustrative of other such activity in the area. In fact, Eugene De Sabla Jr. had been active in

promoting and building the power system at Lake Vera as a part of the Nevada County Power Company and the Colgate Power House on the main Yuba River. These became part of the Bay Counties Power Company organized in 1900, which sold its power 140 miles away in Oakland, using one of the earliest long-distance transmission systems in the world. De Sabla was later a founder of Pacific Gas and Electric Company. Mining water, then, went from an operation undertaken in the early 1850s by miners, through mergers and consolidations to huge water companies, some of which were swallowed up after the end of hydraulicking and made part of irrigation and power systems. The shift toward generation of electrical power, made possible by the invention of high-speed wheels (like the Pelton) and innovations in electrical science between 1870 and 1890, led the water companies in the Yuba Basin toward electrical power (Pagenhart 1969: 153-68). Additional dams were built elsewhere on the Forest and then converted to hydroelectric power at about the same time. Foundry Dam near Downieville was built in 1867 to power machinery at the "Foundry and Machine Shop." After 1896 it supplied electricity for the town's first electric lights. The dam has since been destroyed (Tahoe National Forest Historical File).

Sierra County, like the other mountain counties with Tertiary Gravels, had a large network of ditches. In 1858 there were 183 miles of ditches with a total capacity of 22,180 inches. The town of Downieville was served in 1882 by five different water companies, drawing water from the Yuba River, local tunnels, ravines, and flume systems (Fariss and Smith 1882: 463, 483). Washington, in Nevada County, was still getting domestic water in 1969 from the Canyon Creek ditch built in the early 1850s (Slyter 1969: 93-6).

Hydraulic mining was an inexpensive means of exploiting the deep gravels because relatively few men could do the work of many through the use of a monitor. Unfortunately it was also enormously destructive, not only to the area mined but also to the areas downstream from the hydraulic mines. As the tailings (or "slickens") began to damage downstream agricultural land a movement grew to stop hydraulic mining, or at least force it to control its waste. The argument was important in a larger sense, in that it forced the people to decide if gold mining or agriculture was to be central to California's future.

Farmers and towns downstream of the hydraulic mines began to notice the changing conditions in the rivers in 1856. In 1862, a flood damaged the city of Marysville, which along with Yuba City was especially vulnerable because of its location at the junction of the Yuba and Feather rivers. By 1868, the beds of the rivers were higher than the city streets in Marysville, forcing the city to build levees that eventually cost over $1,000,000 (Kelley 1959: 57-8).

Farmers and miners argued over who was at fault. The miners stated, correctly, that they were there first. More important, the city of Marysville was heavily dependent on trade with the mines — even many of the hydraulic monitors were manufactured there. Besides, it was impossible to know which mine caused damage to a specific farm, making lawsuits difficult to pursue. Worry and anger was the only reaction until 1873, when the citizens and farmers of the Sacramento Valley began to organize against hydraulic mining. The first suits resulted in decisions unfavorable to the farming interests. Initially there was little support for the farmers in towns like Marysville that depended on mining trade. The attitude of Marysville residents changed after January, 1875 when a city levee broke and flooded the city, killing a small boy and half burying the city in mud. Protest meetings began to spread, and the suggestion was made that the legislature rather than the courts should be the target for complaint (IBID: 59-69). Miners realized that as pressure against hydraulic mining grew, a counter-organization would be required. "Called into being by a threat to the industry's existence, it [the Hydraulic Miners Association] assumed not only the task of defense, but of consolidation as well" (IBID: 88). Membership was open only to owners of mine, water or tailing sluice companies. Votes in the Hydraulic Miners Association were tied to the production level, one vote for each $5,000, thus giving big companies control of the organization (IBID: 89-90). Discussion of the waste problem began to focus on building debris dams to impound slickens. By 1882, the U. S. Army Engineers were surveying for debris dam sites on the Yuba, American, Feather, Calaveras, Mokelumne and Consumnes rivers *(Mountain Messenger* 1/14/1882).

In 1882, the farmers organized Anti-Debris associations which spread from Marysville and Yuba City to Colusa, and later to Chico. Soon the anti-debris movement spread throughout the entire Sacramento Valley. In May, 1882, county supervisors from Sutter, Yuba, Yolo, Colusa, Tehama, Solano, Butte, and San Joaquin counties met and agreed to organize the State Anti-Debris Association. Only Solano, Tehama, and later San Joaquin counties did not take part (Kelley 1959: 194-196, 212-213).

A series of cases led in 1884 to what has become known as the Sawyer Decision, which outlawed the dumping of mining debris into rivers (Bean 1978: 233). Tempers had run high. On June 18, 1883, the Rudyard (English) Dam on the headwaters of the Middle Yuba river burst; the resulting flood caused considerable damage and death downstream. Accusations as the cause of the dam's failure served to heighten tensions further (Jackson 1967: 84-88). Attempts to conciliate the differences did little, and as the courts affirmed the Sawyer Decision on appeal, hydraulic mining faded. The Sierra County *Tribune* (12/1/1884) described the impact of the decision on a local mining district:

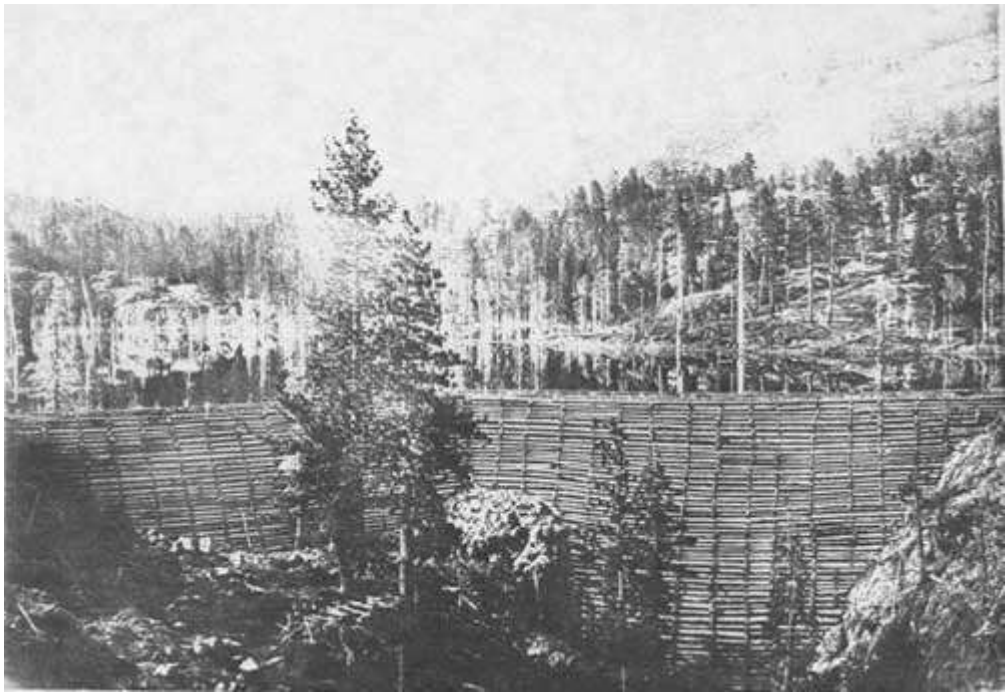
Effects of the Anti-Debris Decision. Brandy City — All are leaving who can get away. Sawmills have shut down. Six ranches, wholly dependent on mining, are ruined. Most of the men who remain here are waiting to see if something can be done to start up. This once prosperous camp is now ruined.

The article went on to state that the value of mines, ditches and other related property had lost seventy-five percent of their previous value.

After the Sawyer Decision, miners continued to look for ways to operate hydraulic mines within the limits of the injunction. In addition, a Debris Commission was set up by the U. S. Congress that began to study the problem in 1889. One of the commission's duties was to locate sites for debris restraining dams *(Mountain Messenger* 3/30/1889). Finally in 1893, a federal law, the Caminetti Act, set up a permanent Debris Commission and legalized hydraulic mining under certain restricted circumstances (Bean 1978: 233). Some of the largest mines tried to operate under the terms of the Act, but found that debris dams were filled far too fast. Thus hydraulic mining faded out after 1884 and was carried on, if at all, on a small scale (MacBoyle 1918: 5).

Gold mining did not end with the Sawyer Decision and Caminetti Act; as noted above, drift gravel mines and deep quartz operations continued well into the 1900s. Better mining techniques and advanced equipment allowed the exploitation of deeper deposits and lower grade ores. Established quartz mining areas like Alleghany continued to be active and develop. Overall, however, in the years following 1884, there was a general decline in gold production (with the exception of dredge operated mining) and the industry did not fully recover until the 1930s (Clark 1970: 6).

Gold mining has held a large share of the attention in California and within Tahoe National Forest. Nevertheless there has been some limited exploitation of metals and minerals other than gold. The most prominent of these were silver and copper. Silver and copper deposits were found in Sierra Valley, Antelope Valley, and their vicinity in 1862-3, and the settlement of Antelope City was established southwest of Loyalton during the excitement. Shafts were sunk until 1866, when mining was discontinued. In 1864, some evidence of silver and gold was found in Bear Valley northeast of Sierraville (Sinnott 1976: 9). A brief gold and silver excitement started in 1861 in the Tahoe District located to the north and west of Lake Tahoe. During the excitement little settlements were planned and some buildings were erected in the "towns" of Claraville and Knoxville (near the mouth of Squaw Creek), Elizabethville (a few miles north of Kings Beach), and Neptune City (north of Lake Tahoe) (Gudde 1960: 345, 74, 188, 108, 237).



ENGLISH (RUDYARD) DAM.

OMEGA MINE, WASHINGTON RIDGE.

Copper mining excitement also spread to the Bear River Valley in the Gardner Bar District in 1853-64. Small settlements called Wilsontown and Superior were set up, ore was shipped to San Francisco, and good prices obtained. As prices fell in 1864, excitement waned and after 1864 "few, if any, copper mines were worked in Placer County" (Thompson and West 1882: 206-7). In Nevada County near English Mountain and Bowman Lake copper was mined in the 1890s and early 1900s (Clark 1970: 46) Copper mines in this area were developed during and after World War I; however, most were worked sporadically in the late part of the nineteenth century (MacBoyle 1918: 85-91).

The California State Mining Bureau surveyed the copper mines in the Sierra Nevada in 1902. The Bureau's report noted five mines or claims in Sierra County. These were located in the Poker Flat District, near Bassetts, Sierra City and the Antelope and Mohawk valleys. In all cases development was very limited. In Nevada County, copper deposits were exploited mostly at lower elevations in the western portion of the county near Spenceville and Mineral Hill. Copper deposits were noted near Washington and North Bloomfield, but little work had been done by 1902. Placer County copper mines in 1902 were all located in the western portion of the county away from the Forest; the report noted that "Placer County has not yet made copper a prominent feature of its mineral industry" (California State Mining Bureau 1902: 161-2, 162, 171, 173).

Mining occupies a prominent place in the history of Tahoe National Forest, and indeed in California. Our image of the industry tends to be that of the sourdough with a pan. However, the true heyday of mining within the forest came after 1859, when industrial forms of mining increased and grew to prominence. During the period other economic activities grew alongside mining as important independent enterprises. All continued to serve mining, but also were part of an economy not wedded totally to gold.

Transportation Within Tahoe National Forest.

The history of transportation on the Forest between 1859 and 1906 falls into two separate periods with the dividing line being the completion of the transcontinental railroad in 1869. Before the railroad was finished, freight wagons, wagon roads, stagecoaches and turnpikes were the mainstays of the regional transportation network. After the railroad was finished all such activity became secondary or ancillary to the railroad. The building of the railroad had a tremendous impact on the region immediately adjacent to it, as well as on the areas that were served by it. Economic activities such as logging, commercial fishing, the ice industry, agriculture and recreation were all stimulated or expanded by the market provided by the railroad.

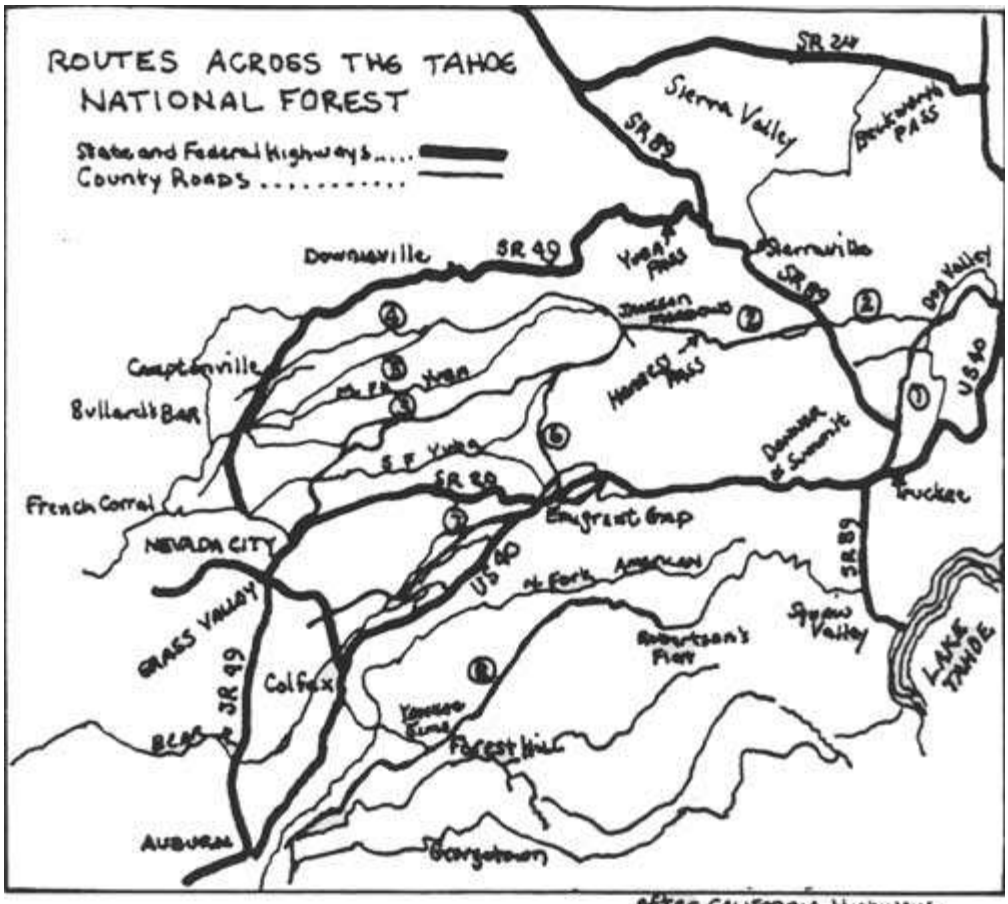
The pre-railroad era, 1859-1868, was the time during which the major wagon roads that crossed the Sierra Nevada within the forest were established. Before 1859, as we have seen, crossing the mountains was done largely by immigrants and pack mule trains on their way to Sierra Valley and other areas east of the mountains. After the discovery of gold and silver in the Washoe in 1859, traffic was sufficiently heavy to warrant major improvements on the cross-Sierra routes (Paul 1947: 179; Jackson 1967 a: 22). All of the major wagon routes through the high passes within the Forest — Henness, Beckwourth, and Donner — had been used earlier in the 1850s by immigrants, although the Donner Pass and Truckee River routes tended to be avoided by immigrants in favor of the Carson Pass route south of Lake Tahoe in what is now El Dorado National Forest (Jackson 1967 a: 19-20).

New wagon routes were sought, and as a part of the effort the California Surveyor-General requested a survey of the Henness Pass route in 1855. The route described by the surveyor ran up the Truckee River to Dog Valley, up that valley to the plateau area beyond, through which the road ran "nearly west" in a line to the summit, and then down the western side of the mountains to the "Lower Crossing of the Middle Yuba River at which point is 1,200 feet below the summit" (California Surveyor General 1856: 191-2). The surveyor painted the Henness Pass route in glowing terms, estimating that only small sums would need be expended to improve the route made by immigrant wagons. "He noted that grass and water were abundant along the entire route and concluded, 'you will see at a glance, . . . its importance, and the benefits to be derived by the counties adjoining Yuba and Sierra by the constructing of a great road through them'" (Jackson 1967 a: 21-22).

Cities on the west side of the mountains like Nevada City, Grass Valley and Marysville desired to be at a trans-mountain road terminus to obtain a share of the rapidly growing Washoe trade after 1859. Accordingly, the Truckee Turnpike Company was organized in November 1859 to build or improve a route through Henness Pass. The road would connect with the Marysville-North San Juan road built earlier in the 1850s Another company was also organized in December, 1859 with the aim of building a road up San Juan Ridge to connect Nevada City with the Washoe via Henness Pass. The company became known as the Henness Pass Turnpike Company (Mitchell 1950: 63). Additionally, entrepeneurs began making plans for express companies and pack train services. Others proposed various cutoffs to shorten the route. Construction began in March, 1860 by the Truckee Company. "The builders hoped stages and freight wagons could traverse the route as early as June and that the road would be completed between July 1 and 15" (Jackson 1967 a: 23-4). The California Stage Company planned to begin running stages up the road starting in May, using the route to extend their terminus from Forest City (and then to Downieville); once the road was finished they would run a line from Marysville to

Carson City and Virginia City. Some boosters even felt that winter travel would be possible on sled runner-equipped coaches (IBID: 24). The San Francisco *Evening Bulletin* (5/3/1860) described development along the route, stating "a considerable portion of the route is adapted to settlement for haying, stockraising, lumbering, even agricultural purposes, and is already settling up, being fenced and built upon."

In June, 1860, the Henness Pass Turnpike Company's road from Nevada City reached Jackson's Ranch on the Middle Yuba River, where it met the road being built by the Truckee Turnpike Company from North San Juan. The two organizations combined their efforts and built toward the Washoe. The route they chose had been used by immigrants and persons with hay ranches in the peaks (Mitchell 1950: 63). By July, the road was as far as Cornish's Ranch, six miles past Forest City; the Truckee Turnpike Company announced that they would go no further, letting contracts for construction of the rest of the road from Jackson's Ranch to the pass and on into the Washoe. The Henness Pass Company made similar plans. Toll gates were set up in Plum Valley, and teamsters, travelers and herdsmen began using the road. The Dog Valley section of the road was the worst, and in the fall of 1860 a crew of 100 was at work improving it. Wagons of up to 11,000 pounds were expected to be able to use the route. Mail stages used the road in the 1860s, as did freight teams; nevertheless the Carson Route was used by the majority of teamsters. One reporter called the Henness Pass Road a mixture of "Excellences and abominations." Its use ended with the completion of the railroad in 1868, except for those using it to reach the railhead (Jackson 1967 a: 25-27).



after California Highways and Public Works, 1950.

1. County road on the immigrant trails to Donner Summit and Henness Pass. It was also the "Dutch Flat and Donner Lake" stage road. (Immigrants descended into Dog Valley but the road followed the ridge)
2. Henness Pass Road. Used by immigrants during the fifties and by stages and teams to approximately 1868.
3. Road via Bowman Lake, Graniteville and North Bloomfield to Nevada City. Built by the Henness Pass Turnpike Company in 1860.
4. Unimproved road on the route followed by immigrants coming through Henness Pass.
5. County Road from Forest City to North San Juan, connected with stage road through Smartsville. Immigrants followed the route as did stages. Built by Truckee Turnpike Company, 1860. This company and the Henness Pass Turnpike Company cooperated in building the road east of Jackson's Meadow.
6. "Culbertson Grade". Built in 1864 to connect the railroad and the Dutch Flat Road at Emigrant Gap with the Henness Pass road.
7. Immigrant Route, Bear Valley to Johnson's Ranch.
8. Route of Placer County Emigrant Road, 1852.

ROUTES ACROSS THE TAHOE NATIONAL FOREST (after California Highways and Public Works, 1950)

Two roads in the eastern portion of Sierra County were built to connect with Henness Pass Road. One, built in the late 1850s or early 1860s, ran from Sierraville via Lemmon Canyon into Sardine Valley; the other, built in the early 1860s, ran from Loyalton along Smithneck and Lewis canyons to Sardine Valley. Teamsters leaving Sierra Valley for the Washoe avoided the Henness Pass portion of the route because of the grades, and used Long Valley instead. Toll roads were established between Truckee and Sierra Valley, one from Truckee to Loyalton and the other from Sierraville to Truckee (Sinnott 1976: 21). The Sierra County Board of Supervisors approved the tolls charged *(Mountain Messenger* 11/21/1868).

Another road connected Henness Pass Road with Dutch Flat on the Donner Route. This was called the Pacific Turnpike (or Culbertson's Road). Work on the road began in May, 1863; by June, 125 men were at work and the company began advertising for more workers The road ran from Dutch Flat across Bear Valley to Bowman's Ranch (later the site of Bowman Dam), and then connected with the Henness Pass Road to Webber Lake, Sardine Valley, Dog Valley, and Verdi on the Truckee River (Thompson and West 1882: 290). "At Bear Valley it was joined by a branch road belonging to the same company, coming from Nevada City up the ridge between Bear River and the South Yuba," now a part of Highway 20 (Thompson and West 1882: 290; Slyter 1969: 37). The road opened in May, 1864, and was considered one of the best built roads across the Sierra Nevada. "Thus the Henness Pass Road (became) a consolidated thoroughfare from the site of Verdi west across the Dog Valley grade and through Sardine Valley, but beyond that point it had many branches going to Loyalton, Sierraville, and Downieville to the north, and Marysville, Nevada City and Dutch Flat to the west" (Jackson 1967 a: 27).

The other major transmountain wagon road built in the 1860s was the Dutch Flat and Donner Lake Wagon Road. A wagon road survey was made in 1860 along the route by S. G. Elliot, and in March, 1861 the Lake Pass Turnpike Company was organized to build the road. Existing information about this organization suggests that the company was uncertain as to exactly where their road would be built. Construction began in April, 1861 (IBID: 28).

The organizers of the Central Pacific Railroad Company saw the value of a wagon road near the proposed alignment of their railroad, and thus set up the Dutch Flat and Donner Pass Wagon Road Company in November, 1861. Charles Crocker, one of the "Big Four" of Huntington, Stanford, Hopkins, and Crocker who were building the

Central Pacific Railroad, was named president and Hopkins secretary (Kraus 1969: 38). The road was planned to run from Colfax to the Washoe Valley.

Primarily, the wagon road was designed to aid the Central Pacific in crossing the mountains and help avoid construction delays; to transport freight from Nevada points to the end of the railroad at Dutch Flat, and then to succeeding points along the line as the completed railroad gradually moved eastward; to haul supplies in ox- and mule-drawn wagons to construction forces working in advance of the railhead as far away as the eastern slope of the Sierra; and, as a toll road, to control freight shipments over portions of the road as it was completed. Three toll gates, at Dutch Flat, Polley's Station, and Donner Lake, were established along the sixty-seven-mile-long road between Dutch Flat and the top of Dog Mountain. (Kraus 1969: 39)

Work was begun on the road in the fall of 1862. By June, 1863, nearly 500 men were at work, and the road was opened for traffic early that month. The California Stage Company began running stages on the road July 16, 1864. The terminus of the road was always the easternmost point of the railroad (Thompson and West 1882: 289-290). The road ran over Donner Summit and down to the Truckee River, then northeast to Ingram's Station on the Henness Pass Road; thus it followed basically the same route east of Donner Lake that the immigrant parties had followed through "Greenwood's Cutoff" (Jackson 1967 a: 29).

Within a few months of the road's completion, inns and hotels began to be established. On the eastern side were Mountain View House, Donner House, Lake House, Colburn's Station (now Truckee), and Prosser Creek Station; on the west side, hotels were set up at a variety of points along what later became the railroad route (IBID: 31). One of the most famous locations was at Cisco, where Messrs. Heaton and Poley had established inns on the road in 1864. The hotels benefitted from the Meadow Lake mining excitement, as the road to Meadow Lake started there and people used the hotels as a jumping off point for the mines. In 1866, the railroad founded the town of Cisco (Thompson and West 1882: 376).

The Dutch Flat and Donner Lake Wagon Road was a creature of the railroad; as the railroad progressed to the east, sections of the road became unnecessary and were bypassed (Jackson 1967 a: 33). After 1868, when the railroad crossed the Sierra Nevada and replaced the road, its usefulness as a transmountain thoroughfare ended (Thompson and West 1882: 290).

The last of the wagon roads to cross the Sierra Nevada within the forest was the Yuba Gap Wagon Road. Unlike Henness Pass Road and the Dutch Flat wagon road, this route provided mostly local access for the eastern and western portions of Sierra County.

The need for a wagon road across Yuba Gap had been apparent for years. Farmers and ranchers in eastern Sierra County had been forced to load their crops on pack mules if they planned to sell in the Yuba River camps. Those who wished to travel from Downieville to the Washoe via Yuba Gap and Sierraville were forced to travel by "saddle train" from Downieville to Sierra Valley; connections with Virginia City were available by stage from that point (Sinnott 1976: 33).

The difficulty in crossing the mountains at the Yuba Gap was demonstrated in 1862 in a newspaper article describing a man who had disassembled a stage, loaded the pieces on muleback (as part of a seventy-three mule train) and took it over the Gap.
The *Sierra Democrat* described the scene in April, 1860.

Stage for Washoe — The first stage through from Downieville to Washoe went this week; and this was the order of its going: body and coupling carried by four men who got $120 for the trip; front wheels on a little brown mule, compensation not known; hind wheels on a big bay mule; axles on the other mules. Ike Green, proprietor of the stage line between this place (Downieville) and Marysville, puts this pioneer stage through to Jamison by the Middle North Yuba trail. (Sierra Democrat 4/24/1860)

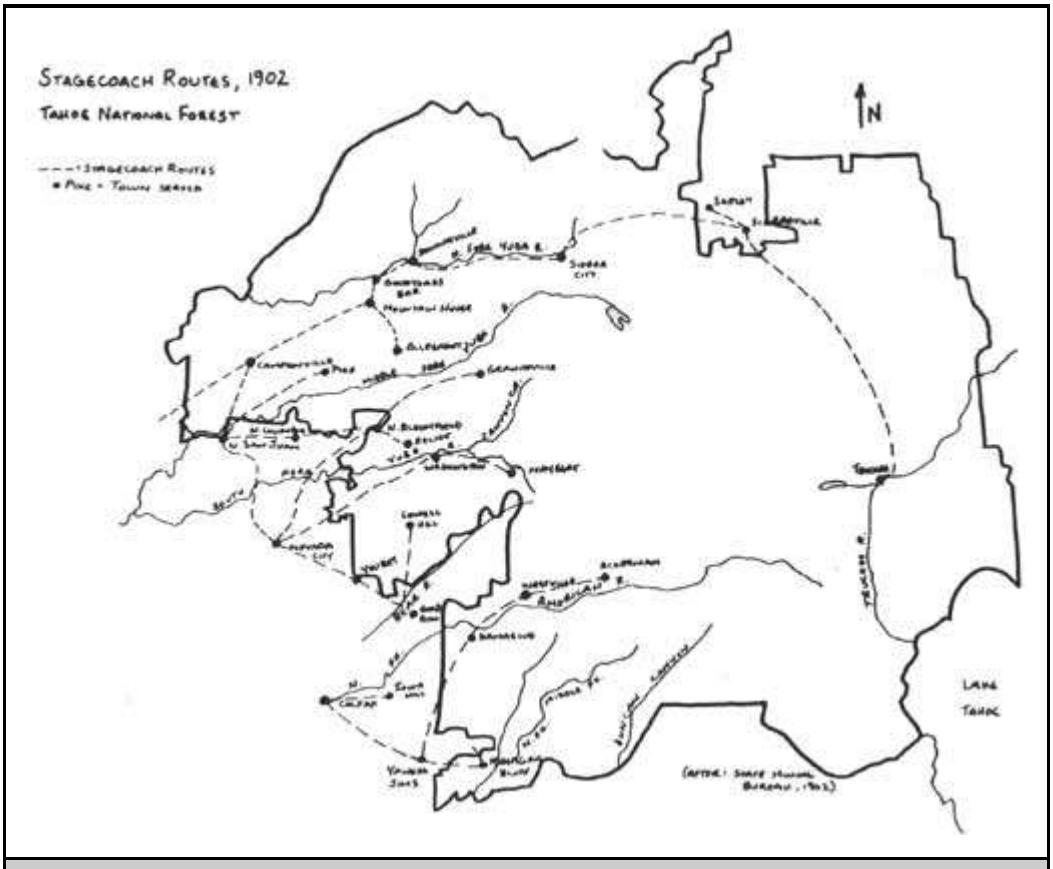
The Sierra County Board of Supervisors let a contract for the construction of a road over the Yuba Gap in the summer of 1862. The *Sierra Democrat* described the changes that began to occur after the contract was announced.

. . . Wide awake people have been staking off and fencing in ranches along the line of the present trail. Wherever a level spot large enough for a garden patch could be found, a notice is put up, trees are blazed, and a fence started around the ranch, Sierra City is taking a forward look. (Sierra Democrat 10/4/1862)

The road was finally completed in 1870, after a succession of cost overruns and problems with the work crew. With the road completed, freight wagons and stages began to move from Sierra Valley to Sierra City and Downieville; in the winter sleigh and sleds crossed the gap, pulled by horses wearing oversized horseshoes in order to stand on the snow. These were described as a steel plate with a piece of rubber and fabric fastened to the top surface to cushion the hoof. The shoes were nine inches on a side. The road itself was operated for a number of years as a toll road (Sinnott 1976: 36, 24-25) Through the rest of the period, stage lines connected Downieville and Sierra City with Sierra Valley and the railroad at Truckee.

Stage lines operated between towns on the Forest on the network of wagon roads built in the 1850s; some were toll roads, although later in the period many became public highways. A number of these toll roads were located around Washington, including the Alpha and Washington Road, owned by Conrad Grissel, the Nevada and

Washington Turnpike, and the Washington and Omega to Fall Creek road, owned by J. A. Doolittle (Slyter 1972: 37). The Nevada City and Washington Turnpike was declared a public highway January 7, 1876; the owners offered it to the county free of charge. A number of stage companies operated on the roads in the area; in 1880, there were eight lines operating between Nevada City and Omega, and Alpha and Washington. Competition was occasionally intense. The companies served a varied population in the mines, which especially during hydraulic mining included many Chinese. The Nevada City *Daily National Gazette* reported that in June, 1870, "fully one-half the transfers in the stages to the mining towns above Nevada City are Chinese" (quoted in Slyter 1972: 50-52).



STAGECOACH ROUTES, 1902 - TAHOE NATIONAL FOREST (after: State Mining Bureau, 1902)

In 1865, an express and passenger mule train service operated between Howland Flat and Downieville via Deadwood and Poker Flat. During the winter months the snow became so deep at these high altitudes that roads over the ridges were obstructed for weeks. At these times the "snowshoe express" replaced the packtrain (Fariss and Smith 1882: 418). Virtually all of the higher altitude settlements within the Forest were similarly affected.

In the winter time it (Washington) is almost inaccessible by stage, frequently communication being maintained to the outside world by messengers mounted on snowshoes. When winter made its approach little towns and camps lay in a supply of needful articles as sufficient for their needs until the return of spring shall open the roads and permit them to renew the supply. (Thompson and West *History of Nevada County;* quoted in Slyter 1972: 39)

The stage lines that survived served as connections between mining camps, logging centers and agricultural valleys and the railroad. A California Mining Bureau pamphlet for 1902 shows stage lines within Placer, Nevada and Sierra counties. Only one line, running from Truckee to Sierra Valley and on to the North Fork of the Yuba towns, still crossed the mountains. The others radiated out from Nevada City, Colfax, Dutch Flat, North Columbia and Camptonville (California Mining Bureau 1902: map).

The major transportation development during the period 1859-1906 was the building of the Central Pacific Railroad. The construction of the railroad wrought great change on the Forest; the connection of California to the east by rail wrought stupendous change on California as a whole. The completion of the railroad ended California's effective isolation from eastern markets and eastern goods forever, and brought California into the economy of the United States in a way it had never been before. The construction and completion of the railroad, then, stands alongside the discovery of gold as a pivotal event in California history.

The idea of a transcontinental railroad was first suggested seriously in 1845; at first considered impractical, the idea gradually took hold as the gold rush led to the development of California and growing sectionalism before the Civil War emphasized the importance of uniting the country. The major stumbling blocks to the plan were its cost, engineering and construction problems, and arguments over its terminal point in the east (Caughey 1970: 304-6).

A major force in changing this situation was Theodore D. Judah, a young railroad construction engineer from the east who had directed the building of California's first railroad from Sacramento to Folsom. Judah began to search for a pass over which rails could be run. "With a one-horse wagon equipped with barometer, compass, and odometer he made no less than 22 reconnaissances of Sierra passes and approaches, finally selecting the Dutch Flat route, which the Central Pacific eventually used. (IBID: 306-7). Armed with specific information he traveled to Washington D. C. in 1856 and 1857 to promote the railroad. Although he generated interest, little specific action was taken. In 1859 his efforts resulted in the Pacific Railroad Convention in San Francisco that called on Washington to help with the project. Judah served as its presiding officer (IBID: 307-8).

The project got moving in 1860. After being rebuffed by San Francisco investors, Judah turned to some small businessmen in Sacramento. It was these men who formed the nucleus of the railroad company; and the four who rose to power within the new Central Pacific Railroad Company and pushed the project through to completion. These were Leland Stanford, Charles Crocker, Mark Hopkins and Collis P. Huntington. All owned small stores in Sacramento. Stanford had been a shopkeeper in Michigan Bluff before relocating in Sacramento (Caughey 1970: 309-9; Kraus 1969: 14).

After some limited financial backing was secured, Judan began more serious engineering studies on the route, and traveled to Washington again to seek federal aid. By this time, 1862, the picture in the east had changed dramatically. With the Civil War underway, the national government was interested in binding the nation together as well as making more secure access to California and Nevada gold and silver. The Pacific Railroad Bill specified that the Central Pacific Railroad Company be chosen to build the rails east. The government also gave its financial backing.

. . . in addition to the 400-foot right of way, the companies should receive from the public domain the odd-numbered sections within 10 miles of the line, that is, 10 for each mile of track. Most important of all, the federal government agreed to advance, on 30-year 6 per cent bonds for each mile of track laid, $16,000 to the mountains, $48,000 in the Rockies and Sierras, and $32,000 in the intermountain section. (Caughey 1970: 311)

It was, apparently the land and subsidies that attracted the "Big Four," rather than the railroad itself. This led to a rift between Judah and his partners that eventually resulted in Judah's ouster from the company. He then went east looking for financiers to buy out his former partners. Enroute he contracted yellow fever in Panama and died shortly after arriving in New York (IBID: 311-312).

The Big Four organized to push the railroad ahead, each accepting responsibility for specific aspects of the project. Stanford became "public-relations chief in California," Huntington the lobbyist in the east, Hopkins in charge of the office, and Crocker in charge of the construction itself. The four let contracts for work on the road to companies that they had organized and controlled; because of this practice the railroad was eventually called the "Dutch Flat Swindle" by other stockholders. As noted above, as a part of the construction the group also built a wagon toll road. The company got further help from the federal government in 1864, including a doubling of the land subsidy (IBID: 313).

Construction moved ahead in 1864-66. One of the stumbling blocks faced by the builders was an inadequate supply of labor, especially as many of the men who signed

on used the jobs as a means of getting to the Washoe. "One proposal was to bring up several thousand Mexicans . . . but Mexicans did not build the Central Pacific, nor did the 5,000 captured Confederate soldiers whom the federal government was requested to provide" (IBID: 314). The solution to the labor problem was found in Chinese workers.

Crocker had been in favor of employing Chinese, but faced opposition from his chief assistant J. H. Strobridge, who felt that the Chinese would not be able to handle the heavy labor required. Fifty Chinese were hired as a trial, then fifty more; eventually there were 12,000 to 15,000 employed on the project (Kraus 1969: 110; Caughey 1970: 314).

It became apparent early in the season that the amount of labor likely to be required during the summer could only be supplied by employment of the Chinese element in our population. Some distrust was at first felt regarding the capacity of this class for the services required, but the experiment has proved eminently successful. They are faithful and industrious and, under proper supervision, soon become skillful in the performance of their duty. Many of them are becomeing very expert in drilling, blasting and other departments of rock work. (CPRR Chief Construction Engineer Montague, quoted in Kraus 1969: 110)

Strobridge's views also changed markedly.

(They are) . . . the best in the world. They learn quickly, do not fight, have no strikes that amount to anything, and are very cleanly in their habits. (Quoted in Kraus 1969: 111)

Chinese railroad laborers received $30 to $35 per month; their net pay was not much smaller than that of Chinese miners. Since many Chinese miners and those working in other occupations left to work for the railroad, wages were probably considered "good" by the Chinese (Mei 1979: 487-488).

By November, 1866, the railroad reached Emigrant Gap, about nineteen miles from the summit. Rails to Cisco were expected to be in place by mid-November. Work continued as snow had not yet fallen *(Sacramento Union* 11/5/1866).

Work went on during winter, but at a much slower pace as thirty foot drifts were common above Cisco. When snowplows failed to clear the rails, experimental showsheds were begun in 1867. Their success led, with some modifications, to building permanent snowsheds in the summer of 1868. Eventually thirty-seven miles of sheds were built at a cost of $2,000,000 (Kraus 1969: 159; Caughey 1970: 316). The railroad track is still kept open in winter by the protection afforded by snowsheds,

although there are presently only a few miles of them located near the summit of Donner Pass.

The granite of the mountains was also a major obstacle, especially in those places where tunnels were required. The quarter-mile Summit Tunnel was very difficult. Often only inches a day could be dug as the hard granite broke drills and dulled chisels. Progress was more rapid after Crocker introduced nitroglycerin, a newly-invented and dangerous explosive. Summit Tunnel was finished in September, 1867. By June, 1868, the line reached the boundary of the state of Nevada, and work began toward Utah (Caughey 1970: 315-316).

The completion of the railroad to the east was an event of great significance. After the lines were joined at Promintory Point, Utah, in May, 1869, the railroad opened California to eastern markets and goods; the anticipated economic boom turned into a ten-year depression that became known as the "Terrible Seventies" (Bean 1978: 180, 182-3). The railroad brought in goods that California manufacturers could not compete with in terms of price, high rates charged by the railroad hurt California shippers, and the end of construction meant that unemployment rose, especially among the Chinese (Caughey 1970: 320-323).

The railroad wrought great change on the Forest in particular. New settlements were established, either as part of the railroad system (Cisco, Truckee, Boca and others are examples), or as a part of the logging recreation, and other industries stimulated by the access to market provided by the railroad. The railroad altered transportation patterns in the mountains permanently, making use of roads like those over Henness and Donner passes obsolete, turning them instead to feeders to railroad stations (Jackson 1967 (S): 33-34). The railroad allowed for persons in the Central Valley, Bay Area, and eastern United States to visit the Sierra for tourism and recreation. Finally, the railroad had encouraged the immigration of many Chinese into California as railroad workers. In the late 1860s, an article appeared extolling "What the Railroad Will Bring." As the economic impact of the railroad began to be felt after 1869, the title was repeated with some bitterness (Bean 1978: 178, 182).

A seldom discussed aspect of transportation within the forest was the use of boats on alpine lakes, Steamers on Lake Tahoe hauled logs and passengers, with Tahoe City as a center of resort activity. A 200 yard-long wharf was built there in 1864, providing a tie-up for steamers in rough weather; the wharf had a post office and saloon built on it. A wagon road connected Tahoe City with the railroad at Truckee (Thompson and West: 403). Inns were also built at Donner and Independence lakes. Augustus Moore established a resort at Independence Lake and launched the *Susie Dana*, a boat capable of carrying twenty-three passengers around the lake (Moore MS, Bancroft Library: 24). One of the most famous of the early alpine resorts was at Webber Lake,

established in the early 1850s by Dr. Davis G. Webber. He stocked the lake with fish, built cottages and provided boats for fishing and recreation (Sinnott 1976: 8).

By 1906, the transportation pattern within the Forest had progressed far beyond its state in 1859. Wagon roads crossed the Sierra Nevada at Henness, Donner, and Yuba passes, and communication between western and eastern portions of the forest was assured. Most important, the Central Pacific Railroad provided regular and rapid transportation through the area. The dominant position of the railroad in California transportation lasted through the early decades of the twentieth century; only with the building of oiled and paved roads and the spread of automobiles was the primacy of the railroad threatened.

Logging Industry Within the Tahoe National Forest, 1859-1906.

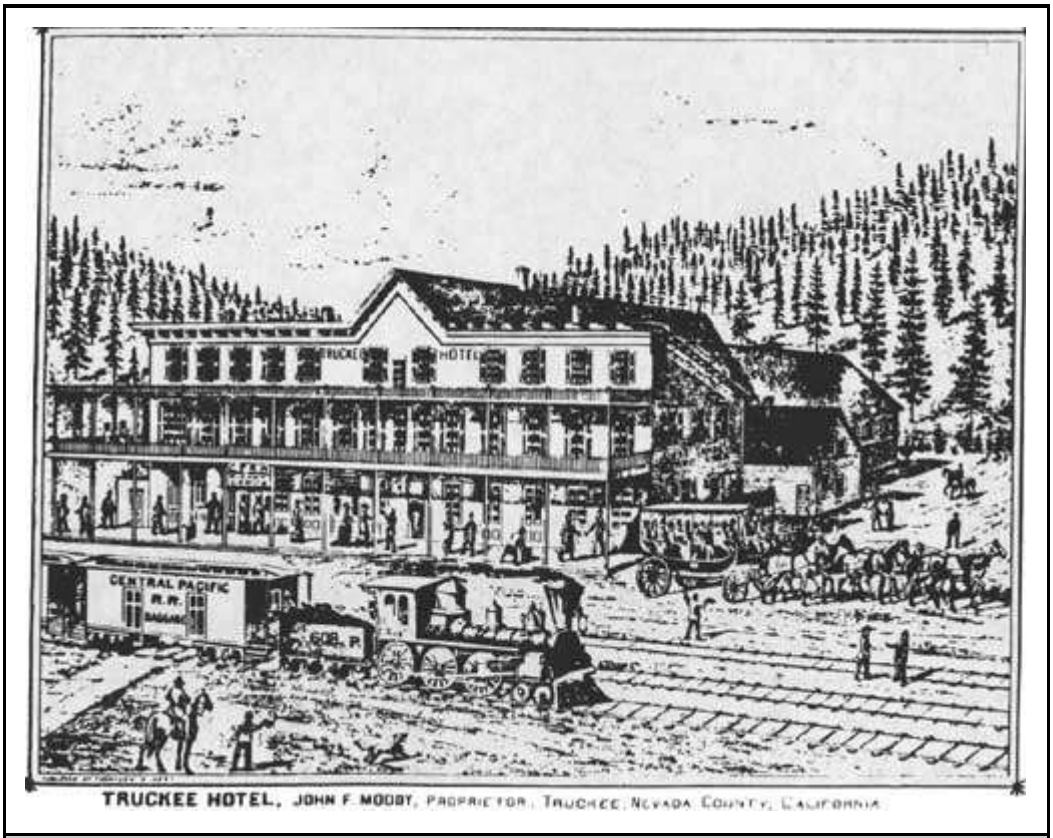
The history of the logging industry on Tahoe National Forest, 1859-1906, can be divided into three periods: first, logging for mining and construction purposes in both California and western Nevada, 1859-1867; second, logging for railroad building, 1864-1870; and last logging for general purposes 1870-1906. Different areas within the forest were affected by logging in a variety of ways. The western portion of Sierra County was logged for local consumption in towns and at mines throughout the entire period. Sierra Valley timber was also cut early on for export to Nevada. Cutting went on in western Placer and Nevada counties for mines and towns, and later for railroad purposes. Lastly, timber was first cut on a limited basis in the eastern portion of the Truckee Basin and around Lake Tahoe. The building of the railroad further stimulated the lumber industry in the region. The Truckee Basin remained one of California's logging centers during the last century

Small sawmills were established around most of the mining towns and centers soon after gold was discovered. Lumber was needed for buildings, flumes, equipment, mines, and fuel. The equipment for these mills was imported from the east coast. By the later 1850s, sawmilling and the lumber trade was the leading industry in Sierra County after mining (White 1961: 6). Sawmills established at towns like Sierra City between 1855 and 1860 grew with the town and local mines (Fariss and Smith 1882: 470-472). Mills also developed around Nevada City; some of the mills established during the early 1850s operated well into the twentieth century (Bigelow 1926: 11). Placer County's early sawmills also clustered around mines. The Towle Brothers, later owners of a number of sawmills on both sides of the Sierra Nevada, purchased a small sawmill near Dutch Flat in 1859, and prospered as mining expanded in the area. They soon built another mill at Lost Camp *(Sacramento Union* 6/16/1882).

Sawmills located around mining towns were common throughout the years 1859-1906; their fortunes, however, were closely tied to those of the mines. The sawmills

around Eureka, which provided lumber for dwellings, flumes and other purposes, were active in the mining era but faded as mining ended (Sinnott 1972: 187). It was not until well into the twentieth century that logging in the western slope area picked up.

The first major stimulus to lumbering on the Forest came after 1856, as mining began to develop in the Washoe Valley of Nevada. Trees were cut for fuel and timber on the eastern slopes of the Sierra Nevada. Cutting spread to the Truckee Basin after the discovery of the Comstock Lode in 1859. "Almost from the time of its discovery the Lode was dependent on the Truckee Basin for mine timbers and also for fuel since no other fuel supply was available. Fuel wood powered the seventy-six ore mills in the area by 1861. Equally important was the need for mining timbers. After 1860, deep mines began to use the square set timbering system, which made a series of cubes from square cut timbers to support mining shafts. The result was a great increase in the demand for timbers; the increasing population also required lumber for buildings (Knowles 1942: 6-7). This new system was also used in California with a similar increase in demand for timbers the result.



TRUCKEE HOTEL, JOHN F. MOODY, PROPRIETOR, TRUCKEE, NEVADA COUNTY, CALIFORNIA. (Thompson & West 1882: 16)

By the 1850s, sawmills were cutting timber in Sierra Valley; after 1861 these mills began selling to Virginia and Carson City mines. Some of the earliest were located near Sattley, Sierraville, Beckwourth and Loyalton. Mills began to be set up closer to the Truckee after 1860. Mills were established in Dog Valley by John Snodgrass and Ben Leavitt; "by 1863 that part of Sierra County lying within the Truckee Basin was carrying on a substantial trade with the Territory of Nevada" (IBID: 14). Nathan Parsons set up a mill in Sardine Valley in 1865. Brown, Squires, and the "Boston Boys" had sawmills near Crystal Peak; after 1864 there were four mills operating nearby (Sinnott 1976: 74). Mills operated in the vicinity of Crystal Peak until the 1880s and 1890s (Knowles 1942: 35-36). In the Truckee Basin "the only sawmill operating before 1867 was that at the foot of Donner Lake, owned by one McPherson and described as 'a little sawmill run by an improvised water wheel.'" Small operations also started up after 1863 near Squaw Valley and along Lake Tahoe in Placer County (IBID: 14).

The lumber industry in the Truckee Basin was tied to the fortunes of Comstock mining between 1859-1867, in much the same way that sawmills on the western side of the Forest were tied to mining in that area. When production began to fall in the mines in 1867, business began to suffer. However, unlike the majority of mills on the western side, a new market was found for Truckee Basin lumber in 1868: the Central Pacific Railroad. It had been building toward Donner Pass since 1864, and greatly enhanced the fortunes of the sawmills along the path of the railroad. Towle Brothers at Dutch Flat were among the mills benefitting from railroad business *(Sacramento Union* 6/16/1882).

As the rails reached the crest in 1866-1867, a number of mills set up operations to supply the railroad with cordwood for fuel, lumber for construction and ties for the road bed. Coburn's Station (or Truckee) became one of the major lumber centers:

In 1868 when the rivalry between the Central and Union Pacific managers was at its height, Truckee saw its palmiest days. Fifty carloads of railroad ties alone were shipped daily from the town during the summer. In the aggregate, 66,000,000 feet of timber were cut and shipped from the immediate vicinity of Truckee. (California Illustrated Times 12/25/1877)

Among the leading lumber companies during the era of railroad construction were Schaffer and Gray, near Truckee; Joseph Gray at Camp 20; Samuel McFarland, at the mouth of the Little Truckee; the Truckee Lumber Company at Truckee; Bragg and Folsom at Clinton (or Camp 18); Elle Ellen, near Truckee; Towle Brothers at Donner Lake; Sisson, Wallace and Company, perhaps the largest, at Truckee; and Richardson's in upper Martis Valley. These mills operated between 1868 and 1880. Other operators were also in the area (Knowles 1942: 16-23 passim).

The major focus of these mills was on the market provided by the railroad. Other products were produced. Caspar Schock ran a shingle mill in Squaw Valley from 1875 through 1880. Shingles were also produced by the Pacific Shingle Company at Camp 16, seven miles below Truckee. The Boca Mill Company was more diversified, producing laths, wood, lumber, ice, as well as shingles. Sisson, Wallace and Company produced, besides lumber, cordwood and bushels of charcoal. In 1872 they employed over 350 Chinese to cut and burn the charcoal in ovens near Truckee, "this product going to the Central Pacific Railroad and to the smelting works of Nevada and Utah" (Knowles 1942: 21-23). The company was also one of the heaviest contractors for Chinese labor in the cordwood cutting industry (Edwards 1883: 74-75). These Chinese were unceremoniously forced out of Truckee in November, 1878, as whites tore down their Chinatown. "Within a month a new Chinese quarter emerged on the south side of the river just outside the city limits" (Jones 1976: 4). The company shipped 1,000 to 2,000 bushels per week to Virginia City in 1874; they later had orders for 8,000 per day (Knowles 1942: 21-23).

The diversification of mill production after 1869 was caused by a variety of factors. There was a large market for wood products that developed outside of the railroad's immediate use, The railroad allowed the Truckee Basin mills to supply wood to areas across the western United States, Production of railroad related material also remained important as other railroads were built throughout the far west. The demand for railroad lumber was relatively constant into the 1890s. "Railroad building is going on all over the Union and every mile that built in the Central and Western States must be tied from Pacific Coast lumber (Vivian 1890: 461). Each miles required about 2,700 ties. By 1890 there were 150,000 miles of railroad operating in the United States, requiring an estimated 405,000,000 ties. In addition, "mining operations were going on, and that means lumber, and from everywhere comes the cry for more wood" (Vivian 1890: 461).

After the 1880s, sawmills produced boxes, sashes, doors, blinds, as well as laths, lumber, and shingles. The Truckee Lumber Company was operator of "the most expensive sash, door, and blind factory of the Pacific Coast" (Knowles 1942: 34). Boxes produced by the company were sold in Arizona, New Mexico, Texas, California and Central America. In 1882, their big plant at Truckee "produced 11,000 doors, 8,000 windows and 8,000 blinds during the 1882 season" (IBID: 35). Companies diversified and grew as new markets were opened to them. As was the case with mining, the industry developed from one typified by small sawmills in the 1860s to larger and larger companies providing a variety of wood products after 1870.

Despite the variety of logging companies, actual operations during this period were fairly uniform. In some cases new techniques were used or novel ideas attempted, but in general one company operated much like another. Transportation of logs to mills

and finished lumber to market was an enduring problem, especially in such rugged country as that present in the Forest. This problem was solved by the various companies through the use of V-flumes, chutes, logging railroads, steam tractors, "big wheels," and booming on lakes and rivers.

The development of the V-flumes helped solve the problem of delivering large timbers from mills to convenient transportation points, most usually wagon roads. The California State Minerologist reported on the V-flume in 1882:

For the purpose of overcoming these obstacles (rugged terrain and long distances from mill to market) recourse has, in many instances, been had to the construction of flumes, which, wherever tried, have well answered the end in view. While these structures are all built on the same general plan, they differ much in size, length, and cost of construction . . . these flumes are simply long wooden races, consisting . . . of two broad, heavy planks joined together at the lower edges, and flaring out, upwards, in the form of the letter V, gaining for them often the name of V flumes. (State Minerologist 1882: 205-206)

Curves were made as wide as possible, trestles spanned canyons, and the grade kept relatively low enough to keep water moving rapidly. "A twenty inch flume, having a three-mile current per hour, is capable of delivering . . . 230,000 feet of lumber daily;" flumes also carried posts, poles, laths, shingles, firewood and mining timbers (IBID: 206). The flume at Prosser Creek in the Truckee Basin "cost $27,000; most of the other flumes in that vicinity, of which there are several, having cost at a like rate. The flume built in 1874 for supplying Grass Valley and Nevada City with lumber and fuel, cost $2,000 per mile, the country traversed by it being nearly level" (IBID: 207). Other flumes were built in Dog Valley by the Crystal Peak Lumber Company from the mill to Verdi, and from the Alder Creek Mill to the railroad near Prosser Creek (Knowles 1942: 21-22).

Where V flumes were not possible, other types of chutes could be built. These often were called dry flumes or log ways, and were in essence a way of controlling a log sliding down a hillside. Parallel logs would be run downslope, cut logs placed on them and skidded to the bottom. "When sent down in this manner, the logs require to be shot into a lake or other deep water" to prevent damage in stopping. Logs skidded so fast that smoke and fire often trailed the log on the ways (State Minerologist 1882: 206).

Logs were also moved by rafting or "booming" on lakes and rivers. The Boca Mill Company, with mill and timber holdings along the Little Truckee River, spent a considerable amount of money making the river suitable for driving logs.

In 1871 the Little Truckee ran through a continuous belt of timber from its sources in Weber and Independence Lakes to its outlet at Boca, a distance of 30 miles. Log chutes precipitated logs into the river and the timber was floated downstream to the mill at Boca and to facilitate the work of river driving, dams were built at the outlets of both Weber and Independence Lakes so that it was only necessary to lift the gates in order to insure sufficient heads of water. (Knowles 1942: 22)

A similar dam was built at the outlet of Lake Tahoe in 1870 by the Donner Boom and Logging Company "to modify the flow of water to float logs into Nevada" (Jackson and Pisani 1973: 6).

Small steamers towed logs on Lake Tahoe. In 1867, the *Governor Blasdel* towed logs from Tahoe City to Glenbrook; by 1873, the boat was joined by the *Truckee.* Companies operating on Donner and Independence lakes also used lumber boats. A sawmill was built on Independence Lake in 1874 *(Truckee Republican* 2/12/1874). It was reported in 1901 that Hobart Mills was using the skiff *Virginia* on Independence Lake *(Truckee Republican* 1/29/1901: 3).

In areas where water was unavailable lumbermen turned to other forms of transportation, generally of two types: animal and mechanical. Animals were used in a variety of ways in the logging industry. The Towle Brothers mill near Alta used a horse-drawn tramway to pull logs to the mill. This was found to be inadequate and was replaced in 1876 by a narrow gauge railroad. The Towle operation also used oxen to haul logs on skid roads to the railroad *(Sacramento Union* 6/15/1882). Similarly, the Truckee Lumber Company used a horse-drawn railway to log the area six miles to the south of Truckee in 1873, as well as near Truckee itself (Myrick 1962: 436-7).

Oxen and horses were used to haul logs along chutes, on heavy wagons, and by "big wheels." The big wheel was a means by which horses hauled logs to the mills. The mechanism was simply a set of large wheels nine to ten feet in diameter on an axle four feet eight inches in length. The big wheel had a tongue sixteen feet long; each wheel weighed 400 pounds. Logs were slung beneath the axle and pulled to the mill. Heavy draft animals, usually horses, pulled the machine. Because this system worked best on flat terrain, big wheels were not as common as other types of transportation (Burroughs 1953: 17-18; Galloway 1947: 76-80). Big wheels were replaced by dolbeer donkeys and tractors.

Perhaps the most unusual means of hauling logs and lumber were the "steam wagons" used by the Lewis Brothers in Sardine Valley and Richardson Brothers near Truckee. These were large (up to twenty-nine tons) three-wheeled steam tractors that pulled loaded wagons. They apparently also terrified the local ranchers' stock. The Lewis Brothers ran the steam wagons from 1888 to about 1900 when, as had most of the

other major lumber companies, they built a logging railroad (Myrick 1962: 398-399; Knowles 1942: 34).

Between 1875 and 1906 a network of logging railroads was built in the Truckee Basin. The earliest of these were pulled by horses; these were quickly replaced by steam engines and more durable rolling stock. Among the companies that built shortline logging railroads were George Shaffer Company, which built a two-mile line between their lumber camp and mill. The Truckee Lumber Company constructed a line south toward Squaw Valley. The Boca and Loyalton Railroad line was started by the Lewis Brothers in 1900 and eventually was built past Loyalton (the railroad stimulated the establishment of small sawmills south of Sierra Valley.) The Sierra Nevada Wood and Lumber Company, which later became Hobart Estate, operated the mill at Hobart and had a large network of railroad lines (Myrick 1962: 398, 399, 425, 436-7; Articles of Incorporation, Sierra Nevada Wood and Lumber Company).

Logging railroads were uncommon on the western slope. In fact, Towle Brothers' narrow gauge running from Alta across the Bear River and terminating three-quarters of a mile southwest of the Washington County road and Highway 20 in Nevada County was the only one mentioned in the literature. The road covered some thirty-five miles and tapped timber on ridges south of the South Fork of the Yuba River. During 1885, passengers were taken from Dutch Flat to Omega on this road (Slyter 1972: 35-36).

BEAR VALLEY MILL, TOWLE BROS., DUTCH FLAT. (Thompson & West 1882: 369)

KEARSAGE MILL, TOWLE BROS & CO., DUTCH FLAT, PLACER CO. CAL.
(Thompson & West 1882: 368)

The Towle Brothers had a novel way of loading the cars. Those logs lying near the railroad were hauled onto the cars by pulleys and ropes.

Other places cars are lowered down a tramway into the canyons, loaded with logs, tightly secured, and again hoisted to the road. On the 'flats' logs are hauled by oxen, of which 150 head are employed. Above the railway, chutes are constructed . . . in other places less precipitous, skid roads are built, by laying small logs like ties on a railway track. Logs are fastened together and resemble a train of cars as they are dragged by oxen along these skid roads. (Sacramento Union 6/16/1882: 1/6)

Thus, the Towle Brothers used almost every form of logging transportation used where water was not available except for the big wheel.

Logging railroads were not built with the same care or precision as were standard gauge passenger and freight lines that were meant to be permanent. Location of timber dictated the route:

As one side is logged off, the tracks are withdrawn and then extended elsewhere into virgin sections. Unlike the commercial mainline, it is designed only as an out-and-back proposition and planned solely to accomodate timber . . . logging economy dictates the shortest, cheapest route . . . timber trestles substitute for costly earth fills, and the track is laid around a prominence rather than thru [sic] *a cut. Generally following natural drainages, it is a twisting way whose every mile is determined by the board feet of timber it would reach.* (Floyd 1967: 92)

Economy also dictated that they be lightly constructed, "particularly feeder lines to more remote camps" (Myrick 1962: 441).

Logging camps within the forest were temporary affairs, and were moved as the available supply of timber was logged off. In addition, cutting in the mountains was highly seasonal, as the deep snows of winter made logging impossible "In the Winter all the men are discharged, and the work suspended, to be resumed again in the Spring" (State Minerologist 1882: 208). Many of the laid off lumbermen found employment in the ice industry around Truckee during the winter. The size and structure of the camps varied, and it was not uncommon for an entire camp to be moved to a new timber stand once work was completed (Nelson-Meggers Interview, 1982).

Sawmills were of two kinds: water and steam powered. While the early mills were often water powered, steam powered sawmills became common after 1868.

The typical mountain sawmill is located in some convenient valley, to which a small stream of water is conveyed by ditch or flume, for the use of the engine. The mill is covered by a roof of rough boards, while the sides are open. The building is generally constructed after the engine and saws are set, the boards being cut by the mill, and the house built over the machinery. The mill is generally, if not always, driven by a common steam engine of sufficient power. (State Minerologist 1882: 207)

Extensive mill ponds were usually built at the largest mills, and were used in winter for the ice harvest.

Many of the leading lumbering operators in the Forest have been previously mentioned. In 1889, a roster of the "Pine Cut in the Truckee Basin" described their output.

Boca Mill Company	*7,000,000 feet*
George Shaffer	*5,000,000 feet*
Pacific Lumber and Mill Co.	*5,000,000 feet*
Richardson Brothers	*3,500,000 feet*
E. Ellen	*3,500,000 feet*
Truckee Lumber Company	*3,000,000 feet*
Lewison and Smith	*3,000,000 feet*
O. Lonkey	*3,000,000 feet*
Essex Mill Company	*3,000,000 feet*

(Vivian 1890: 469)

The same publication listed operating sawmills within the Forest in 1890. Three were in Downieville, two in Sierra City, two at Emigrant Gap, two at Etta, one each at Alta, Boca, Mountain House, North Bloomfield, Pike City, Rocky Point, and six at Truckee (IBID: 470-72).

One of those mentioned at Truckee was the George Shaffer Company. Shaffer, as noted above, began operating in the area of Truckee in 1868 cutting ties for the railroad, By 1872 his mill works were in Martis Valley, as well as one mill in Truckee. He built a V flume three and a half miles into Truckee. His operation continued for a long time. The *Truckee Republican*noted in September, 1905 that the old Shaffer mill had burned, along with its contents, flumes, and a part of the mill pond dam *(Truckee Republican* 9/2/1905).

The fact that Shaffer's mill burned in 1905 is in a sense symbolic. Between 1881 and 1909 seven of the biggest operations in the Truckee Basin ceased operation; companies "who during the seventies had transformed this area from a vast primeval forest into a region of sawmills: Yerington and Bliss, George Shaffer, Richardson Brothers, the Truckee Lumber Company, Elle Ellen, the Boca Mill Company and the Pacific Wood and Lumber Company" (Knowles 1942: 32).

Shaffer had built a plant in Martis Valley in 1881, complete with mill, cottages for the workers, artificial log pond, flumes, and ox-teams to haul in the logs. Further expansion into new areas and the construction of new mills was undertaken in 1883; by 1892 a logging railroad was necessary to bring logs to his mills. The fire in 1905 ended the Shaffer operation. Richardson Brothers closed down their operations as well; they, like the Lewis Brothers, had used steam wagons to haul their finished lumber from mill to Truckee. The Truckee Lumber Company logged out their land and then shifted operations to near Oroville. Elle Ellen shut down in 1901, after years of production of ties and cordwood for the railroad. The Boca Mill Company closed its mill in 1908 after having logged out their lands; near the end the logs were cut at increasingly distant stands. Pacific Wood and Lumber operated near Brockway on Lake Tahoe until 1894; the main building burned in 1903 (IBID: 33-38).

There is a common thread running through the story of logging in the Truckee Basin: the fact that as the nearby stands of timber were exhausted, logging became much more expensive and thus less profitable. In addition, after 1900, the era of great railroad building was over, and the market for railroad wood tightened. Smaller mills continued to operate, clearing up small stands of timber, but by 1910 logging in the area was undertaken by far fewer companies.

As earlier mentioned, activity on the western slope centered around the railroad line and mining areas. In 1888, in Placer County, it was noted that "the Forest Hill Divide

has been well timbered, but most of the timber around the mines has been cut off." In Nevada County, the same report noted that within a radius of five miles of Nevada City and Grass Valley "all of the original timber has been cut off." Mines were the major consumers. "There has been about as much timber used in the mines of the county as has been sawed by the mills. When using steam power, the mines burnt pine wood exclusively, but now water power is used." Like the Truckee Basin, the forest showed the effects of intensive cutting by the 1880s, (State Board of Forestry 1888: 169-172)

A discussion of the timber industry during the nineteenth century brings to mind steam mills, logging camps, flumes, and lumberjacks. There was a small scale timber industry on the forest that usually is ignored in the popular view: shake making. Shake makers made the long, thin, shingle-like pieces used for roofs and siding on mountain cabins and barns, and as fruit tray bottoms by orchardists. A shake was usually made of sugar pine, and measured thirty-two by five inches. They were typically three sixteenths of an inch thick at the thin edge (Berry 1913: 388-92). Shake makers were considered very destructive. The California State Board of Forestry discussed their practices in 1888:

The shake-makers can be found throughout the Sierras, generally a shiftless set who cannot bear the restraint and superintendence of manual labor in populated districts, preferring rather to lead a free and careless life in the mountain forests . . . Scenting out a Sugar Pine as easily as a terrier does a rat, they visit every district in the Sierras. (State Board of Forestry 1888: 156)

The report called them "forest pirates," because they cut down many trees but only used a few.

Shake makers were an independent sort. The job required a high degree of skill and practice. Several steps were required. First, trees were selected for long, straight grain. A tree that looked as if it was usable would have a six inch block chopped out to test its splitting qualities. If the tree was found worthwhile, it was felled and cut into shake length blocks. Shakes were split out with a shake froe, a long blade with a handle on one end. Once cut, the shakes were stacked, dried, and bundled for shipping. Shake makers wasted a tremendous amount of wood, and their activities were made more destructive by the fact that they culled the finest timber from the forest. Shake makers were generally replaced by tray mills, which made shake-like pieces, but used a much higher percentage of each tree. By 1913, only old men were active, and the Forest Service made regular sales to them; this industry has since died out (Berry 1913: 389-390).

M. L. MARSH OX-TEAMS AND BARNS

M. L. MARSH SAWMILL. NOTE FLUME AND OX-TEAMS.

Agriculture during this period can be divided into two general categories: settled agriculture on farms of varying size within the Forest; and grazing use of forest range lands by livestock and dairy ranchers on a seasonal basis. Areas of permanent settlement included scattered small farms or ranches near mining towns and stage stations, as well as large farming regions like the Sierra Valley that supported year-round agriculture. These ranches typically provided food and fodder for the mining towns and logging camps nearby, and were able to gain access to larger markets once the railroad was completed if near enough to the line. The use by seasonal grazers was much less dependent upon local market conditions, especially as most of the animals in summer pasturage were destined for distant markets at the end of the grazing season.

The livestock industry within the Forest was of three general kinds — beef cattle, dairy ranching, and sheep. In general, these were all seasonal users of the mountain pastures, and involved the importation of animals from winter feeding areas. Some seasonal grazing was, of course, carried on by ranchers and farmers settled within the Forest.

The beef cattle industry dates back to Spanish and Mexican days in California; the first cattle in the area of the Forest were probably those brought in by immigrants before the gold rush. The gold rush also stimulated the cattle industry in the Central Valley and coastal counties because of the market provided by the miners. Unfortunately, the 1850 census gives no information regarding the number of cattle or sheep in the state; figures begin appearing after 1860. In the three counties that make up the greatest portion of Tahoe National Forest — Nevada, Placer and Sierra — figures for cattle between 1860 and 1900 seem to show a gradual increase after 1870, the lowest year in the count.

Cattle, 1860-1900

	1860	1870	1880	1890	1900
Nevada County	4,392	2,304	4,053	7,328	7,288
Placer County	12,269	4,138	4,682	9,287	6,602
Sierra County	282	3,342	3,945	4,952	7,308

Unfortunately these figures can only be viewed as a general indicator of historical trends. They are suspect because it is unknown what time of year the livestock was enumerated, how complete the surveys were, and most important, where the cattle were concentrated.

By the late 1860s, a pattern of range use was developing where valley or foothill ranch owners used the public lands in the mountains on a seasonal basis. The early eighties most likely represents the date when the "full stocking of the range lands of California probably should be dated" (Burcham 1956: 277). In 1899, a government inspector of forest reserve lands in California noted that "cattlemen claim to own large tracts of mountain land, a portion of which is fenced, but the larger portion is unfenced forest land. Simple cabins are maintained on the fenced portion of the range and the holdings of the riders who follow the drifting cattle" (Sudworth 1900: 510-511). Such use of public range lands had long been a custom in the California livestock industry:

Americans brought to California a philosophy that public lands may be used by private individuals. It seems that this is true particularly in the case of use for grazing. In the first half century of settlement and development there was virtually no regulation of this use of public land, although the legal fiction was maintained that graziers were merely tresspassers who might be evicted — or even prosecuted — at any time. However, it was common practice to obtain ownership of lands having sources of water for livestock or other strategic values, so that they thereby controlled use of contiguous public lands for grazing . . . By 1880 the period of free ranging on public lands had essentially ended, except for high elevation grazing lands in mountain districts. Here it continued until 1906. (Burcham 1956: 333,336)

The temporary, quasi-legal status of livestock grazing makes it particularly difficult to uncover information about pre-National Forest use in specific areas. It seems reasonable to think that most of the high mountain valleys were used for grazing during the latter decades of the nineteenth century. In 1882, it was noted that "the American Valleys are now used exclusively as summer pasturage for stock" (Thompson and West 1882: 406). American Valley is at the headwaters of the Middle Fork of the American River.

The beef cattle ranchers who are known to have used the public domain are largely those in the area around Sierra Valley. Many of the early settlers in the valley ran multi-faceted operations that raised animals, fodder, vegetables, and produced dairy products. The Italian-Swiss from Canton Ticino settled in Sierra Valley, at first in the Plumas County section in the 1860s; by the 1870s and 1880s they had begun to settle the Sierra County end of the valley (Raup 1951: 312). The Italian-Swiss, like the earlier, groups who settled in the valley, were interested in a variety of activities including raising beef cattle. A common pattern of immigration was that a new arrival would work for a rancher, save his money, and then purchase an improved ranch (Sinnott 1976: 94). A similar pattern was followed by other immigrant groups, including the Basques. In the area of Sardine Valley, Prosser Creek, and Sagehen

Creek north of the Truckee River, a small number of ranchers ran cattle; here again the pattern was seasonal (Jackson 1967 a: 43-44; *Mountain Messenger* 1/16/1865).

In the Forest, the mountain valleys were the locus of dairy activities. Most of the dairies were in the northeastern portion of the Forest. There were also small ranches and farms elsewhere in the Forest that produced dairy products The *Mountain Messenger*, 1878, 1881, and 1885, described the McMahon Ranch on Lower Morristown Ridge as an example. The ranch was settled by the Edward McMahon family in the 1860s. The 1878 article noted "flourishing crops" and a considerable trade in dairy products. In 1881, hay and potatoes were sold, and by 1885 the family's cattle had largely been sold off. In the early 1880s the McMahon's, like many others, bought a home ranch in Brown's Valley in Yuba County, and used the Sierra County area seasonally (Sinnott 1976: 179).

The major area for dairying was east of the Sierra Nevada in Sierra Valley and the valleys between Sierra Valley and Truckee. Ranchers in this area, as was the case elsewhere in the Sierra Nevada, grazed their cattle in fenced alpine meadows (Sudworth 1900: 54). In October, 1869, the *Mountain Messenger* 10/23/1869) discussed the industry in valleys adjacent to Sierra Valley.

'Grazing in Mountain Meadows.' Considerable quantity of butter and cheese is being taken to the railroad for shipment. Large herds of stock are being driven every Spring to mountain meadows to graze during the Summer. This region is the most delightful in the world for a summer residence. All that is needed is for grazers to build substantial houses . . . instead of living in camps. During the winters, which are long and dreary in that region, they could return to their houses on the plains. Sierra Valley is already quite thickly settled with an enterprising population, who are prospering in their agricultural pursuits. Long Valley, Sardine Valley, and some others, are quite extensive, but as yet contain few settlers.

North of Donner Lake, dairy ranches began to be developed after 1870. Prosser and Son operated a 100 acre ranch, raising hay and dairying with the aid of hired help. Tinker and Fenton were listed as having eighty acres and a number of cows. Tinker apparently ran a stage station on the Dutch Flat and Donner Lake Wagon Road, and ran a dairy in addition to his inn (Jackson 1967a: 39). The Stampede Valley (now largely inundated) was first settled by summer dairy ranchers after 1865 or 1870. Among the first was John Fleckenstein. By 1880, he rented 640 acres of land, and paid $1,800 in wages in 1879, sold seventy of his seventy-five calves, and made 1,500 pounds of butter. "The butter was all made in the summer, brine was poured over it to keep it fresh, and then the entire production was sold in the fall" (IBID: 40). Other dairy ranches in the Stampede Valley included Dog Valley Ranch, Woodward, Bill Williams Ranch, and the Perazzo and Hoke dairies. These dairies all operated from

1870 through 1890, and unlike some of the Sierra Valley operations, were characterized by seasonal use. The herds and ranchers returned to the Central Valley in the winter (IBID: 41-44).

W. F. Edwards described the Truckee Basin in 1883 as "the dairyman's heaven." During the summer months, Sacramento Valley ranchers brought their "droves of milch cows, lots of choice pigs, coops of poultry and herds of calves" into Squaw Valley, Twin Valley, Lake Valley, Russell Valley, Martis Creek Valley, Prosser Creek Valley and numerous other small valleys. Each valley had "their ranches, which, when the season gets in, are occupied by old and experienced butter men, who bring all the modern appliances in the way of patent churns, improved setting pans, etc." According to Edward's count, fifteen to twenty dairy farms were located near the Truckee River; there was "not a nook, or vale but is known to the dairymen and occupied." Most of the Truckee butter produced in the early 1880s was marketed by Nelson Martin and Sisson, Crocker and Company; cheese factories were just beginning to be introduced into the region (Edwards 1883: 69-70).

The sheep industry in the forest paralleled cattle, in the sense that it was largely a summer, seasonal activity. However, sheep had a great effect on the livestock industry because of the destruction caused by the bands in the mountains. The depredations caused by sheep turned public opinion in the mountain counties and in western states toward regulation of grazing, and was at least to some extent responsible for the establishment of national forests by the federal government.

In 1849, there were only 17,000 sheep in California. By 1860, there were over 1,000,000, the increase resulting largely from the demand for meat during the gold rush. Before 1870, sheep were kept largely in the same location year round, but as numbers grew so did the requirement for new grazing grounds. By 1872, Southern California sheepmen explored Nevada grasslands as a new region for grazing, but this plan was not successful at that time (Ellenwood 1915: 585-587).

The following table provides information regarding the number of sheep within the three counties that make up the bulk of the forest.

Sheep, 1860-1900

	1860	1870	1880	1890	1900
Nevada County	1,147	504	2,791	1,936	3,142
Placer County	23,280	26,596	58,805	62,161	32,432
Sierra County	55	502	1,151	12	1,726

(Burcham 1956: 414-416)

Sheep figures referred to in this table are, at first glance, skewed heavily toward Placer County. There are a number of possible explanations for the wide variations in counts. First, Placer County has extensive areas within the Central Valley upon which ranches were located, and was at the upper end of a circular route from southern California through the Sierra Nevada taken by sheepherders during the late 19th century. Second, the low numbers in Nevada and Sierra counties may have reflected the confusion often envinced by livestock ranchers between census takers and assessment of property for tax purposes. In addition, as grazing areas were opened in southern Oregon and Nevada, new patterns of yearly grazing developed that brought animals into the northern counties of the forest. It is known that total numbers of sheep in California declined between 1880 and 1890 (Ellenwood 1915: 587-588). One reason for the decline was a series of great drives of flocks from California into the intermountain states. After 1890, the number of sheep statewide declined largely because former sheep ranges were being put to other uses (Ellenwood 1915: 588-589) "Establishment of National Forests in 1905, and the grazing fees which they began to assess in 1906, were further setbacks to the sheepmen" (Burcham 1956: 273).

Regulation of grazing on the public domain by agencies of the federal government had its roots in a number of causes, not the least of which were the fires that sheepmen set as they left the range each fall. In 1902, P. Y. Lewis, a pioneer sheepman, described his use of the mountain grazing lands in 1876-1877.

When we turned back toward the foothills, we started setting fires and continued setting them until we reached the foothills. We burned everything that would burn, such as brush, young timber and grown timber, setting the fires behind the sheep as they grazed back over the range the second time. The sheep moved but a short distance each day and we spent a large part of the time in setting the fires. The sheepmen on the neighboring ranges set fires about the same time as we did, and in the latter part of the season there would be fires as far as a person could see. Large tracts of excellent timber were destroyed and became brush fields later, but the sheepmen did not care as it was thought that fires improved the feed and removed the timber which interferred with the sheep. (Lieberg, 1902: 10)

This practice was objected to by a wide range of persons, from timbermen to local residents and state officials. The San Francisco *Chronicle* (8/27/1887) noted from Sierra County that "much feeling is manifested in this part of the country (Sierra City) against sheep herders, who it is believed start most of the forest fires raging through the mountains." The State Board of Forestry reported in 1888 that while some fires were caused accidentally by teamsters, sheepmen started most.

The most disastrous fires, from a forest point of view, are unquestionably those started by the sheepherders who drive their flocks into the high regions of the Sierra

to feed during the summer months. These men, ignorant and shiftless, as a rule, do not comprehend the magnitude of the injury inflicted on the forests by fire, and looking upon our vast mountain ranges as 'no man's land,' think that it does not matter in the least how they treat them. A great many of those herders, especially those who return year after year to the same grazing regions, set fire to the undergrowth upon leaving in the fall, so as to improve the herbiage of the following spring and summer. Removed as they are from all human habitation, they are free to commit whatever depredations they please.

The report suggested that the state strictly regulate grazing by dividing the forests into districts, with permittees liable for fire damage. Until the state controlled grazing, warned the forestry board, "there seems to be but very little hope of preventing fires in our mountain forests" (State Board of Forestry 1888: 154).

In 1902, a Department of Interior inspector noted the lack of progress made by officials in controlling fires started by sheepherders. "The fires along the main divide of the Sierra north of Beckwith Pass found burning in July, followed exactly the movements and progress of the sheep camps" (Lieberg 1902: 10). Fires had destroyed an area fifteen to twenty miles wide and running from Table Mountain in Butte County through Plumas County, across the Yuba River Basin, the Bear River Valley, through the basin of the American River to the Rubicon River and on to the south (IBID: 1902: 9).

Sheep raising by ranchers owning property adjacent to or within the boundaries of the Forest was apparently not extensive. In 1871, W. C. Lemmon was the only Sierra Valley resident with a significant flock. County assessors noted a total of only 700 sheep in the valley. Sheepherders from Nevada and the Sierra Nevada foothills were the primary users of the range around Sierra Valley. In 1870, approximately 5,000 sheep were grazed nearby (Sinnott 1976: 93). Only one rancher was noted in the Stampede Valley area as specializing in sheep, which "made him something of an 'outsider' in the community" (Jackson 1967: 43). As years passed more emphasis was put on sheep raising on the eastern slope of the mountains. In the early 1900s, Fred Blinman of Sierraville had a flock of 2,000. The fact that so many of the sheep on the forest were from outside the area was illustrated by the fact that in 1906, 47,000 sheep owned by Reno and western Nevada ranchers were apparently temporarily barred from grazing on the range in Sierra and Yuba counties by the Forest Service. Eastern California ranchers who feared that overgrazing would permanently damage the range had been protesting the range practices of migratory sheepherders for many years (Sinnott 1976: 93).

Many of the sheepherders who used the public domain at this time were Basques. They had begun to arrive in California with the discovery of gold; many mined, and

by the mid-1850s, some began to raise sheep. By the end of the 1850s, Basque sheepherders were well established in southern California, and began the practice of using the high mountain pastures in summer and low desert areas in winter, a practice similar to that used in the Pyrenees. The first were itinerants who packed their belongings with them on a burro. When their bands increased, many sent for a relative from their homeland, and paid the assistant in ewes. As the assistant's flock increased, he simply struck out on his own, and both repeated the cycle. This quickly caused overcrowding on the range. By the 1870s, their flocks reached northern California. The itinerant shepherd had by law the same right to the public domain as ranchers settled in the area, who customarily divided range rights among themselves. It was the settled ranchers who lobbied for the establishment of national forests, and, later, for the Taylor Grazing Act. Eventually boards of local ranchers made decisions regarding permittees and acted to shut out the wandering Basques (Douglass 1980: 59-61).

As noted previously, stage stations had small fields and orchards to provide fresh food for guests. The Howard House and Ranch (later known as Bassett's Station), on the Yuba Gap Trail six miles above Sierra City, was such a combined enterprise *(Mountain Messenger*5/6/1865). A similar operation was run by Jerome Fordyce in "Meadow Lake dam valley" where he would board horses, mules, and cattle for $3.00 a month. Fordyce's advertisement stated that he grew the "best quality grass clover and timothy up to a jackass in Fordyce Valley" and was able to support 500 animals (Virginia City *Union* 9/2/1865).

An example of a ranch adjacent to a mining area was the Lavezzola Ranch, six miles northeast of Downieville. The Lavezzola family established a farm there after emigrating from Genoa, Italy, in 1859. The family bought a squatter's right to 160 acres of a Mr. Wilson's homestead, of which fifty acres was cultivable. Two of the three sons, Peter and Daniel, remained on the farm; another, Antone, purchased the St. Charles Hotel in Downieville in 1904; he also owned shares in quartz and gravel mines (Woolbridge 1931: 344-5). Similar ranches were scattered around Sierra County (Crossman and Cochran 1867: map).

There were small ranches in the area of Washington in Nevada County. *The History of Nevada County* (1882) listed six ranches within Washington Township, with improvements valued at $7,400 (Slyter 1972: 78). The Nevada *Daily Transcript* in 1890 mentioned four ranches around the town.

The soil for tillage is limited, but rich. Messrs. Brimskill, J. Grissel, Millerick and Murphy, have orchards with fine fruits. The potatoes are sweet and mealy. The apples, pears, and peaches, have a fine mountain bouquet, juice and flavor. Pork raised here are excellent. (Quoted in Slyter 1972: 78)

The Chinese living near Washington raised much of the vegetables produced nearby. In May, 1870, "a gentleman from Washington informs us that in the vicinity of the village of Washington there are over 100 Chinese and that they outnumber the white population" (Nevada City *Daily National Gazette* 5/14/1870). Some of these people farmed; the *Daily Transcript* remarked in 1890 that "the Chinese have almost a monopoly on gardening vegetables" (quoted in Slyter 1972: 79).

Some of Placer County's high mountain valleys were used for farming. Squaw Valley farms raised hay, vegetables, berries, and produced butter, cheese, and eggs for sale in Lake Tahoe hotels, area sawmills, and in Nevada (Thompson and West 1882: 406).

In 1870, Sierra County had 2,602 acres of hay producing 2,602 bales; in 1880, 11,640 bales were raised. Figures for other counties with land in the Forest are available, but are difficult to assess because locations within each county are not given (Vivian 1890: 300-303).

Agricultural water development during the period 1859-1906 was limited on the western part of the Forest to the delivery of water to foothill areas by former mining water companies. This was further stimulated by the Sawyer Decision in 1884 that ended hydraulic mining, and the Wright Act of 1887 that allowed for formation of irrigation districts. The South Yuba Canal Company delivered water to foothill farms before the development of the Nevada County Irrigation District. This change had been discussed in the 1860s when it was noted that mining would be temporary and that irrigation would stabilize water use patterns on the long term (Pagenhart 1969: 161).

The development of water use in the Tahoe-Truckee basin was much more complicated. Use of the Truckee River was considered crucial to the future of agriculture in the Washoe Valley and lumber companies used the river to transport lumber destined for the Washoe mines and Comstock. Naturally, as a major source of fresh water flowing into western Nevada, it was considered crucial to Nevadans (Jackson and Pisani 1973: 1).

An enduring struggle over the use of Lake Tahoe's water began in 1865, when "a San Francisco hydraulic engineer, Alexis Von Schmidt, formed the Lake Tahoe and San Francisco Water Works Company" to tap the Truckee to supply water to San Francisco and other towns along the proposed aqueduct (Pisani 1975: 38-42). The formation of the company started a sixty-four year long controversy over the water in the Truckee Basin. Californians criticized the plan, which included a tunnel from Squaw Valley to the North Fork of the American River and an aqueduct from the river to the Bay Area, as too expensive and potentially damaging to the Truckee River logging operations. Nevertheless, Von Schmidt doggedly pursued his plan, building a

diversion dam near Squaw Valley. Support for the plan and its required bonds were voted by the San Francisco Board of Supervisors; this was, however, overruled by the Mayor in 1871. After 1871, the Von Schmidt plan was no longer seriously considered (Jackson and Pisani 1973: 3-5).

Use of the water in Lake Tahoe and the Truckee River by farmers in western Nevada was made more certain by the passage of the Newlands Reclamation Act in 1902. A complication had arisen because of the fact that the State of California in 1870 had given permission to the Donner Boom and Logging Company (a subsidiary of the Central Pacific Railroad Company) to build a dam to regulate the flow of the Truckee in order to better run logs on the river. This right was later obtained by the Truckee River General Electric Company, which in turn absorbed smaller electric companies along the river. Thus the use of water in the area came under four major interests: the U. S. Reclamation Service; Nevada farmers; power companies and mills along the Truckee; and property owners, resorts and inns on Lake Tahoe. As late as 1909, the U. S. Bureau of Reclamation was still fighting with Truckee River General Electric over the outlet dam at the lake and its schedule of releases which did not coincide with the needs of Nevada farmers (Pisani 1975: 37-142, passim).

Between 1859 and 1906, agriculture underwent a series of changes that resulted, in part in the establishment of government control over many of the resources used by agriculturalists. The free use of the public domain was characteristic of this period; but the controversy around overgrazing and fires led to grazing regulation. Water for agriculture also fell under government regulation, either by newly established irrigation districts in California or the efforts of the Newlands Project in western Nevada. Small scale cultivation established during the gold rush period continued; there is, however, no evidence of substantial expansion during the period.

Other Pre-National Forest Industries.

Although economic activities during the period between 1859 and 1906 were largely centered around mining, lumbering, and agriculture, there were other minor enterprises undertaken, mostly on the eastern side of the Sierra Nevada. Such activities were the ice industry, commercial fishing, and recreation.

The ice industry was most highly developed along the line of the Central Pacific Railroad and in the Truckee Basin. There was some small ice enterprises on the western side of the Sierra Nevada — "upon Rock Creek, northeast of Nevada City, ice has been produced for market since the earliest times" ("The Irrigation of Nevada County" 1923: 1). The main center of the industry was located, however, on tributaries of the Truckee River and around Donner Pass.

The growing population of California's major cities and the development after 1850 of a relatively stable population pattern led to the growth of a market for ice. This was originally met by wagons full of packed snow, which had been brought down from the mountains on muleback, and sold for $2,000 a ton in Sacramento (Itogawa 1974: 1-3). Some ice was harvested from creeks in 1854 by idle miners northeast of Georgetown on Pilot Hill and, as noted, on Rock Creek, but the ice demand was largely met by ice brought to San Francisco from Alaska by ship. However, the potential for an ice industry was noted as early as 1855 (IBID: 16, 23, 12-15). The Sierra Nevada ice industry developed greatly after the completion of the railroad across the Sierra.

Strong economic ties between the Central Pacific Railroad and the domestic ice companies stimulated a degree of mutual dependency; the railroad's demand for refrigerator coolant and the ice company's requirement for rapid transportation established a close working relationship. (IBID: 25)

In fact, the railroad established an ice company as a subsidiary in 1868. The railroad selected Joseph M. Graham, an assistant construction engineer, to survey for and build the ice works.

They organized the Summit Ice Company for filling their ice houses. They built the ice houses at some little lakes south of Summit Valley and struggled for about three winters to make ice . . . During that time, I learned that the temperature down the Truckee River near Boca was some 20 degrees lower than it was registered at Summit. I then made surveys of Prosser Creek near Boca and found that we could build a dam 35 feet in height. It would give them a reservoir of 42 acres, which was more than sufficient for their ice house. The Summit Ice House immediately abandoned all their works in Summit Valley and constructed ice works at Prosser Creek. (Kraus 1969: 186-187)

In 1882-83 the Summit Ice Company was estimated to have put up some 50,000 tons of ice (Edwards 1883: 32).

Boca quickly became an ice center. "This industry utilized the area's clear, sweet waters, its relatively moderate snowfall, and its dry, frigid winter temperatures to produce great quantities of what was probably the hardest and best natural ice to be found on this continent" (Goodwin 1979: 3). Between 1868 and 1874 several companies established works near Boca. The Summit Ice Company built a semi-circular ice house along a bend of the Truckee that measured 450 by 50 feet, and used the river to float blocks from their ice field to the storage house. The Boca Mill and Ice Company, organized by L. E. Doan and the Sacramento lumber company of Friend and Terry built an ice house in 1869 measuring 484 by 40 feet and with a capacity of 8,000 tons. "The mechanics of filling the ice houses at Boca required an

elaborate system of tramways, trestles, and steam elevators. Blocks of ice, elevated to a height of fifty feet, descended the trestle into the ice houses" (Itogawa 1974: 28-29). The Nevada Ice Company, organized in 1870, built ice works at Camp 16, one mile east of the mouth of Prosser Creek (Edwards 1883: 32). They later were forced lower in the basin by weather. The Nevada Ice Company's works included two endless belts and other equipment to pack their ice house with 10,000 tons of ice. In 1873, the company got the rights to harvest ice at Shaffer's Mill on Martis Creek, hauling the blocks out by wagons after attempts at using the lumber flume reduced the eleven inch thick blocks to three inches. In 1874, the People's Ice Company began harvesting near Shaffer's Mill, and near Camp 20 east of Boca. They built two ice houses with a total capacity of 8,000 tons (Itogawa 1974: 29-31).

The ice harvesters used the same tools as used in the eastern ice industry, as well as locally designed and manufactured equipment. These included ice plows, scrapers, ice markers, and saws (IBID: 33-34).

Ice was harvested from man-made ponds and from ponds adjacent to lumber mills that had closed for the winter. Typically ice was not considered ready to harvest until it was at least ten inches thick, which usually took one month from the time that ice first appeared. Just before that time the ponds would be cleared of floating debris by dragging the surface with a float. As winter temperatures froze the pond, ice workers would keep the surface as clear as possible of an insulating blanket of snow; as soon as the weight of horses could be supported, scrapers were pulled across the ponds. "The shaving machine, equipped with rectangular shaped blades suspended from the undercarriage of horse drawn sleighs, effectively shaved off the final layer of snow ice" (IBID: 33-34). Ice was then scored for cutting, which was done in checkerboard fashion, each square twenty-two inches on a side.

The pattern outlined on the ice represented a guide for the ice plows to inscribe deeper incisions. Ice plows resembled early farm implements, modified only with a four foot long steel attachment equipped with seven individual teeth. Each tooth is a quarter of an inch longer than the first. One pass of the plow deepens the furrow by an inch and three quarters. Repeated incision of each furrow deepens the groove to a sufficient depth to insure proper separation of the ice blocks. The unsevered segment was then manually separated with a four foot long hand saw. (IBID: 35)

Workers cut the slabs into proper size blocks and floated them to the head of a tramway from which the cakes were sent to the desired ice house for storage (Edwards 1883: 31). Once in the icehouse, blocks were covered with an insulating layer of sawdust obtained from local sawmills and stacked as tightly as possible. Railroad spur lines were built to facilitate loading ice on cars for transportation to market. Each car carried about ten tons (Itogawa 1974: 36-38).

Ice harvesters were from two groups: local lumbermen laid off seasonally; and transient workers arriving for work in the ice houses. The transients used the railroad to get to Truckee, some from the Pacific Northwest and others from Mississippi Valley. Chinese workers were also hired, but the antagonism of white workers made this relatively rare (IBID: 42-44).

By 1876, the development at Boca peaked with the construction of the Boca Brewing Company (Tahoe National Forest Historical Files). In 1888, another ice dam was built for the ice business. Use of ice was described by the *Loyaltonian.* Sixty carloads were sent to San Francisco and Los Angeles, and "great quantities of ice will be kept at these points for the purpose of icing fruit cars during the summer. The ice men expect that the season's cut of ice will reach 100,000 tons in the vicinity of Truckee" (Quoted in Sinnott 1976: 208). Over 1,100 men were employed in the harvest of 1903 *(Mountain Messenger* 12/12/1903).

Commercial fishing, like the ice industry, was given a boost by the completion of the transcontinental railroad. Fish caught in Sierra Nevada lakes and rivers could be quickly transported fresh to the Washoe mines, Sacramento, and San Francisco. Fishing for mountain trout was common along the Truckee River, and fishermen complained that sawdust and other pollution from sawmills in the canyon damaged the fishery (Pisani 1975: 70). The catch in Donner and Independence lakes, and along the Little Truckee River was such that the State Fish Commissioners ordered that the lakes and river be stocked in 1878, 1879 and 1880 with eastern trout, salmon, and whitefish (State Fish Commissioners 1879: 9-12; 1883: 7). The catch continued to grow, and the Commission, with the cooperation of Sierra and Nevada counties, passed regulations outlawing fishing until the spawning season had passed. In 1893-94 "the Commission caused the arrest and prosecution of the professional fishermen who operated at Independence Lake during May, contrary to the ordinance" (State Board of Fish Commissioners 1895: 20). The poachers were not convicted, but the arrests had the affect of stopping out of season fishing on the lake. The fishermen caught their fish through the ice and sold their catch in San Francisco (IBID: 20). Commercial fishermen were active on most of the Sierra Nevada lakes during this time, including Tahoe, Donner, Webber, Independence, and others (State Board of Fish Commissioners 1886: 7). The Commissioners noted in 1893-94 that "a considerable number of trout are annually caught by market fishermen on Donner and Independence lakes and the Truckee River and are shipped to the San Francisco market," enough that the annual spawn was threatened (State Board of Fish Commissioners 1894: 31).

One of the earliest service industries on the Forest was recreation and a number of resorts were developed in the last half of the nineteenth century. As noted previously, Dr. David Webber opened a resort on Webber Lake in the early 1850s that was

accessible via the Henness Pass Road. Webber bought the land around Webber Lake in 1852; the lake was then known as Truckee Lake. He built a lodge, cottages, stocked the lake with trout, and had boats and horses for the use of the guests. During the Meadow Lake excitement, his business flourished, and in the 1870s he opened a private school for his guests during the summer months. Unfortunately for Webber, as the Meadow Lake excitement faded and the railroad replaced Henness Pass Road, the number of visitors fell off drastically (Sinnott 1976: 8).

Similar resorts were located on Independence, Donner and Lake Tahoe. Augustus Moore established a resort hotel at Independence Lake in the 1860s that included a small boat for the use of his guests. Like Webber, Moore's hotel was on the Henness Pass road (Moore MS. Bancroft Library: 24). Small resorts and hotels were established on Donner Lake in the 1860s as the roads and railroad through the region opened easy communication. Among these were Lake House, Donner House, and Donner Lake House. "One traveler thought Donner Lake 'a haven of peace, in the shape of as fine a stopping place, so far as good meals go, as can be desired'" (Jackson 1967a: 30-31).

One of the most famous of all early recreational developments in the Forest is Summit Soda Springs, originally chosen by Mark Hopkins for summer residence in 1872. The site is on the National Register of Historic Places (Summit Soda Springs, National Register of Historic Places Inventory — Nomination Form 1977). The buildings on the site were described in 1977.

The building and structures which remain today are two guest cottages, the 'Hopkins Cottage,' the stone chalet, log barn, soda well houses, tool shop and old concrete fountain built as a scenic attraction for the old hotel. Miles of original stone walls built for livestock, and cobblestone pathways leading in and around the buildings and meadows further refine the setting and contribute to the original in tent of the complex — that of serving as a summer retreat for the Hopkins family. The entire complex retains its original integrity.

The area was leased by the Central Pacific Railroad in 1872 to William Jones who built a three story hotel with a capacity of eighty-five guests. Many prominent Californians of the time were attracted to the resort (IBID: 4).

Like other mountain lakes, Lake Tahoe became a popular resort area after the 1860s.

Very early there were those who sensed the possibilities of the Lake Tahoe region as a pleasure and health resort. With increasing frequency pioneer vacationists from Nevada and elsewhere were lured to the place by the beauty of the lake as well as its hunting and fishing facilities. (Hoover, Rensch and Abeloe 1966: 266)

Cabins were built at a variety of points around the lake; these were followed by the development of resorts like Hunter's Home, built in the 1860s by John W. McKinney on McKinney Creek (IBID: 266). Further resort building followed, and by 1900 the lake was a popular resort and vacation center for many of California's most prominent citizens.

CHAPTER V
Era of National Forest Management, 1906-1940

The post–Civil War period was an expansive one. Americans rushed to settle vast tracts of hitherto uninhabited land in the west. In 1860 the western frontier of settlement lay near the Missouri River, and between eastern Kansas and the West Coast; there were hardly any white inhabitants except the Mormon settlement in Utah. The decade of the 60s brought homesteads for the farmer and land grants to railroads and institutions of higher learning. In the following decade, Congress offered further incentives to make western lands more appealing through passage of the Timber Culture Act (1873), the Desert Land Act (1877), and the Timber and Stone Act (1878) (Land Planning Committee of the National Resources Board 1935: 60-71). By the nineties, immigrants pushing west into the Great Plains and Rocky Mountain regions and east from California formed a virtually uninterrupted pattern of settlement across the continent. In 1890, the superintendent of the United States Census announced, perhaps prematurely, that the frontier was eliminated. "Up to and including 1880 the country had a frontier settlement but at present the unsettled area has been so broken into by isolated bodies of settlement that there can hardly be said to be a frontier line" (U. S. Census Bureau 1890).

By far, the most influential piece of writing about the west produced during the 19th century was the essay on "The Significance of the Frontier in American History" read by F. J. Turner at the 1893 meeting of the American Historical Association. Turner's "frontier thesis" that America's democratic institutions owed much of their identity to the presence of an area of free land on the western edge of the advancing settlements revolutionized American historiography and has remained provocative enough to generate controversy among historians for four generations. Turner predicted that with the end of a frontier would come major changes in national thought. Among the impacts would be a lessening of cheap resources that would force Americans to adjust their economic, political and daily lives to a new kind of world (Billington 1966: 1-31). In fact, the latter 19th century did bring important new themes to American environmental thought. Chief among these was the belief that science and scientific methods must become the chief foundation on which environmental plans would be built. The image of the land as holding inexhaustible economic opportunity gave way to the vision of technological abundance. New professional groups of conservationists, engineers, city planners, architects and scientists sought a new set of environmental ideals relating to urban, industrial society. Among their shared assumptions was that it was better for society, through the agency of experts, to design and direct the development of the landscape rather than leave the process in the hands of untrained, self-interested men. Coordinated public planning was viewed as

necessary to curtail haphazard and exploitative practices common in the laissez-faire approach (Worster 1973: passim).

Establishment of Tahoe Forest Reserve.

The scientific community raised the issue of more efficient management of natural resources long before the progressive politicians made a popular crusade of it in the early twentieth century. Perhaps the single most influential work by an American was George Perkins Marsh's*Man and Nature* (1864). Marsh graphically illustrated the devastating impact man had exercised on the natural world. Over half of his book dealt with the function of forests as critical agents of soil and water conservation. He recommended that forests be managed scientifically, trees grown on farms, and only mature timber harvested. Marsh's treatise was widely read in America and Europe. He exercised great influence on a few important scientists and policymakers, but his insights and recommendations were only rarely applied in the United States during the nineteenth century.

As early as 1855, the Department of the Interior attempted to stop timber theft from public lands, but local land officers largely ignored timber trespass and local juries were reluctant to convict lumbermen brought to trial. In the 1870s the American Association for the Advancement of Science membership lobbied for Congressional action on forest protection and preservation, claiming that lumbering practices were illegal. No legislation came from the association's efforts, but in 1875 Congress created the Division of Forestry under the Commissioner of Agriculture asking it to prepare a report of United States forest production and consumption. The report, which drew heavily on Marsh's theoretical considerations, set off new interest in forests and led to the organization of the American Forestry Association in 1876 (Steen 1976: 4-19).

Concern for forest conservation and preservation of scenic beauty found expression in several forums in California by the mid-1870s. By that time lumbermen were already making sizable cuts into the giant redwood groves. In 1876 John Muir complained in several newspaper columns and national journals of government inertia in the face of wholesale destruction of the "Big Trees." Concern over clear-cutting Tahoe's forest led a local newspaper to cry out in opposition to the lumber barons who were destroying the "gem of the Sierras."

If in some cathedral there was a picture painted and framed by an angel, one such as mortal art never could approach in magnificance, the world would be shocked were some man to take off and sell the marvelous frame. But Tahoe is a picture rarer than ever glittered on cathedral walls; older, fresher and fairer than any work by the old

masters, and yet they are cutting away her frame and bearing it away. Have we no state pride to stop the work? (Truckee Tribune 9/7/1878)

By the 1880s, writers, professionals and scientific groups began to threaten that the country would face a "timber famine" if steps were not taken to stop the plunder and destruction of the country's forests. During Grover Cleveland's first administration (1885-1889) some efforts were made to prosecute land law violations by timber and cattle companies. Denouncing timber frauds in Northern California, the General Lands Office launched investigations that found lumber companies openly using farmers, sailors, and laborers to file under the Timber and Stone Act of 1878, which allowed acquisition of 160 acres of timbered and stony land at a nominal price. The land conspirators would purchase a claim and then immediately re-sell it to the company at a modest profit and go about their other business. General Land Office agents investigating the cases claimed that perhaps three-fourths of the claims filed were fraudulent (USDI, Annual Report 1886: 95, 200-213).

In addition to investigating fraud on public forest lands, Cleveland appointed a professionally-trained forester, Bernhard E. Fernow as chief of the Division of Forestry. Fernow suggested professional management practices and introduced legislation proposed to create forest reserves and the means to administer them. He met with strong opposition in Congress. However, the Forest Reserve Act of 1891 authorizing the President to set aside forest reservations was finally passed as a little recognized rider to a bill whose main purpose was to revise a series of land laws. President Harrison duly created six forest reservations including over three million acres in 1891-92; later he added nine more timber reservations totalling an additional three million acres (Steen 1976: 22-30). Grover Cleveland added five million more acres during his second tern. Included in these early reservations were the San Gabriel and San Bernardino reserves in Southern California, as well as the vast four million acre Sierra Forest Reserve stretching from Yosemite National Park south beyond the Sequoia (Strong 1981: 81). Forest land in the Northern Sierra Nevada remained unprotected.

The 1891 act provided for withdrawal of the forested land but did not specifically deal with administration of the forest reserves. Until management provisions could be devised, the resources on reservations were essentially locked-up. On the other hand, since Congress provided no funds to protect the reserves from plunder, fire, mining or grazing, they probably fared no better than unreserved lands on the public domain.

In 1897, another major piece of legislation, the Sundry Civil Appropriations Bill, passed Congress with unexpectedly strong western backing. An amendment to the appropriations bill authorized the president to modify or suspend or revoke any forest reserve. It stipulated that no reserve should be established unless it would improve and

protect the forest, the water flow, and furnish a continuous supply of timber. No lands were to be set aside as reserves if they were better suited for mining or agriculture. Perhaps most significant, the act also gave the Secretary of the Interior the authority to permit cutting and use of timber and stone for firewood, building, mining, milling and irrigation. The timber selected for sale had to be appraised, advertised, sold at or above appraised value, "marked and designated" prior to cutting and supervised during cutting (USDI, Annual Report 1897: CIX-CXIV). The act appealed to some western opponents of conservation because it reestablished commercial access to the national forests; it also paved the way for Gifford Pinchot's resource utilization policies on the national forests.

From 1891 to 1905 the responsibility of administering the forest reserves remained with the Department of the Interior, however, the department turned more and more to the Division of Forestry in the Department of Agriculture for technical recommendations and administrative planning.

Gifford Pinchot succeeded Bernhard Fernow as chief of the Division of Forestry in 1898. From a staff of 123 when he accepted the appointment, Pinchot gradually expanded the Forest Service to an organization of 1,500 people in charge of 150 million acres of forests in 1908. In 1902, E. T. Allen and Pinchot wrote a comprehensive manual issued by the Department of the Interior regarding administrative procedures and policies for the reserves. The two principle reasons for the reserves, the manual stated, were for protection of timber and regulation of water. However, regulations for many other forest-related activities were also addressed.

The manual explained that farming on reserve lands better suited for agriculture was desirable; that prospecting and mining were not prohibited; that roads, trails and irrigation canals could be built by permit only; and that schools and churches could be constructed on public land. Grazing, the rangers were reminded, could be forbidden if damage to the reserve was probable. Regulations prohibited grazing until after it had been shown that no damage would occur. (Steen 1977: 53)

Policies related to grazing and timber management demonstrated clearly that one of Pinchot's obligations was to manage the reserves to the benefit of those living on or near the reserves. Settlers in forest communities were eligible for permits allowing free use of timber. Timber sale procedures provided that "local demand will have first preference." Grazing permits were to be issued individually to cattlemen living in close proximity to the reserve (IBID 1977: 59-60).

On February 1, 1905, President Roosevelt gave final approval for transferral of the forest reserves to the Department of Agriculture. Six months later the Bureau of Forestry was renamed the U. S. Forest Service with Pinchot heading up the agency as

Chief Forester. Pinchot immediately began to write a policy blueprint for operation of the Forest Service that was published in a 4 by 7 inch, 142 page volume of regulations and instructions known as the *Use Book*, designed to fit in a ranger's shirt pocket. Use, the manual made clear, was not contrary to conservation. In Pinchot's perspective, three simple principles governed the management of forest lands: development rather than husbanding of resources; prevention of waste; and development and preservation for the common good (Pinchot 1910: 40-42). Wise use and scientific management for the nation's long-lived material prosperity were the hallmarks of the Chief Forester's philosophy, not preservation for aesthetic considerations or wildlife habitats.

Tahoe National Forest.

Concern over the denudation of timber lands in the Tahoe-Truckee basin had been vocal since the mid-1870s. The State of California took official notice in 1883 when Governor Robert W. Waterman appointed the Lake Bigler [Tahoe] Forestry Commission to investigate the situation in the basin. The three-man commission spent the summer at Lake Tahoe. They discovered that the Nevada side of the lake was largely stripped of its timber while the California side was less thoroughly logged. Of the land in California, roughly one-half belonged to the Central Pacific and the remainder still belonged to the federal government with the exception of selected state school lands and some lakeshore properties belonging to wealthy San Franciscans. The commission recommended that Congress exchange the railroad's lands for lieu lands of equal value outside the basin and then to deed all federal lands to the state "for the purpose of forever holding and preserving it as a State Park" (Report of the Lake Bigler Forestry Commission 1885: 12). The proposals met with opposition in the state senate perhaps because of popular perceptions that the railroads land transfer suggested a "deal" with the corporate interests (Pisani 1977: 12).

In the 1890s, interest in preserving properties in the Tahoe basin once again received considerable attention. Unfortunately by that date the Carson and Tahoe Lumber and Flume Company had completed cutting timber from its tracts at the south shore of the lake and by the end of the nineties large areas in California had been logged. One journalist in 1900 reported: "there has been a dunudation of nearly the entire original forest so far back as it has had a commercial value, from the shoreline of the lake back for 10 or 15 miles" (Bartlett 1900: 247). By the mid-90s, the recently organized Sierra Club, which had been influential in gaining support for the huge Sierra Forest reserve, began campaigning for protection of the forest range in the northern Sierra. The club won support for a 260,000 acre park on the California side of Lake Tahoe from California and Nevada top officials, university faculty, and the Secretary of Interior. The General Land Office sent B. F. Allen, a special forest agent and supervisor, to examine the proposed park. He strongly recommended creation of a National Park (Pisani 1977: 14).

Allen's report received wide publicity in the California press *(San Francisco Call* 12/24/1897) and the opposition forces quickly mobilized. Local residents and business interests were alarmed, especially vigorous was the protest from El Dorado County residents who petitioned the Commissioner of the General Land Office. The petitioners argued that the proposed reserve would reduce the taxable property of the community, be detrimental to the grazing rights of sheepherders and restrict the private development of fruits and potatoes on land suitable for agriculture. Lumbermen who operated in the Sierra region complained about the reserve as a threat to their jobs and investments (Strong 1981: 82). The Placerville *Mountain Democrat* (2/18/1898) agreed, noting in an editorial that the reserved land would serve no useful purpose except to become "a shady resort for Forest Comissioners and nonproducing loafers." The *Placer Herald* entered similar protests intimating that "a sporting organization of San Francisco" had no right to create a game preserve and recreational playground at the expense of the local economy (3/19/1898).

In part to placate local interests, the final proposal of the General Land Office was for a much smaller withdrawal of land, excluding much of the area outside the basin to the west. On April 13, 1899, President William McKinley signed a proclamation for a "forestry reserve and public park" setting aside 136,335 acres, or less than half the area proposed in 1896 by the Sierra Club. The Lake Tahoe Forest Reserve included 55 miles of shoreline and other land in the southwest part of the basin (Pisani 1977: 14). Creation of the reserve did not end the controversy. As events would soon show, concern for watershed protection in the northern Sierra overshadowed interest in protection of limited acreage within the basin. Farmers dependent on irrigation in the Central Valley, John Muir, Theodore P. Lukens and other wilderness preservationists joined forces as champions of watershed protection.

Throughout 1899, leaders of the California Water and Forest Association, the State Board of Trade, the Sierra Club, and other influential organizations pushed for expansion of the Lake Tahoe Forest Reserve (Strong 1981: 33-4). William Mills of the Central Pacific favored including the headwaters of the American River and the western slope of the Northern Sierra in the reserve to assure hydroelectric power and irrigation water to the Central Valley *(San Francisco Post* 6/21/1899). Charles Wolcott, director of the U.S.G.S., favored expansion. Senator William Stewart of Nevada lent his support for withdrawal of additional lands from public entry as part of a plan to deliver surplus water in the Tahoe-Truckee catchment basin to arid lands in Nevada and to provide hydroelectric power for homes and industries in Reno (Pisani 1975: 129-133, 147-151). Support also came from interests behind the nascant tourist industry at various Sierra alpine lakes who heartily welcomed the enhanced scenic beauty promised by establishment of forest reservations.

Several interest groups objected to the establishment of a Tahoe National Park. The most vociferous opposition initially came from county officials, dairy and stock raising interests, lumber companies and mining interests. These same interests opposed enlargement of the existing forest reserve. Forest Superintendent Charles S. Newhall tried to temper their hostility by explaining that unlike the "prohibitive" administration of a National Park, reserve status would allow for commercial development by regulating and protecting the resources under principles of scientific management. The confusion persisted. Other critics of the bill to enlarge the Tahoe reserve recognized other hidden dangers. Any enlargement would include thousands of acres of land owned by the Central Pacific Railroad, many of which were cut-over or rocky, barren and precipitous land. Lumber companies also owned vast tracts of logged-over land under the Lieu Land Act of 1897, those owning property within the boundaries of a national forest could exchange for land of equal size elsewhere on the public domain. The San Francisco *Examiner,* in a highly influential article, condemned expansion of the reserve, charging it would result "in the gift of thousands and tens of thousands of acres of the choicest public lands — timber, oil, mineral, agricultural and grazing — to private parties" (2/27/1900).

Forestry agents continued to study the issue of an expanded Tahoe Reserve. Charles H. Shinn inspected the area for the Bureau of Forestry in 1902, noting severe overgrazing and fire protection problems. He advocated expanding the reserve several times its existing size to more than 900,000 acres. The following year Albert Potter, the bureau's range expert, conducted an inspection tour of existing and proposed reserves in California (Strong 1981: 87-88).

The conservation movement of the early twentieth century is most closely identified with Theodore Roosevelt's brand of Progressivism and his shrewd appointments to key positions. The focal point of the Progressive conservationists was land — and the timber, water and grass upon it. The first conservation issues to which Roosevelt devoted himself was irrigation, or the "reclamation of arid lands." In Roosevelt's opinion, the interest of irrigation in California demanded an extension of the forest reserve system. Gifford Pinchot was of the same mind. In 1905 when Congress shifted administration of the forest reserves to the Department of Agriculture, the forests came under Pinchot's charge. With Pinchot as Chief Forester and a president in the White House who actively supported conservation measures, expansion of California's forest reserves seemed inevitable. When Congress repealed the lieu land law that same year, the last blockade to expansion was removed (Strong 1981: 87-89).

In 1905, Roosevelt established six new forest reserves in Northern California: Klamath, Lassen Peak, Plumas, Shasta, Trinity and Yuba. He also greatly enlarged the Tahoe Forest Reserve. Local newspapers did not voice opposition to the expansion. One paper noted that the enlarged Tahoe reserve would be beneficial to the mining

interest by furnishing a permanent supply of timber *(Mountain Messenger* 10/04/05). Subsequently, the national forests underwent many name and boundary changes. In 1906, Roosevelt consolidated the Yuba forest reserve which included lands within the watershed of the forks of the Yuba River, with the Tahoe into the Tahoe National Forest.

Four years later, his successor President Taft, created the El Dorado National Forest from parts of the Stanislaus and the Tahoe National forests. Thus, after 1910 the southern boundary of the Tahoe forest extended to the Middle American and Rubicon rivers. After World War II, lands within Nevada were transferred to the Toiyabe National Forest (U.S.F.S., Proclamation Map Atlas, Tahoe National Forest).

Administration of Tahoe National Forest Lands, 1906-1940.

General administrative programs in office and field had to be set up once the National Forest was created. This task fell to Madison B. Elliott, the first supervisor of the Tahoe National Forest. Appointed as a district forester by Roosevelt in 1904, Elliott had assisted in setting up the basic administrative organization for the soon to be created forest reserves in Northern California. He was an educated man, a college graduate and former principal of the Lakeport School. As with most forest service appointees in those early days, his most important qualifications were his practical experience and strength of character. Elliott was a native Californian, born in 1869 to a ranching family who ran cattle in the foothill and mountain country north of Clear Lake, in Lake County. As a young man he established his own ranching business in the vicinity and for some years operated a sawmill. His major responsibilities in his three years as supervisor were to recruit rangers, explore and map the new forest lands, and initiate the routine business of implementing forest programs (Grass Valley *Union* 10/15/55).

Mapping and bringing under even rudimentary management the over one million acres in the Tahoe National Forest was a great burden for a small staff. The forest officials dealt first with what they saw as the greatest problems. There were few timber sales in the first few years of Forest Service management. The range offered more pressing problems than the administration of timber resources and Elliott had much success in establishing a cooperative range program with local stockmen. Overgrazing had been a perennial problem in California's forest range so the concept of allotment itself was not debated seriously. Stockmen realized that open ranges required a quota system. Beginning in 1907, Elliott called together stock grazers in the Tahoe National Forest to an annual convention where permits were issued for the following season and general range problems were discussed. The Grass Valley *Morning Union* reported in 1908 that 230 stockmen attended the second convention, all seeking permits to graze on the National Forest (11/10/08). The

interests of the stockraisers were various. Among the issues addressed by Elliott, who served as chairman of the meetings, were range improvements; handling of and caring for stock; building fences, corrals, cabins and roads on the forest; reseeding ranges; poisons and predatory animal reduction; and water development*(Morning Union* 11/11/08).

GOLD LAKE RANGER STATION CA. 1922

SIERRA VALLEY RANGER STATION, 1915

Overall, Forest Service range policy was favorably received among the stockmen who used the forest for summer pasture. Of sixty-four stockmen polled at the Nevada City convention in 1908, sixty responded that the method of grazing under government regulation was preferable to the old ways *(Morning Union* 11/22/08). In recognition of his valuable services on the Tahoe, Elliott received a promotion to the regional office in San Francisco as chief of grazing.

Elliott was somewhat less successful in his public relations with the press and local public officials who remained skeptical that the National Forests would accommodate homeseekers, prospectors, farmers and lumbermen. The controversy was touched off by Elliott's proposed western extension of the forest into an area within one mile of Nevada City on the north and two miles to the east. The Banner Hill, Blue Tent, Crystal Springs, Greenhorn Creek and Willow Valley mining districts, as well as the towns of Sweetland, Sebastapol, North San Juan, Cherokee, Badger Hill, Columbia, Lake City, Relief Hill, and North Bloomfield would have all fallen within the boundary of the expanded Forest *(Morning Union* 11/21/08). The mining interests of the region feared that the large number of unpatented mining claims in the affected territory and sizeable tracts of land open for mining locating would be hampered by governmental restriction. Others argued that a considerable amount of the land was suitable for growing fruit, and therefore unfit for inclusion in a National Forest. In spite of Pinchot's own reassurances published in the *Daily Democrat* that mining claims would not be affected adversely, Elliott was unable to convince local residents.

Acting on his constituent's petitions against the western extension, Congressman Englebright successfully killed the proposal *(Morning Union,* 11/25/08).

During the long superintendency of Richard L. P. Bigelow (1908-1936), the concept of multiple-use management was introduced as forest officials tried to integrate the functions of watershed protection, grazing, mining and recreational development with timber management and sale. Bigelow began working for the Forest Service in 1902 under Charles S. Newhall, Superintendent of Forest Reserves in California. Bigelow was born in Oakland in 1874, son of a pioneer in the San Francisco fire insurance business. As a young man of eighteen, he left the city for Fresno County where he took up stockraising and ranching until his appointment as forest ranger in 1902 on the Sierra Reserve (Woolbridge 1931: 207-8), While there, he gained experience in fire fighting, boundary line surveys, trail work, timber cruising, issuing use permits, thinning out forests, and regulation of transient sheep grazing on the reserve. Bigelow served as Supervisor of the Trinity, Klamath, and Shasta National forests before accepting a similar appointment to the Tahoe *(Grass Valley Union* 10/22/55).

Several important personages in American forest history worked on the Tahoe National Forest during the Bigelow years. M.B. Pratt, State Forester, worked as his Forest Assistant; Evan W. Kelly, a world-renowned forester, was a ranger; W. B. Greely, Chief Forester of the USFS, was a scaler, as was DeWitt Nelson, the future Supervisor of the Tahoe National Forest and Director of the California State Department of Natural Resources *(Grass Valley Union*10/22/55; Fry 1976). Although many of the management functions during the Bigelow years were custodial in nature, the staff had to delicately balance and develop policies for compatible uses and to deal with constant pressure by special-interest groups, mainly representing timber, water, grazing, and mining. Recreational demand and road improvements were substantially accelerated after use of the automobile became widespread in the 1920s.

By the mid-1920s, power development was one of the chief resources on the Forest as the numerous sites on lakes, reservoirs, and rivers transmitted the hydroelectric power to San Francisco and other cities. Water from the forest also irrigated thousands of acres of orchard lands in the foothills and valley, and was transported to cities for domestic consumption. Commercial timber harvests hovered at about the ten million board foot per year level. Stockmen ran some 13,000 head of cattle and about 100,000 sheep on the forest range lands. With the completion of trans-Sierra state highways came summer home developments, roadside garages, stores, summer resorts, and private and public campsites (Woolbridge 1931: 207-209). During the early decades of Forest Service management receipts from timber sales, grazing permits, recreational leases, and special use permits regularly totaled less than expenditures. The forest was seriously understaffed with just twenty year-round employees and 30 seasonal men employed on the average in 1924. Not until the New Deal planning and

programs were instituted were manpower and finances available in quantities large enough to tackle large-scale tasks in a comprehensive manner. Their availability would have a profound, positive effect on professionalism and resource planning within the Service.

To manage the many diverse resources on the Tahoe National Forest compatibly required careful planning, particularly when dealing with long-term ventures such as timber plans or expensive projects such as road building. On the other hand, plans had to be flexible to accommodate abrupt and unexpected shifts in priority. Under Bigelow's administration, plans had been laid out that would be implemented as New Deal monies became available during the 1930s. During this decade a wide variety of physical improvements were made on the forest: ranger stations, lookout towers, telephone lines, roads and trails, and campgrounds (Meggers/Nelson Interview 1982).

The task of implementing the Civilian Conservation Corp and other New Deal assignments on the Tahoe National Forest fell largely on DeWitt Nelson. Unlike the first two supervisors Nelson was a professionally trained forester, but he also worked his way up the ladder within the Forest Service step-by-step. He graduated from Iowa State College with a bachelor's degree in Forestry in 1924. In the spring of 1925 he passed the federal civil service examination for Junior Forester in the U S. Forest Service and was assigned to a position as scaler on a Hobart Mills timber sale in the Tahoe National Forest. The following season Supervisor Bigelow appointed him ranger on the Truckee District. Between 1927 and 1935, Nelson served as assistant supervisor and then supervisor in three different forests in California. He served two years (1935-36) as CCC liasion officer for the 9th Corps Area Military Command in San Francisco, representing all the technical services of the CCC program for the army in ten western states. In May of 1936, he left the liasion post and reported back to Nevada City, this time as Supervisor of the Tahoe National Forest (Nelson Interview 1982; Fry 1976: 15-68). A dramatic rise in the price of gold and the institution of CCC programs had immediate economic and social impacts that were felt in all the communities across the Tahoe National Forest. In addition to the young men from towns and cities who were transferred to working in the healthy forest environment came an equally large number of poverty-stricken victims of the Depression. They squatted on the public lands, took up residence in forest campgrounds, and tried their hand at prospecting for gold to eke out a living until World War II brought employment opportunities elsewhere.

Logging on the Tahoe National Forest, 1906-1940.

Forest Service policy required foresters to exercise balanced judgment in handling timber sales. Chief forester Pinchot set the tone for the conservationist policy of "wise use" and "scientific management" for the nation's long-lived material prosperity. His

multiple use concept in the management of National Forests required the protection of watershed and grazing rights to be integrated with timber sales and management. Yet the sales program had to take into consideration local conditions and the structure of the lumber industry. Timber management was to be geared toward stabilizing local industry and benefitting it in the long-run through wise resource planning.

During the first few years of federal management, timber sales were sluggish in the Tahoe National Forest. In order to develop a suitable timber sales program, Supervisor Bigelow instructed his Assistant Forester, M.B. Pratt, to prepare a study of sawmills on the forest. His findings revealed significant changes had been occuring in the industry since the last decade of the nineteenth century. In general, the trend had been away from many small independent mills toward concentration of ownership and vertical integration of the industry.

The first sawmills in the region grew up in association with the gold rush mining camps. They were small mills producing timber for local demand. Pratt reported that on the Foresthill Divide there were eleven sawmills in the early 1850s. The number had fallen to five by 1876, the decrease largely being explained by the decline in mining activity. Only one mill operated on the divide by 1910; however, unlike the earlier mills this one was operated by a large lumber company that owned substantial timber lands and exported its products to outside markets (Pratt 1910: 169).

In the late nineteenth and early twentieth centuries, California lumbermen found themselves caught in a squeeze between rising operating costs and relatively stable prices paid by consumers of their products. Between the late 1890s and World War I, annual cut of pine trees in California nearly doubled. Under the Timber and Stone Act huge tracts of timberland had been fraudulently acquired by large investors who erected large sawmills of 50,000 or more board feet daily capacity. The increase in production prevented significant rise in prices. Meanwhile, the cost of production soared. Logging operations required increasingly complex machinery. Donkey engines replaced oxen in yarding felled trees. In the mills single and double-band saws replaced the old circular saws. These mechanical engineering improvements eventually increased profits, but the capital outlay was tremendous. The initial impact was detrimental as the innovations raised operating costs significantly. According to a 1915 report by forestry expert Swift Berry, the prices pine lumber companies received for their products barely covered the costs of production (Berry 1915: 226).

By 1910, on the Tahoe National Forest, there were only thirty-three mills cutting timber. Of these, twenty-nine were independent firms and the remaining four cut timber for the large mills. Nine mills had a capacity of 50,000 board feet or more. Twenty mills had a capacity ranging from 5,000 to 50,000 board feet, but averaged approximately 15,000 board feet. Of these twenty mills, one-half cut for local

demand, five operated in conjunction with mines and ditch companies, and five competed in the marketplace with the nine large mills. In 1910. approximately sixty percent of the land lying within the exterior boundary of the Tahoe National Forest was patented land. Although the vast majority of the timber harvested was taken from private holdings, six of the smaller-sized mills depended wholly upon the National Forest for the timber they cut (Pratt 1910: 169-73).

The large lumber companies responded to narrowing profit margins by restructuring their firms. One response was vertical integration. The mills hired their own fallers and yarded their own logs. Independently operated flumes gave way to company-owned railroads as the chief means of carrying lumber to the mill. Firms that produced only unfinished timber expanded their operations. Large mills operated drying kilns, ran box factories, planing mills, and sash and door plants. Expanded operations allowed them to use poorer grades of pine and white fir. Waste products such as sawdust even found a profitable market. Company officials expanded the size of their firms to take advantage of economies of scale. During the 1910s, reduced profits had caused many small firms to merge or quit business altogether. On a statewide basis, small mills with circular or single band saws cut much of California's lumber in 1900; two decades later, large mills using double-band saws dominated the industry. The number of sawmills fell by twenty percent during this 20 year interval and by 1920 over eighty-five percent of the state's lumber was cut by mills with an annual output of more than ten million board feet (Blackford 1977: 60-73; Pratt 1910: 170).

The changing logging equipment, harvesting methods used by lumber companies, and scale of operations caused timber managers on the Tahoe National Forest to adjust their sale regulations. The Forest, in 1911, advertised for bids on a seventy-three million board feet saw timber sale, providing a ten year period for removal of the timber. It called for construction of twenty miles of railroad line and an adjustment in stumpage costs after a five year period *(Pioneer Western Lumberman* 1/15/12: 11). The announcement inaugurated an important departure from past policy. The National Forest had large quantities of timber, but it was not easily accessible. Timber purchasers had to make heavy capital investments in transportation facilities to take trees from the stump, to the rail line, and finally to the mill. Under these circumstances only large-scale timber sales requiring a number of years to complete, were attractive to the local lumber companies (Ayers 1958: 33-34).

Until 1911, Forest Service policy was to oppose long contracts. Sales of timber were proportional to existing supply and demand and were designed to encourage sales to small purchasers. The vast majority of the early sales were of this type. Since stumpage prices were rising, forest officials saw long contracts based on current prices as a danger for it might encourage speculation and give unfair advantages to

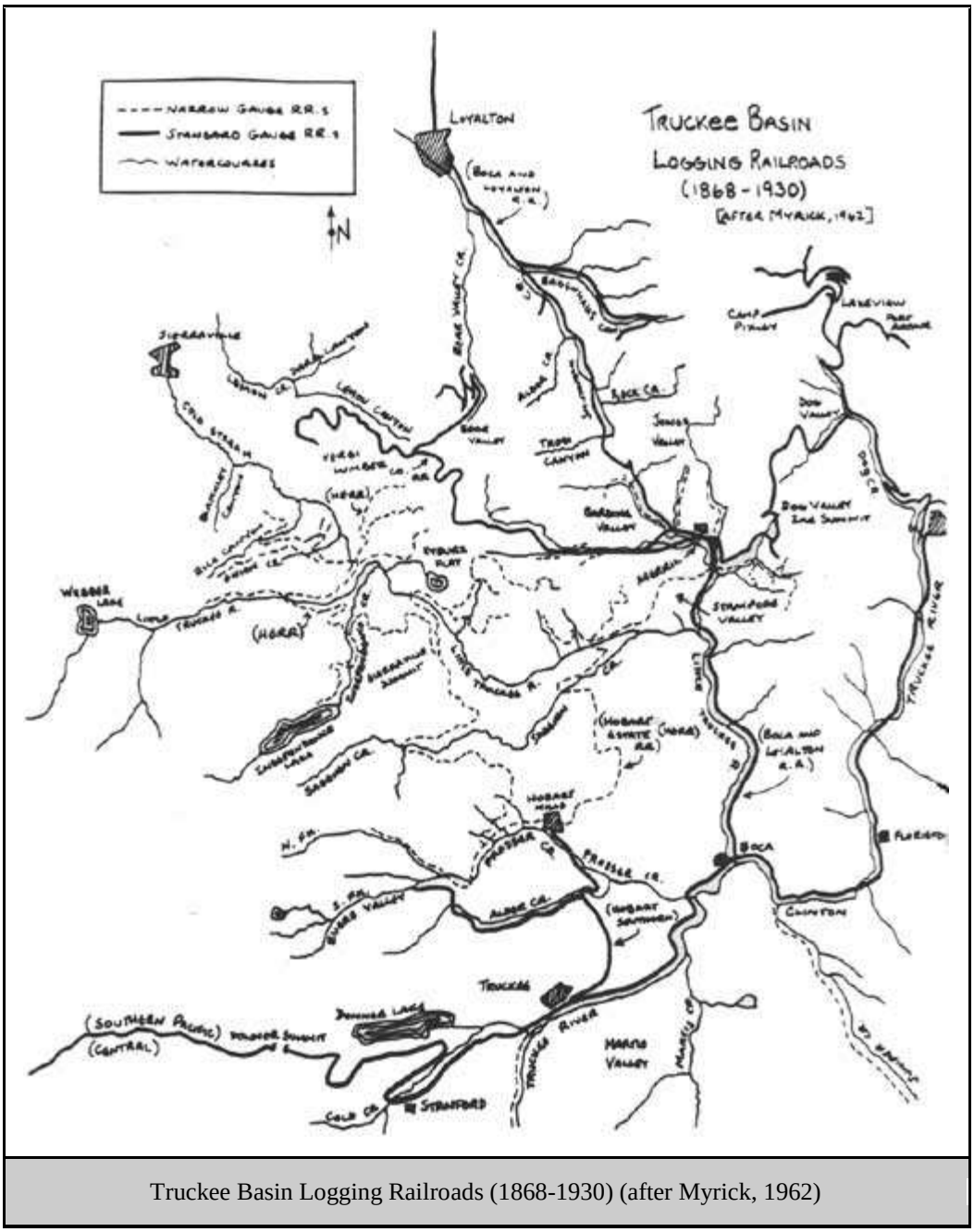
large companies. Prior to 1911, no sales were let for a period extending over five years. Conditions in the lumber industry made the policy impractical. The new plan allowing longer operations with periodic revision of stumpage rates was a useful innovation that protected the public and small operators while opening the forests to the large concerns *(Pioneer Western Lumberman* 1/15/12: 11).

In 1926, Supervisor Bigelow estimated that in the first twenty years of timber management the Tahoe National Forest had sold and permitted cutting of approximately 185 million board feet of timber, an average of about 9.25 million annually. Timber sales ranged in amounts from a few thousand feet up to whatever amount was warranted considering the investment required for constructing rails or other means of transportation into comparatively inaccessible regions. The Tahoe forest permitted cutting on 14,000 acres of government land in 1925, containing an estimated seventeen million board feet. Bigelow estimated that there were seven billion board feet of saw timber remaining on federal lands. Following the Forest Service policy of marking trees to ensure a second cut within 30 to 40 years, reforestation of the cut-over land would provide timber for future generations (Bigelow 1926: 12).

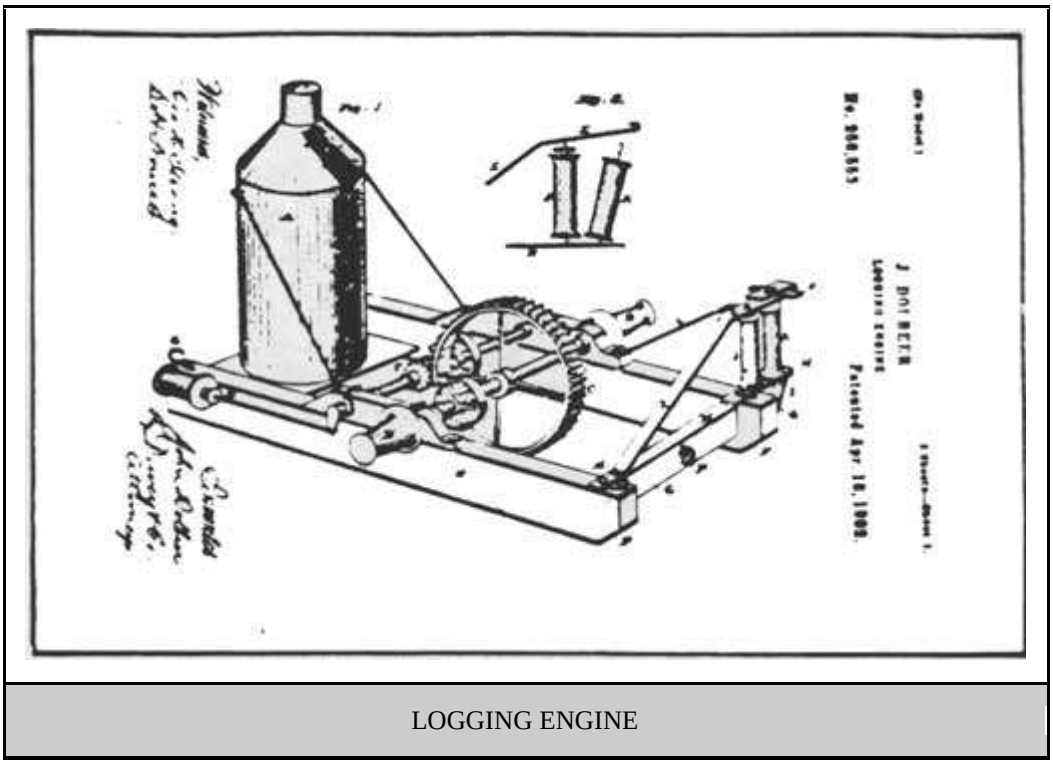
On private holdings the rate of timber consumption far surpassed that on the National Forest properties. The forest supervisor estimated existing private timber stands at 6 billion board feet in 1925 with timber being cut at a rate of 65 million board feet annually (Bigelow 1926: 121). Except in times of high prices such as during World War I, there was little attempt on the part of lumbermen to engage in scientific forestry practices. "They were concerned with getting the timber out and producing the most profit they could," recalls a Forest Service scaler. By 1910 most of the timber in the Tahoe Truckee basin was stripped off; by then the focus of operating had shifted north into the region north and east of the Little Truckee River and into Sierra Valley. Within 25 years, the lumber companies had denuded their properties. They eventually sold much of their cut-over acreage to the USFS during the depression years as the companies could not afford to assume the heavy tax burden on non-harvestable timber lands (Nelson Interview 1982).

Prior to the 1890s in the pine regions of California, the typical logging operation used oxen to haul logs from the stump to the yard. From this temporary storage area lumbermen transported their timber by raft, river drive, chute, flume, wagon, or railroad to the mill site. Yarding with bull teams was a slow, cumbersome, expensive process. Animals were difficult to maneuver in tight places, or where footing was poor. Where ground conditions were rough or slopes steep, they could not operate at all. If steam power could be utilized for yarding, many problems could be overcome.

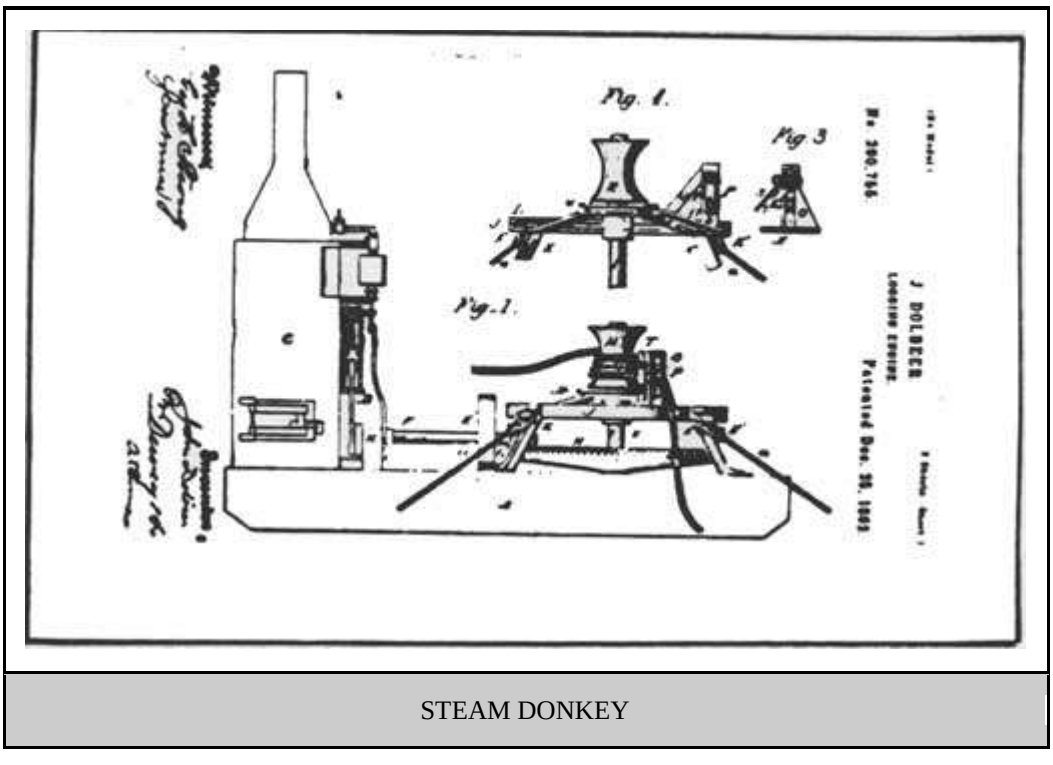
The invention of the steam skidder of the variety used on the West Coast may be found in the granting of a patent in 1882 to John Dolbeer for a "Logging Engine." A seafaring man turned logger, Dolbeer drew his inspiration for the logging engine from machinery commonly used along the waterfront to load and unload cargo between ship and wharf. The original steam donkey contained a small engine with upright boiler and contained no winching drums at all. The machine "featured a horizontal shaft with gypsies at both ends. It had a snatch block fairlead mounted at the head of the frame at one corner to guide the hauling line to the gypsy behind it" (Tooker 1970: 23-24). This side-spool construction proved impractical and the elaborate systems of pulleys required to yard logs reduced the pulling power of the machine. Dolbeer improved his machine in 1883, developing what became the Dolbeer Donkey. In contrast to his earlier machine, this was a capstan type with the vertical spindle-mounted drum driven by steam power (IBID: 24-25).



Truckee Basin Logging Railroads (1868-1930) (after Myrick, 1962)



LOGGING ENGINE



STEAM DONKEY

Two problems plagued Dolbeer's invention. First, in the early 1880s available steel rope could not stand up to the forces exerted on it in logging operations and snapped too easily. Hemp rope stretched a great deal under strain and manila rope's practical

limit was 500 feet at best. Second, Dolbeer's engine still had no storage drum, so the rope had to be coiled and uncoiled manually during yarding. This slowed operations considerably. After 1890 the quality of steel cable improved steadily making it possible to skid logs at a distance of over 1,000 feet (IBID: 27-28). Also in the 1890s, David Evans of the Excelsior Redwood Company near Eureka put into operation the first bull donkey which had three storage drums around which the haul, trip and straw lines were wound (Rutledge 1970: 27).

More powerful machines followed Evan's donkey — all had drums and large vertical boilers. With more powerful engines and reliable wire rope, the donkeys could take over the skidding from the tree falling area to the landing where the logs were loaded on railroad cars. Gradually yarding as a separate operation distinct from skidding to the landing was eliminated.

In his *History of Timber Management in the California National Forests* (1958: 38), R. W. Ayers describes the typical donkey logging layout as it existed around 1907. The lumber company would start by laying cables along a main chute running up a gulch from one to four thousand feet. At the bottom of the chute would be a bull donkey or road engine. The bull donkey was different than the slack rope skidder (or yarding donkey) in that it did not go to the stump directly but simply hauled logs brought to it by other means. It was the main haul engine, and as such it took the place of trains, flumes, or sled roads. In a small logging operation the bull donkey might be at the mill itself; in operations distant from the mill it was placed at the main railroad with a loading engine.

At appropriate places along the main chute, yarding donkeys were placed to haul logs from the stump to the chute for a distance of 200 to 1,800 feet. The yarders varied in form from merely the bare engine with the necessary pulleys, cables and fittings to a completely portable model assembled on sled skids designed to allow the machine to pull itself along by winching onto stumps or trees (Williams 1908: 15) Close to the yarders would be a swing donkey to take logs from the yarder and drag them through a "frog" or switch into the main chute. Logs were collected in trains at each frog thereby providing a large load for the bull donkey to take down the chute to the railroad or mill site (Ayers 1958: 38).

High-lead yarding which used cables attached to spar trees was introduced to California from the Pacific Northwest. As the rigging was expensive and difficult to set up, only where timber was extremely valuable was this method employed. The high-lead method was not used extensively in California, but where it was found practical Forest Service regulations limited the height on the lead to a maximum of 35 feet so as to minimize scarring the ground. This technique became known as the "modified lead" method (Show 1926: 26-32).

Throughout the 1920s, almost all of the large-scale companies on the Tahoe National Forest logged with donkey engines and railroads. There were some exceptions. The Davies-Johnson, Calpine and Loyalton lumber companies experimented with tractor logging as early as 1924. Of course, the first gas tractors used in California were built for agricultural use in the Great Central Valley. It was not long, however, before they were adapted to the lumber industry. Ayers, in his forest timber management history, implies that tractors were probably adopted first by smaller-scale operators who were still using big wheels and horses in the early twenties. Fuel was cheap and gasoline powered engines cut log handling costs. Furthermore, tractors could log slopes as steep as 30 percent, whereas wheels and horses were limited to 12 percent grades. By the 1930s tractors came into more general use (Ayers 1958: 35-37; Meggers/Nelson Interview 1982).

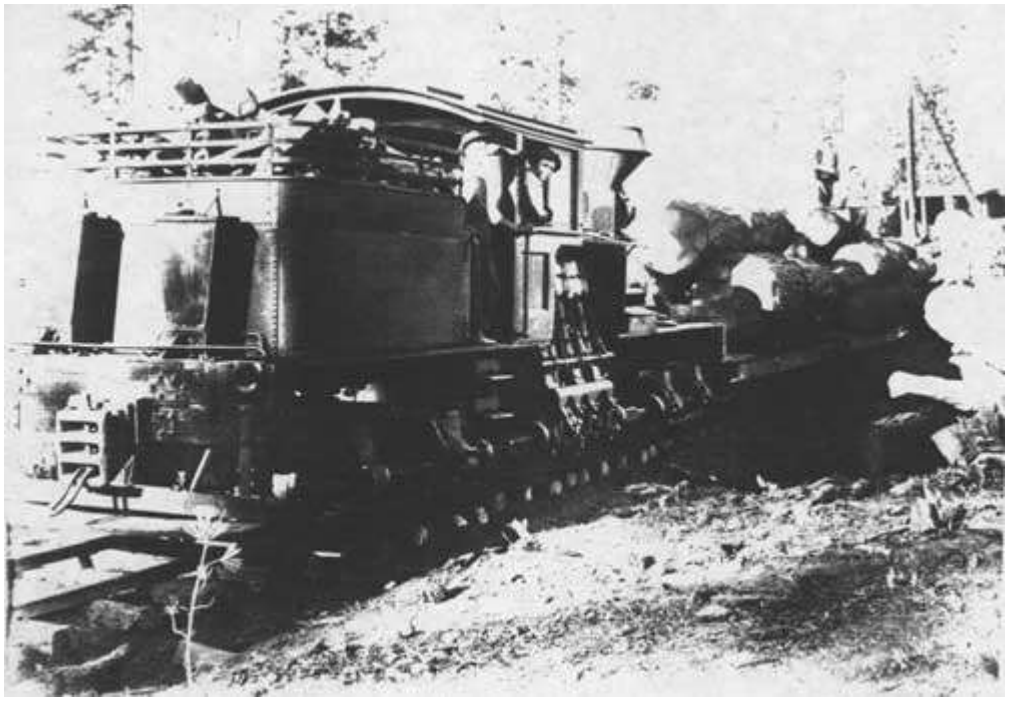
On the west side of the Tahoe National Forest where sawmills tended to be smaller and produced for local consumption, the men who worked in the mill and Forest were generally settled members of the community in nearby towns. On the eastern side of the Forest where the majority of the logging took place from 1906 to 1940, the situation was quite different. Those who worked in the mills at Loyalton, Calpine, Hobart, Verdi, or Floriston were more likely to be year-round residents of those towns. However, those who labored in the forests, employed on a seasonal basis, constituted a substantially larger floating population. Supervisor Bigelow, in April of 1912, estimated the resident population of lumbermen and millmen within the Forest boundaries at only twenty-eight whereas the "nomadic" loggers almost reached 2,000 (Bigelow 1913: 1). These men lived in the logging camps, temporary forest communities established by lumber companies near the scene of each season's cutting operations. Oftentimes a logger would remain in a camp only long enough to earn a grubstake. "The local people had a saying," recalls ex-supervisor DeWitt Nelson, "any lumber camp had at least three people in it: one working, one coming and one going" (Nelson Interview 1982).

The most successful lumber companies of the twentieth century were those that expanded their operations to include all phases of production, from cutting the trees to producing finished products. Besides handling their own marketing, milling, and manufacturing, these firms took over the production — and often transportation — of their raw materials. This expanded form of industrial operations was necessary in an enterprise whose raw materials came from the ground and where limited resources could be controlled by a few firms. To gain an assured source of supply was essential to the manufacturer.

The three biggest lumber companies on the Tahoe National Forest were vertically integrated firms with substantial land holdings. The Verdi Lumber Company, in 1912, held 14,080 acres in eastern Sierra County. Northwest of its mill site, the Hobart

Estate Company owned some 65,680 acres of timberland. The Floriston Pulp and Paper Company's holdings amounted to 32,380 acres (Knowles 1942: 43, 50). In common with the other large mills on the Tahoe National Forest, these manufacturing plants had direct connections to a transcontinental rail system that facilitated broad distribution of their finished products.

STEAM DONKEY YARDING, CA. 1900



RAILROAD LOGGING ENGINE, CARS; LOADER IN BACKGROUND. NOTE TEMPORARY NATURE OF ROADBED, TIES.

For about a quarter century, Oliver Lonkey had been active in the Sierra lumber business before incorporating the Verdi Lumber Company in 1900. Since the 1880s, his mills and box factory at Verdi had been supplied with lumber from Dog Valley, first through a long winding flume and later by three-wheeled steam vehicles. About the time Lonkey decided to incorporate the Verdi Lumber Company undertook construction of a railroad into Dog Valley. By about 1905 the company had cut-over all of the Dog Valley drainage. In the final year of operations they cut nine million board feet from their chief camp, Port Arthur, at the north end of the valley (Knowles 1942: 44-45; Bigelow 1926: 10).

Once the timber was exhausted in Dog Valley, the company extended its railroad lines to Long Valley Canyon near Purdy and over Dog Valley Second Summit to Merrill in Sardine Valley. Here it crossed the trackage of the Boca and Loyalton Railroad and pushed on west along Davies Creek into the mountains. In a little over ten years, the Verdi Lumber Company had stripped its vast acreage of all timber:

By the summer of 1912 the company's standard gauge railroad . . . was extended to their timber tracts in eastern Sierra County which comprised an area of 14,080 acres, 9,440 of which they had denuded even to the seed trees during 1912. Two camps were then established to take off the remaining 4,640 acres: Camp No. 1, situated on the line between sections 2 and 3 Township 19 North, Range 17 East and Camp No. 2 in Section 1, Township 20 North, Range 17 East. The bulk of the remaining 4,640 acres lay between these two camps on the rugged land between Merrill Creek and Dog Valley. It had to be logged with donkey engines. The Company finished clearing this during 1913. (Knowles 1942: 45)

Faced with timber shortages, the Verdi Lumber Company purchased the first long-term timber contract from the Tahoe National Forest in 1911 and two years later absorbed the Tonopah Lumber Company and its 40,000 acre timber holdings in Sierra and Washoe counties. Lemon Canyon then became the major site of timber cutting. The company purchased property and timber rights in 1911 and began cutting four years later. Lemon Valley remained the chief cutting site of the Verdi Company through the 1926 season. The firm constructed a railroad spur line into the hills above Bear Valley in 1917. After this area was logged, the company timbermen and railroads branched out westward from Davies Creek into the hills on the south side of Lemon Canyon. Logging continued for five years there and then switched to the north slope of the canyon keeping the railroad supplied for several more years (Jackson

1967: 52-53; Bigelow 1929). On the rail lines laid after 1920 in the Lemon Valley area, the Verdi Company's roads possessed a unique feature, the "Revert Tie":

During 1920 the President of the Verdi Lumber Company, A. Revert, invented a new type of railroad tie, designed to effect considerable saving in timber. The 'Revert Tie' was built from a number of small pieces of timber all held firmly together by a series of wooden dowels. By the spring of 1920 the company was using these ties on its logging railroad. (Knowles 1942: 48)

The sawmill, storage yard, and roundhouse at Verdi burnt in 1926. The company abandoned its mill, sold its remaining timber lands, and tore up the tracks of its railroad. Nearly all the rails were removed and the roadbed abandoned in the summer of 1927 when the Hobart Estate bought the right-of-way to several miles of the old Verdi Company track (Jackson 1967: 62; Myrick 1962: 441).

By the mid-1890s, the Sierra Nevada Wood and Lumber Company had concluded operations at Lake Tahoe and moved its mill to the Hobart mill site seven miles north of Truckee. Equipped with two band-saws and a 52 inch circular saw, the mill had a capacity of about 175,000 feet per day. The new plant also boasted a box factory capable of turning out 9,000 boxes a day, a sash and door mill, a planing mill, and a modern machine shop. A boarding house, dwellings for employees, post office, and a company store were built adjacent to the plant in 1900. In subsequent years, the company added a hotel, school, and express office. Most of the 500 men employed at the mills in 1924 lived in the company town of Hobart Mills. The town remained intact until 1958 (Larder and Brock 1924: 437; Knowles 1942: 47-48).

The company built a standard gauge railroad from the mills to Truckee during 1896 and covered it with snow sheds to allow trains to operate during the winter months. Over this line finished products and sawed timber were shipped to the Southern Pacific main line. The Hobart company operated a small sawmill in Alder Creek in 1901; however, from the time of its establishment at Hobart Mills in 1896 until its winding up operations forty years later, most of the timber company's cutting was done in Sierra County. Demands for sugar pine doors, boxes to ship California's agricultural products, and construction timbers for the Southern Pacific Railroad kept the mills busy. The output of the mills during the period 1900-1920 varied from a high of over fifty million feet in 1906 to a low of twenty-two million in 1918. Annual cuts during the 1920s were somewhat lower ranging from 20-28 million feet (Knowles 1942: 48-49).

From 1909 when Bigelow made the first sale to Hobart Mills to 1936 the company cut some 29.5 million board feet from the Tahoe National Forest, or about three percent

of the company's total cut. Most of the Forest's parcels were logged by Hobart after 1917 (Bigelow 1936: 3).

The first line of Hobart's narrow gauge railroad was built up Sagehen Creek to its junction with the Little Truckee River. A second line carried timber from Carpenter Valley down Prosser Creek. By 1917, the company had built twenty miles of track, extending lines into the Independence Creek and Onion Creek Valley. The narrow gauge line from Hobart to the confluence of Sagehen Creek and the Little Truckee was rebuilt to sturdier specifications around 1920. During the following decade, construction was extended to the northeast to Merrill, at Davis Creek, and on north to Sardine Valley, with branches extending in all directions to new timber areas (Jackson 1967a: 34). Ten miles of narrow gauge track were added to the system between 1917 and 1922 when some twelve donkey engines were working to keep the Hobart Mill saws supplied. Many of the roadbeds of the abandoned Boca and Loyalton (1916) and Verdi Lumber Company (1927) railroads were used again by the narrow gauge. Around 1928, Hobart began testing tractor logging. Each year caterpillars replaced some of the mill's Willamette donkeys. The company, in 1934, had six gasoline logging tractors operating on the Tahoe National Forest (Knowles 1942: 49; Myrick 1962: 441). Two years later, Hobart Mills ceased operations. During their forty years of operation they had cut about one billion board feet of lumber. The USFS purchased the cut-over lands of the Hobart Estate Company under provisions of the Weeks Act (Nelson Interview 1982).

In 1899, San Francisco capitalists, funded primarily by the Fleischacker interests, built a pulp and paper mill at Floriston. When the plant was completed the following year it was the second largest paper mill in the United States, and the only such mill in the state. The company owned a 14,000 acre tract of timberland surrounding the plant and controlled an additional 18,000 acres of timberland by 1914 in the region north and northeast of Lake Tahoe and south of the Southern Pacific Railroad. For use in the company's paper mill some 20,000 cords of red fir and white fir were cut annually from these lands (Mills 1914: 679; Knowles 1942: 50).

Whereas the Floriston mill used only fir in its operations, all of the other companies in the region cut pine trees. The paper company worked out agreements to acquire the fir species from the timberlands of other companies such as the Hobart Estates Company and the Loyalton Lumber Company. D. J. Smith cut some 50,000 cords of wood for the Floriston mill from his timberlands in Placer County on Coldstream Creek. The Roberts Lumber Company, in 1909-10, supplied the mill with 20,000 cords of fir from their Truckee and Anderson tracts that had been previously stripped of their pine trees (Knowles 1942: 50).

On the average, the company employed about 150 workers at its Floriston mill and produced from 7,000 to 8,500 tons of paper annually. An Oregon company, Crown-Columbia Paper, bought the mill and its timberlands. Within two years nearly all of its 32,000 acres of timberland were stripped of its fir trees. During an era when other companies were employing steam donkeys and railroads, the logging methods of the paper company appeared very outdated:

They began cutting the logs in October in order that they might season for 6 or 8 months. All trees were cut to a diameter of 12 inches and each tree was cut to a 4 to 6 inch top diameter. The system of winter cutting, however, made it necessary to leave stumps as high as 6 feet so that many cords were thus left in the woods in this form. In summer, or as early as the weather permitted, the cut logs, thoroughly seasoned, were packed on mules or by horse teams and wagons to the company's flume which conveyed them to the mill at Floriston. (IBID: 50)

In 1908, a cooperative agreement was worked out between the Crown-Columbia Paper Company and the USFS to control forest fires on the private and Forest lands being logged by the paper company north of Lake Tahoe and in the Duffy's Camp vicinity. Under the agreement, fire patrols were established on the company lands during the dry season. The headquarters for the patrolmen were in the woods where two-room log and shake cabins were built to provide housing. Between 1909 and 1914 five patrolmen's cabins were built and three fenced pastures set aside to provide feed for the patrolmen's horses. As part of the program, the company and the Forest Service cooperated in constructing fifty miles of telephone line and thirty-six miles of trail to facilitate easy communication with the patrolmen (Mills 1914: 679-83).

The paper company shifted its logging operations to Browns Camp near Soda Springs and to Truckee Lumber Company tracts in Placer County between 1914 and 1921. After exhausting these supplies, the company moved to Donner Lake where it operated a tramway on the south side of the lake to haul wood down the steep mountain slopes to the Southern Pacific Railroad tracks, where loggers loaded the cordwood for shipment by rail to Floriston. Later the company built a standard gauge line north of Donner on Alder Creek and into Evers Valley. The rail line was used in conjunction with the Hobart Estate Company, but was abandoned in the 1930s (Myrick 1962: 442-43; Knowles 1942: 50).

In the midst of Depression hard times, the Floriston mill folded up its operations. The company had exhausted its most readily available timber resources; the mill's efficiency, as well as its output, lagged behind the larger paper mills that had been built in the Pacific Northwest.

Several sawmills operated in the vicinity of Sierra Valley during the twentieth century. Up until 1928, seventeen different sawmills cut national forest timber from the Sierra Valley Working Circle (TNF: Management Plan 1928: 18). The Clover Lumber Company of Loyalton, a subsidiary of the Verdi Lumber Company, purchased the old Marsh mill in 1917. Its annual cut averaged about eight million feet, much of which came from the Badenoch Canyon region. Sardine Valley sawmills included those of Davies, on Davies Creek; Warren near the damsite on the Little Truckee; and Winnie Smith, on the Little Truckee just above Sagehen Creek. The Roberts Lumber Company, the Lewis Brothers California Lumber Company, and several other small sawmills logged along the line of the Boca and Loyalton Railroad, a road built to handle logging operations tributary to their right-of-way (Bigelow 1926: 10-11; Knowles 1942: 46). In 1907, the Boca and Loyalton had at least fifteen short spur lines into the forests where lumber camps had been located. Other spurs ran to the various mills. As the timberlands south of Loyalton were cut over, the Boca and Loyalton declined in importance. With the coming of the Western Pacific Railroad to Sierra Valley, competition for freight traffic accelerated the decline. The Boca and Loyalton operated at an annual loss of $41,000 to $52,000 between 1909 and 1912. Winter shipments were suspended in 1916 and soon thereafter all service on the line south of Loyalton was discontinued (Jackson 1967a: 50).

The sawmill at Calpine was perhaps the largest producer of the Sierra Valley region in the twenties and thirties. The community developed in 1919 or 1920 around the mill and yards of the Davies-Johnson Lumber Company, and was first known as McAlpine. The sawmill and box factory provided almost the entire economic support of the town. Approximately 150 men were employed at the mills in 1934 with an additional seventy-five on the payroll of the company performing other tasks. Much of the finished products from the mill were shipped to distant markets over a spur branch of the Western Pacific which terminated at Calpine. The lumber company closed its mill in 1939. It sold a portion of its property to J. J. Farrar who subdivided it and sold lots to people who incorporated the town of Calpine. The settlement became a vacation and retirement center *(Mountain Messenger,* Special Mining Edition, 7/29/34; Roth 1969: 8-9).

The logging history of the western side of the Tahoe National Forest continued to differ significantly from that of the Tahoe-Truckee and Sierra Valley regions. The sawmills produced for local consumption, providing lumber for town building, mining sites and other related mining developments. The Marsh sawmill which began production in the 1850s, was still running in 1926. Its logging operation and sawmill moved with the cutters, but its lumber yard remained in the same location near Nevada City where the first sawmill was constructed (Bigelow 1926: 11). The west-side sawmills usually operated on a seasonal basis, closing down with the winter

snows each year *(The Morning Union* 11/25/08). Unlike east-side lumber operations, these companies did not build logging camps in the woods to house cutters. Loggers lived in nearby communities (Meggers Interview 1982).

After World War I, the local lumber business, dependent as it was on the strength of the mining industry, experienced a general state of decline. During the years 1918-1930, the output of gold mines dropped to their lowest point ever and people left the region in record numbers. Not until the mid-thirties did mining recover; when it did, huge orders for building materials arrived at the mills. The Grant and Heether Company of Camptonville for example, experienced sales ten times that of the previous years in the summer of 1934 after Roosevelt lifted the embargo on exportation of gold *(Mountain Messenger* 6/2/34). General prosperity continued through the war years.

Mining on the Tahoe National Forest, 1906-1940.

From the turn of the century to 1917, gold production statewide rose by about $4.2 million or approximately a twenty-five percent increase. Much of the increase can be attributed to the introduction of gold dredging in the late 1890s which accounted for ninety-one percent of the total amount recovered in 1922 from placer deposits. Since dredging took place in the lower foothill elevations, placer production within the Tahoe National Forest was fairly small. Exhaustion of river placers and stringent limitations placed on hydraulic debris left drift mining as the major form of exploiting the gravel deposits. Lode mining methods had improved significantly in the nineties with the introduction of new equipment; however, with other investment opportunities in California agriculture and Southern California real estate, little outside capital found its way into the deep mines in the early decades of this century (Clark 1970: 4-8).

Inflation following World War I reversed the rising trend of gold production and it continued to decline until the early 1930s. From 1933 to 1935, the price of gold was increased from $20.67 to $35 per fine ounce. The rise resulted in an immediate large increase in gold output and new exploration for the remainder of the decade. Economic conditions in the mining industry on the Tahoe National Forest tended to run, counter that of the rest of the state and nation. The post-World War I prosperity drew workers into California's urban-industrial centers. In agriculture, the war spurred expanded production. When peace came the economy of California had been lifted to a new plateau of production, distribution and consumption of both goods and services. With the price of gold fixed, inflation and high labor costs caused gold production to sink to its lowest level since 1849. Thus, in 1929 at the peak of the post-war boom, gold production had hit bottom (Jenkins 1948: 19).

From a production valued at $9.45 million statewide in 1930, gold output soared to nearly $51 million by the end of the decade. This was the most valuable annual output since 1856. Thousands of miners found new employment in the quartz mines at Grass Valley, Nevada City, Alleghany, and elsewhere (Clark 1970: 7-8). Still bearing millions of cubic feet of auriferous gravel-bearing hillsides, hydraulic mines closed since the mid-80s attracted mining engineers and investors. Thousands of urban unemployed rushed to the Sierra gold fields to prospect with pan and rocker along the various rivers and creeks. It was a movement reminiscent of the "days of '49." The resident population of the communities within the National Forest rose for the first time since the 1900 census. The rise was precipitous — some 42 percent during the 1930s (U. S. Census, Population 1900, 1930, 1940).

The revival of mining infused Forest communities with new life and stimulated non-mining industries such as logging and agriculture. Even a stable town such as Downieville, the county seat of Sierra County, barely survived the hard times of the twenties. Isolated from the outside world and faltering with the failure to attract capital investment in mining, the "somnolent mountain town" was "verging perilously toward the status of a 'ghost town'." With the revival of mining in 1934, the *Mountain Messenger* reported mining properties long idle were being examined by engineers and that the sleepy town "had suddenly been transformed into a bustling community" (7/29/34).

Under provisions of the 1897 act authorizing management of the reserves, vacant forest land was left open to mineral exploration and location under the general mining laws of the United States. The controlling legislation was the mining law of 1872 which permitted prospectors to enter public lands and stake a claim based on their discovery. The law did mandate that improvements be made on the claim, but did not require the mineral deposits to be actually mined, nor did the miner have to demonstrate the commercial viability of the proposed development. Claims with marginal or no value enabled miners to establish a surface right and with it the right to timber. Strategic mineral locations were sometimes used to control access to forest lands by preemption of the only site for road development (Steen 1976: 295-296).

The U. S. Forest Service permitted bonafide prospecting and mining on national forest lands with the exception of a few mineral resources which we not subject to location. Miners wishing to establish a claim had to file with the appropriate county agency; the Forest Service received no consistent report on the existence of locations in the Forest, nor notice as to whether they were being worked or abandoned. Ordinarily where claims were established, no mineral examination was made until application for a patent was filed. Miners were required to mark the corners of their claim and post a descriptive notice. An initial $500 investment work was required, with the Forest Service reserving the right to inspect the claim for the purposes of issuing a favorable

or unfavorable report. If the finding was favorable a patent could be issued. The mining laws required a claimant to submit to county officials a yearly "proof of labor" affidavit stating that at least $100 was spent developing the claim (Friedhoff 1944: 4, 46; Steen 1976: 296).

There were several loopholes in the law which allowed for fraudulent mining claims. Proof of labor certificates were often not recorded, and failure to submit an annual report was not grounds for forfeiture. W. H. Friedhoff, a mineral examiner for the U. S. Forest Service in California with thirty-three years of experience in the field, estimated in 1944 that only about ten percent of mining claims on which proof of labor affidavits were recorded had $100 worth of work been done. Construction of houses, roads, trails, or other non-mining improvements were accepted as patent expenditures. Only in instances where claims were in material conflict with the public interest or interfered with Forest management and administration were they investigated. Where use and activities were not authorized by the mining laws, the validity of the claim was contested. In most cases, the Forest Service won its case against mining trespassers (Friedhoff 1944: 1-4, 9, 46).

Abuses of the mineral laws were common on the California national forests. From 1902 to 1918 lumber companies filed mining claims for no other purpose than to gain surface rights to the timberlands. The Forest Service contested a large number of these so called "sugar pine mining claims" which were particularly rampant in areas adjacent to railroad right-of-ways. After World War I, mountain road improvements provided enhanced opportunities for outdoor recreation. Some of the "gentlemen recreationists" filed mineral claims on which to build second home sites. This remained an on-going problem through the 1940s. During the Depression hordes of migratory small-scale placer miners descended on the forests. These "snipers" presented a major administrative problem, but given the pressing economic circumstances of the times their activities were tolerated. Throughout the period elderly persons and retirees have squatted on the public domain by taking up mining claims as a means of escaping the high cost of urban living (IBID: 34-5).

More than sixty-six square miles of national forest land in California between 1910 and 1938 was patented under the mining laws. Of the claims filed, 81.4 percent were approved. One hundred forty-four locations comprising 3,180 acres were contested. The Forest Service cancelled almost all of the contested claims for reasons ranging from fraudulent use as a homesite or commercial development, exclusive use for agriculture or logging, moonshing, blocking public campgrounds or highway development. Within the Tahoe National Forest the vast majority of the mineral patents on Forest lands were issued prior to 1910. Less than one-fifth of the roughly 30,000 acres of Tahoe mineral patents were issued after 1910. Of the patents granted

from that year to 1937, subsequent Forest Service investigations determined forty-eight percent to be used primarily for purposes other than mining (IBID: 5-11).

By the time Tahoe National Forest was established, the lode mining industry had reached a mature stage of development. The mineral areas containing gold bearing ores had already been discovered and more or less explored and exploited. Experienced mining engineers understood this, and instead of prospecting for new discoveries, mine operators and investors focused their talents on improving equipment, reducing operating costs, and improving their capacity to efficiently extract gold from the underground veins. With the rise in the price of gold during the 1930s, mining engineers and prospectors combed the countryside looking to patent claims. With a few exceptions, they directed their efforts to re-opening abandoned mines. Thus, even with the rise in the price of gold, lode production during the Depression was almost entirely from previously established mines.

The lode producing districts actively mining in the early 1900s were centered at Alleghany, Damascus, Downieville, English Mountain, Graniteville, Poker Flat, Sierra City, and Washington (Clark 1970: 19-131). Abandonment of mines in the nineties was forced by crude methods of extracting ore and failure to attract outside investors during that decade of depression. Local mining interests hoped that introducing modern equipment and electric power to the mines would make them once again paying propositions. By 1907, the Grass Valley *Daily Morning Union* expressed confidence in the resurgence of Sierra and Nevada county mines. People who had previously invested in Nevada's famed silver camps were beginning to look at California gold mines once again. The rejuvination of mining, the paper reported, "is the calm outgrowth of quiet and business-like investigation . . . Wealth is certainly here only awaiting the investment of capital and the application of scientific operation to uncover it" (10/2/07).

There did appear to be some reason for the *Union's* sanguine outlook in the fall of 1907. The Anchor mine near Graniteville opened for the first time in many years, and the new owners were erecting a ten mill stamp on the property. Eastern and San Francisco investors bought up the adjacent claims in several mining districts and consolidated the existing mines into single ownership. The Hayes brothers of San Jose, owners of the Sierra Buttes mines at Sierra City, organized the Sierra Buttes Water and Canal Company for the purpose of developing water power and generating electricity for their mining operations. Earlier that year the Alaska mine at Pike City was the first mine in Sierra County to obtain electrical power through hydroelectrical generation. The mines in that district were prospering. The Oriental mine, with a large body of paying ore, had plans to erect a new mill the following spring. At the Plumbago, Tightner, Red Star, and Sixteen-to-One the plants were running at full

speed. In the entire Alleghany-Forest area, no miners were unemployed *(Daily Morning Union* 10/4/07, 10/5/07, 10/10/07, 10/11/07).

On a statewide basis peak production during the period from 1900-1929 came in 1915 when $22.4 million was produced by California gold mines (Clark 1970: 4). In Nevada County, the "War Years" from 1914-18 marked the peak of production. In each of these years the county's quartz mines produced over $3 million, a greater total than any year since 1880 (Report of the State Minerologist 1930: 96). By the early twenties adverse conditions were felt severely in these lode mining districts. Many quartz mines in Nevada County shut down completely. Unfavorable labor conditions, the continuing high cost of power and materials, and power shortages that curtailed milling and mining were the major reasons (Report of the State Minerologist 1921: 434-435).

Placer County mines produced little gold throughout the twenties. Only the largest mines weathered the storm. For the first time since 1900, the Nevada County quartz mines' output in 1928 dropped below the $2 million mark. Nearly two-thirds of the gold production came from mines either operated or acquired by the Empire Mines and Investment Company and the North Star Mines Company. Of the remainder, one-half came from the Idaho-Maryland Consolidated Mines, Inc. mines. In the Washington and Graniteville districts, investors made several efforts to rejuvinate former producing properties. Most of these efforts came from small, inadequately financed companies whose efforts in almost every case failed. In the Meadowlake District miners opened 24 claims between 1924 and 1929, but nothing more than perfunctory assessment work was accomplished. Of all the National Forest mining districts only Alleghany, where phenomenally rich ore pockets were being worked at depths of only a few hundred feet, seemed to prosper (Report of the State Minerologist 1930: 96-102; Clark and Fuller 1981: 57-58).

The price of gold on the world market began rising rapidly in 1932 stimulating activity in the California gold districts. Since the world price exceeded that paid by the U. S. mint by almost $10 per ounce, gold exports shot upward causing Roosevelt to institute an embargo in April of 1933. Later that year he relaxed the temporary embargo, allowing sales to foreign markets. Treasury officials foresaw a quickening of mining activity in the western states and predicted an increase in profits of $15 million per year *(San Francisco Chronicle* 8/30/33).

Within a month mining operators and engineers began appearing in northern Sierra gold towns. Stimulated by high gold prices, rehabilitation work on inoperative mines got underway and the *Mountain Messenger* (11/4/33) predicted a rebirth of activity in the mountain counties unlike anything seen since the gold rush.

. . . mining is the keystone to the whole situation, for with the influx of people as a natural consequence of the opening of our mines other things will follow. The abandoned hill ranches, with their orchards still intact, which supplied vegetables and produce to the miners would again be made to function; the lumber industry would be stimulated by the building activity that would follow the influx of a large number of people; the dairy and cattle industry would find an ample and ready market right at home, and the resort and campsite business would quickly develop to a degree where it would present a problem to care for visitors.

State Minerologist Walter N. Bradley also noted the immediate increased activity in production, development, and exploration in California mines since the embargo was lifted. "From every county and district, from many sources — the local press, our own field engineers of the State Division of Mines, callers at our offices and personal observation — come reports that men are being added to the payrolls, options are being given, and that mines are being reopened." Bradley predicted that the prosperity would endure for quite some time as many veins and localities had been explored to only a shallow depth. In his opinion, "the surface [was] hardly more than scratched" *(Mountain Messenger* 1/6/34).

Some rich lode districts within the National Forests such as Alleghany, Downieville, and Sierra City produced continuously through the first four decades of the twentieth century. In many other districts mines that closed down by the twenties reopened in the 1930s. This was especially true of districts such as Emigrant Gap, Graniteville, Meadowlake, Poker Flat, Tahoe and Washington (Clark 1970: 19-131). Whereas during 1917 at the height of World War I production, thirty-four mines on the Tahoe National Forest employed ten or more miners, in 1937 the total had reached fifty-three. In addition, there were some 100 smaller operating mines within the Forest boundary. Combined the mines produced gold valued at over $1.15 million (Bigelow to Shinn 3/20/17; USDA: Tahoe National Forest Facts 1937: 2).

In some cases, mines not worked since the 1850s were reopened. Near Downieville, for example, the Shamrock Mine opened operations at the legendary Shamrock-Mexican Mine. Mexicans had once worked the mine secretly by transporting mule loads of rich quartz down the mountains and steep canyons to their arrastras which were built on the opposite side of the river from Oakley's store at Cox Bar. The mine location was never rediscovered until 1933. To extract ore from the inaccessible mine, the Shamrock Gold Mining Company cut a road one mile through the Forest along the ridge from the City of Six and the Cornish Mine road, and constructed a 700 foot rail tramway down the Yuba slope from the end of their road to the mine portal. Buildings were then erected — a blacksmith shop, compressor house, bunk and cook house, and foreman's house. Compressors and machine drills were installed and gasoline, timber and food supplies laid-in in sufficient supply to keep the mine operating through the

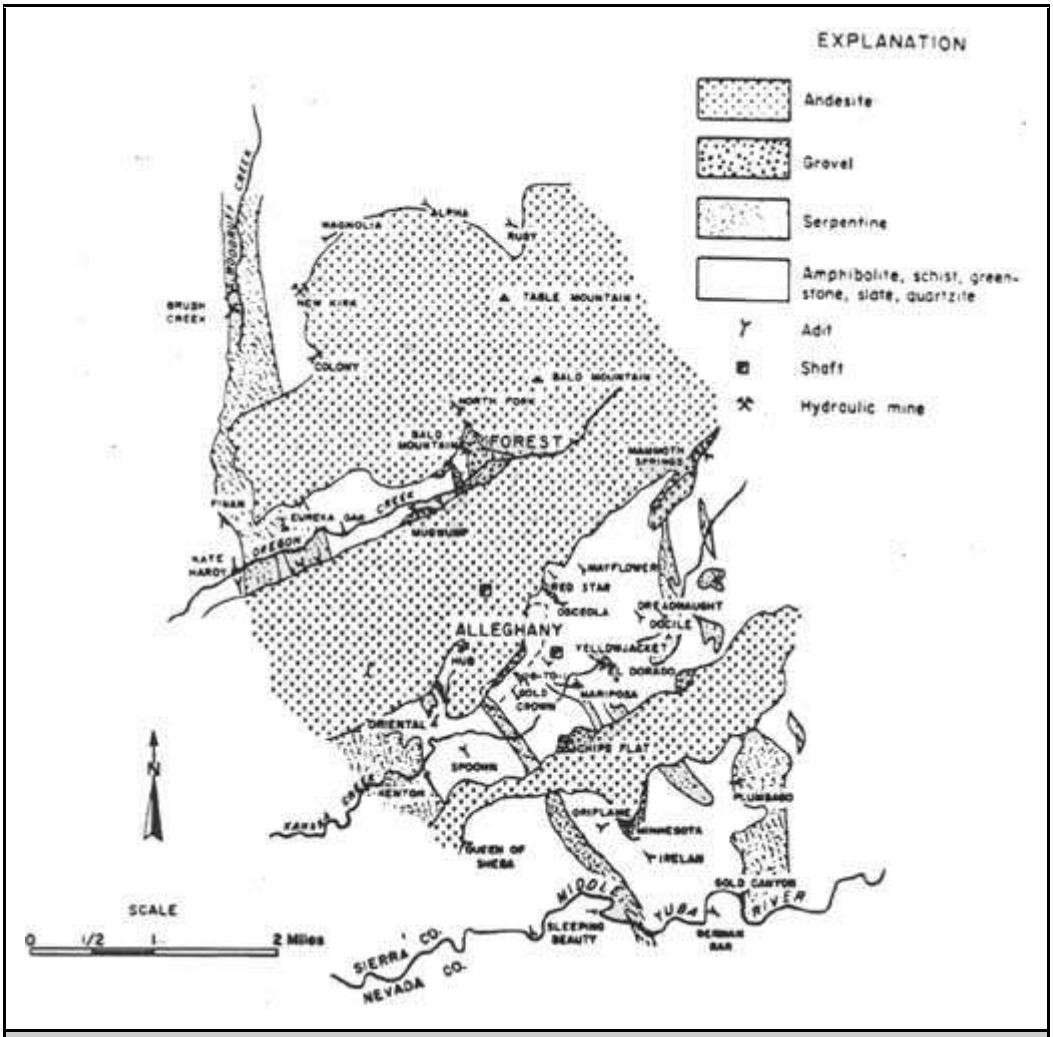
winter. One-third mile below the Shamrock, the Blue Jay mine readied for opening in the spring. West of these in Slug Canyon on the trail to Downieville, the City of Six and Triple Pocket mines were reactivated. This flurry of activity was not unique, noted the local newspaper, "many districts surrounding Downieville on all sides . . . are feeling the stimulating effects of the great revival in gold mining" *(Mountain Messenger* 12/16/33).

By no means were all of the newly opened mines successful. During the Depression, California gold mining attracted a lot of publicity, particularly in papers on the East Coast, where readers eagerly watched for new developments in the California gold fields. The boom attracted some easterners west as it had earlier when mining was the principal industry of the state. Ed Gardner of the California Division of Mines, noted that many new mines were developed by men with no mining experience. In one week in 1934, he visited six mines — one operated by a building contractor from Kansas, one by a manufacturer from Chicago, and a third by an electric furnace man from Pittsburg (Division of Mines 1936: 134). The U. S. Mining Bureau collected records of one thousand old reopened and new mines in California developed by newly organized companies. It discovered that only a small percentage of these operations were successful. Insufficient tonnage of profitable ore, inexperienced or poor management, and inadequate financing were the major causes of failure (Wright 1936: 167-188).

The richest and most famous of the "high-grade ore pockets" to be developed in the California mines was located in the Alleghany District in Sierra County. Ten mines in the Alleghany District produced 57.1 percent of the lode gold in the state in 1937, and accounted for 90 percent of the output of the Tahoe National Forest (Friedhoff 1944: 23, 28). After being relatively quiet in the nineties, rediscovery of the Tightner Vein in 1904 by Henderson L. Johnson led to the revival of lode mining which continued for more than 60 years. Alleghany was the only town in California after World War II where gold was the principal economic base of the community (Clark 1970: 19-20).

Johnson consolidated the Rainbow, Red Star, and El Dorado claims in 1908 with the Tightner and applied for and was granted a mining patent by the Forest Service in 1911. He then sold out to J. M. O'Brien and A. D. Foote, associates of the well-known North Star mine at Grass Valley (Clark and Fuller 1981: 55-56). Foote, a distinguished mining engineer and chief of operations for the North Star Mines, decided to construct a year-round road to link Alleghany with the railroad terminus at Nevada City. The existing road was closed during the winter when supplies had to be packed in and gold carried out by men on skis. The road, a joint public-private venture financed by Sierra and Nevada counties, the U. S. Forest Service and the Tightner mine, was a magnificent engineering achievement. Along the steep descent into the canyon of the Middle Fork, Foote employed skilled Italian, Swiss and Slovakian stone

masons to form a dry-laid rock ledge along the precipitous canyon wall. Steel eyelets driven into the canyon wall held the new rock ledge in place (Conway 1980: 11-12).



Geologic Map of Alleghany District, Sierra County. The location of mines are shown. *After Ferguson and Garrett,* 1932, and *Carlson and Clark,* 1956. (Clark 1970: 22)

Foote and O'Brien operated the Tightner mine until 1918, producing a total of $3 million of ore. Beginning in 1922, a number of extremely rich ore bodies were found in the Sixteen-to-One mine valued at between one and two million dollars. The Sixteen-to-One owners purchased the Tightner mine in 1924 and from then on the operations were combined. These mines together with the nearby Oriental and Plumbago were extraordinarily profitable during the twenties. When gold mining underwent a boom the following decade, hundreds of men found employment in the Alleghany mines (Clark and Fuller 1981: 57-58).

The town of Alleghany was swept by a terrible fire on May 31, 1934, that "almost obliterated the little mountain town." A mining community uncharacteristically known for its population stability and friendly labor-management relations, Alleghany was rebuilt completely within a few months. Much of the rebuilding was done on a cooperative basis with the Sixteen-to-One mine *(Mountain Messenger* 6/16/34; 7/21/34).

Under the Caminetti Act of 1893, hydraulic mining operations in the Sierra Nevada were made legal; however, a debris commissioner licensed the mines and required them to build debris dams to impound mining tailings. The dams proved in most cases to be a prohibitive expense. In the early 1900s, hydraulic mines still operated in several mining districts on the Tahoe National Forest: Brandy City, Eureka, Indian Hill, Michigan Bluff, North Bloomfield, Pike, Washington, and Alleghany (Clark 1970: 19-131). By the early twenties only three percent of the state's placer yield came from hydraulic mines; drift mines produced five percent and surface placers only one percent (California State Mining Bureau 1922: 48). In 1921, the state minerologist commented on the lack of placer mining activity in the northern Sierra. Most of the hydraulic mines in Nevada County were closed and while there was some drift prospecting, none was producing on an important scale. Placer County reported no hydraulic mining activity in 1920. Pacific Gold Dredging Company dredgers operating on the North Fork of the American River below Applegate accounted for most of that county's gold production. A noted drift mining area, Sierra County production was minimal. "Lack of rainfall, unfavorable financial conditions, and scarcity and cost of labor" had brought drift mining almost to a standstill throughout the Sierras (Report of the State Minerologist 1921: 343, 442-451, 476).

In spite of unfavorable circumstances some hydraulic mining did take place at North Bloomfield in 1927. Several other mines in the vicinity were also producing, among them were the Brockmeyer, Paine Diggings, Sherwood Diggings, and the Dutch Bay Diggings. Two miles west of North Bloomfield the Union Hydraulic Pit was operating as were several other mines that extended "in a continuous series" from North Columbia to Badger Hill. All of these mines sent their debris into the South Yuba River or its tributary Spring Creek (Report of the State minerologist 1927: 110). At Relief Hill and the Omega Placer Mine, hydraulic mining companies experimented with constructing retaining walls at the outlet of old hydraulic mining pits and sending their slackings by flume to be impounded in these locations (Report of the State Minerologist 1930: 131).

All the attention of the debris commission focused on the hydraulic tailings that silted and polluted the rivers and flooded the agricultural lands in the valleys below. No mention was made in the Sawyer Decision of the environmental damage to hills at the hydraulic sites. Vast pits were left behind that attained the proportion of gorges. The

huge monitors washed away hillsides where towns and houses once stood. Over the years much erosion has occurred in the pits. At the Malakoff, for example, a great slide took place in the early 1930s that filled the pit to a depth of 70 feet or more (Jackson 1967b: 126). Of all the major methods of gold mining, hydraulicking was the shortest lived, its heyday over by the mid-1880s. Most of the towns associated with great hydraulicking centers have virtually disappeared — Alpha, Omega, Morristown, Forest, Michigan Bluff, Brandy City. When hydraulicking ended, no other industry arose to revitalize the economy of these towns. In only rare cases were the auriferous gravels at the hydraulic sites rich enough to warrant other mining methods, such as drift mining.

Sites similar to those recorded by John W. Winkley could probably be observed at many hydraulic centers on the forest by mid-century. In 1956 he inspected the Great Malakoff wash and left this record:

I drove along the 12 miles of this vast wash and inspected the little towns — ghost towns — of the people who once worked here. The site of Grizzly Hill and the original location of North Columbia have vanished, but ruins mark the spot where Lake City stood. I climbed in and out of cellar pits and foundation enclosures about which grow old locust trees and rose bushes. In one remaining little cabin was a bedstead and stove deep covered with dust. Across the road (once a street) lay the great floor timbers of the Lake City Hotel, once a place of rest and revelry. Along the broad, tree lined main street of North Bloomfield I saw few remaining houses, some in a stately though weatherbeaten architecture of a past age. A few families still lived there. Forest Service, lumbering, road work, cattle and the like keep them busy. (Oakland Tribune 12/2/56)

By the second decade of the twentieth century most of the old hydraulic mining reservoirs were used for irrigation and power purposes. Irrigation districts and power companies purchased the miners' water rights, making it very difficult for hydraulic mine operators to get sufficient water supplies. Although there was some small-scale prospering and intermittent development of hydraulic mines in the thirties near Brandy City, Eureka, Indian Hill, and Michigan Bluff, the output was minimal. Drift mines produced about three times as much gold as hydraulic mines. Among the drift mining districts active in the thirties were Alleghany, Downieville, Damascus, Forest Hill, and Scotts Flat (Clark 1970: 19-131). Power excavators were introduced on the river beds during the 1930s and one of these machines, in 1937, produced almost as much yield as the seventeen producing drift mines on the Forest. As the table which follows indicates, much of the placer gold recovered during the Depression years was taken out by small-scale hand methods and by the "snipers."

Placer Gold Production by Mining Type, TNF, 1937*

Type of Mining	Number of Sites	% of Total Production Value (Placer and lode deposits)
Dredges and Power Excavator	2	$43,855 3.3
Small-Scale Hand Methods	50	23,205 1.7
Hydraulic	8	16,205 1.2
Drift	17	51,100 3.9
Snipers	ca 6,500	38,787 2.9

*(Compiled from data in Friedhoff 1944)

As earlier mentioned, an interesting feature of Depression era mining on the national forests was the migration of thousands of urban unemployed to the gold districts. These "snipers," both men and women numbering perhaps as high as 20,000, drifted from place to place on the forest mining for gold. As with the original '49ers they could usually be located along the rivers and streams working the auriferous gravels. They rarely remained in any location for more than a few weeks, and often took up residence in Forest Service campgrounds (Meggers/Nelson Interview 1982; Friedhoff 1944: 4).

The infusion of several thousand penniless men and women into the mountains brought some social problems, but they were also viewed as a valuable asset. The *Mountain Messenger* advocated creating a school for snipers where lessons would be given in "sluice box craft." Old timbers would teach the art of constructing long toms, sluices, or rockers so that snipers might make and spend more money to boost the local economy (11/25/33). Between 1935 and 1937 it is estimated that snipers on the national forests averaged making less than two dollars per day. The surface placer deposits had long been exhausted as far as commercial values were concerned (Friedhoff 1944: 32-33).

Gold was the principal mineral product of the Tahoe National Forest; however, several other minerals including chromite, copper, lead, and asbestos have been produced. Chromite production was very low except during the war years. The Oxford Quartz Mining Company took chromite out of the Downie River - Red Dog Mountain region. It held five patented mining claims, ninety acres of timber claims, and eight unpatented quartz claims from which it extracted 200 tons of chrome ore during 1914-18. The company constructed a cable train on Red Dog Mountain and packed or sledded its ore to Downieville. Chromite mines also operated at Poker Flat, Brandy City and Forest (Division of Mines 1942: 16).

When prices for chromite dropped after World War I, companies were left with a stock of high grade chrome on hand and equipment that could no longer be used. California annual production averaged 161,177 tons from 1914 to 1918. In the interwar years it dropped to below 1,000 tons. Rising prices in 1941 stimulated output to the 2,300 ton per year level (Averill 1942: 70-93).

Much of the asbestos production within the Tahoe National Forest has come since the 1940s from the Sierra City and Goodyear Creek areas, and from mines in Placer County (Division of Mines 1942: 14). The Sierra Asbestos Company operated an open mine pit between 1917 and 1923 and had a milling plant two and a half miles northwest of Washington (Report of the State Minerologist 1930: 91). Many rich deposits of minerals such as iron, limestone and lead existed within the Forest but remained undeveloped because lack of adequate transportation facilities prevented competitive marketing with other producing regions (Division of Mines 1942: 14).

Water Development in the Tahoe National Forest, 1906-1940.

An important factor in lode mining success in the twentieth century was the availability of hydroelectric power which was delivered over a network of high tension transmission lines owned and operated primarily by Pacific Gas and Electric Company. Electrical energy powered hoists, drilling and milling equipment more efficiently and economically and could be used as well for lighting in the mines. The Alleghany and Pike City Forest mining communities were the first to receive hydroelectric power. In 1907, a PG&E predecessor built a 30,000 volt line from its Old Rome powerhouse on the South Yuba River near Nevada City to Pike City. The power was used to replace a steam-electric generating plant, the output of which was too costly and inadequate for deep mining. Four years later, PG&E extended the transmission line for the Middle Yuba Electric Company to Alleghany, a distance of eight miles. Extension of transmission services was soon made to several mining camps in the Alleghany Forest district from the Alleghany substation *(Mountain Messenger* 7/29/34).

Much of Sierra County remained without adequate electrical power until the 1930s or 1940s. Small hydroelectrical companies the Sierra City Electric Company and the Downieville Electric Company, served those isolated communities. In Placer County the Forest Hill Electric Company, from its plant in Dardanelles Canyon, served that region into the 1920s (Fowler 1923: 73). In 1926, PG&E took over the properties of the Middle Yuba Company and three years later extended service to the mines in the Washington District of Nevada County. In the fall of 1929, Downieville, for the first time in its history, was afforded a twenty-four hour service of electrical energy. Its small water-powered plant on the left bank of the North Yuba which had served the city since 1895 was put out of business *(Mountain Messenger*7/29/34; Report of the

State Minerologist 1930: 90). As late as 1942, a local power plant served the Sierra City district and most of the county's mines were not served by electrical power unless they generated their own (Division of Mines 1942: 8). Construction of dams and power plants on or near the Tahoe National Forest preceded general electrical distribution to Forest communities by a number of decades. Most of the electrical power initially generated by PG&E facilities was transmitted to urban-industrial population centers of the state.

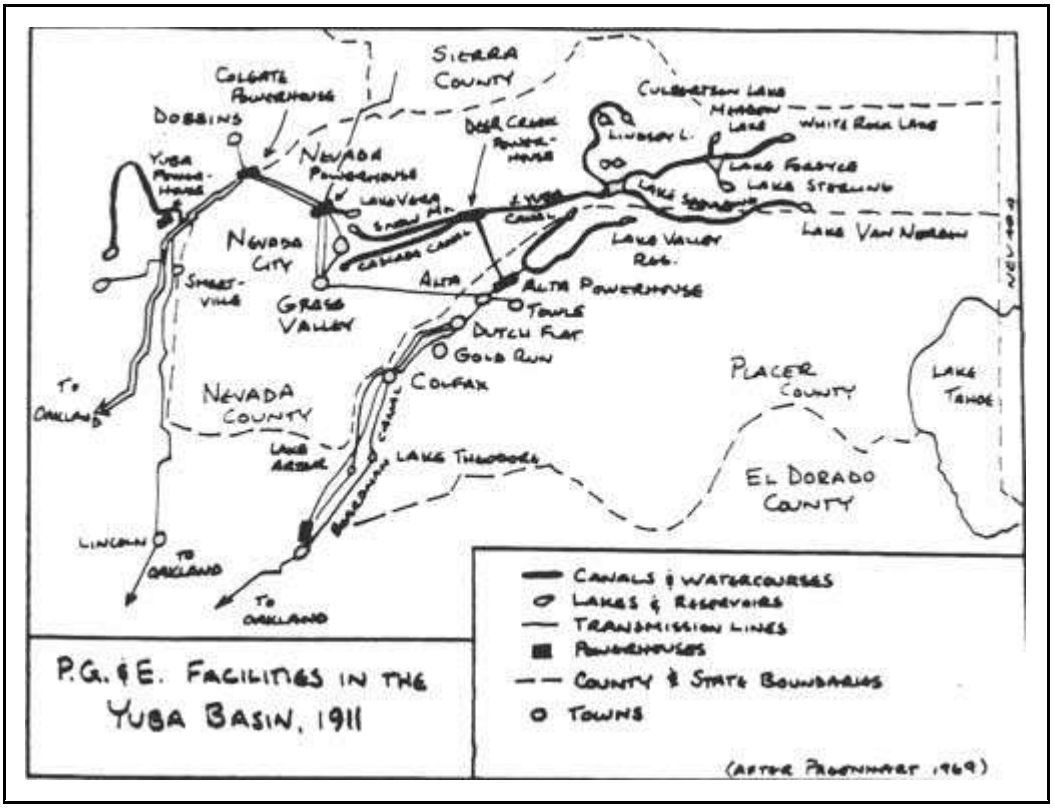
Incorporated in 1905 as a holding and operating company to take over California Gas and Electric Corporation and San Francisco Gas and Electric Company, Pacific Gas and Electric Company became the most conspicuous example of the tendency toward consolidation manifest in the power industry on the Pacific Coast. The first generating plant built by PG&E was put into operation on the South Bank of the South Fork of Deer Creek in 1908. The main reservoirs of the South Yuba system and a small emergency peak-load supply from the Deer Creek forebay served the power plant. Hydraulic mining companies built the Spaulding Powerhouse. Excavation on the first generating plant began in 1912 and went into commercial production five years later. Spaulding Power Plant No. 2, constructed by PG&E in 1920, generated power from water falling from the Drum conduit to supply the South Yuba canal. The powerhouse was a reinforced-concrete structure built on solid granite foundations in the bed of the Yuba River and was connected to Powerhouse No. 1 by a covered stairway (Fowler 1923: 167-175).

Up until the end of 1913, the Main Yuba Canal was the only conduit owned by PG&E that diverted from the South Yuba, but in that year the Drum Canal was finished and became the principal diversion. Only surplus waters and the minimum amount required to satisfy established water rights were thereafter diverted through the South Yuba and Upper Boardman canals. The Drum Canal headed at Lake Spaulding and passed down the Bear River Canyon. A typical section of the conduit had a base of about eleven feet and a seven-foot depth. Portions of the canal were reinforced with masonry and held in place by dry-laid rock wall on inner banks and a wall of rock laid in mortar on the outer bank (IBID: 176, 187).

Another component of the South Yuba Power development within the forest constructed in the period under consideration here was Lake Valley Reservoir. Originally built by the Towle brothers in 1887 to supply power for pulpmills at Towle, PG&E enlarged the reservoir in 1909-11 to furnished water for the Alta powerhouse. The power company constructed two earth-filled dams with wooden cores at the outlet and a spillway at the south end of a small earth fill secondary dam. The outflow was regulated by agate valve at the end of a tunnel at the east end of the main dam (IBID: 172).

In 1915, a group of southeastern Nevada County farmers and orchardists formed the Irrigation Club, the nucleus of the present day Nevada Irrigation District (NID). The group planned to bring water to a section of Nevada County that was not served by previous quartz or placer mining water systems. In 1916, this group together with Nevada City and Grass Valley businessmen petitioned PG&E to extend its South Yuba Water System to provide irrigation to this unwatered area. The utility company declined, so the club members filed water rights applications on upper Canyon Creek beyond Bowman Lake and for storage waters at Sawmill Lake. PG&E's water rights at that time were still confined to the South Yuba headwaters and to lower Canyon Creek tributaries (IBID: 714-715).

In 1921, the NID launched far reaching plans for headwaters storage development and downstream ditch construction. The irrigation district planned to construct new dams adding headwaters of the Middle Yuba River through a tunnel from Milton to Bowman. The irrigation system of the Excelsior Water and Ditch Company would then be used by the project to deliver water for electric power and irrigation in Nevada and Yuba counties (Bigelow 1926: 14-15). PG&E opposed the plan. It had overbuilt its Spaulding and Bear River power plants anticipating eventually to appropriate the water rights now held by NID. Eventually the two sides settled their differences in an agreement whereby district water was transferred to Lake Spaulding under a power contract with PG&E (Pagenhart 1969: 181).



P.G.& E. Facilities in Yuba Basin, 1911 (after Pagenhart, 1969)

PG&E's first major power development on the Tahoe National Forest was the South Yuba and Bear River power system, designed to transfer the headwaters of the South and Middle Yuba rivers to the Bear River Canyon where power could be generated through a series of power plants. The entire system included twenty-seven reservoirs controlled or owned by PG&E, many of which were originally constructed for use by hydraulic miners in the nineteenth century. The first step in PG&E's construction program was the enlargement of Lake Spaulding and construction of the Drum Canal and Powerhouse. The Drum conduit crossed the head of the Bear Valley drainage basin to the south side of the Bear River Canyon and paralleled the old Boardman canal at a higher level.

The South Yuba Water and Mining Company built the original dam at Lake Spaulding in 1892. It was constructed of coarse dry rubble faced on the inner side with three by six inch planks. The new Spaulding Dam, located one-half mile below the old one, was a concrete structure 225 feet high with a thirty inch steel pipe outlet embedded in the concrete. In 1916, PG&E raised the dam to 260 feet and constructed four supplementary dams built into depressions on the ridge north of the main canyon. Called Dams No. 2-5, each of these structures was a gravity section arch dam. These dams were raised, as was the main dam (to 275 feet) in 1919. About 1,000 feet from the main portal of the dam was the original canal and forebay in 1860, they were enlarged in 1907 by California Gas and Electric Company (Fowler 1923: 191).

On the North Yuba River the remaining hydraulic interests combined into an organization known as the Yuba Development Company with plans to construct a series of dams on the river to store hydraulic mining debris, generate power, and provide water for downstream irrigation. The company constructed the Old Bullards Bar Dam on the site of an inadequate debris dam and leased a power plant at the site to PG&E for power development. In 1928 PG&E bought the dam which now lies under the New Bullards Bar Reservoir (IBID: 177-179, 195).

As of 1926, there were no water power developments on the North or Middle forks of the American River with the exception of the hydroelectric plant at Folsom (Bigelow 1926: 15). On the east side of the Sierra on the Truckee River, water developments in the twentieth century were quite extensive.

The Truckee General Electric Company was the first power company to establish itself along the river. It was incorporated in 1899 and built a power plant at Farad to supply electricity to Virginia City that same year. Water was diverted from the Truckee into the Farad Flume by means of a rock-filled timber crib dam at Floriston.

Subsequently, four additional power plants were constructed on the Truckee River, all to the east of the Forest boundary (Fowler 1923: 834-843).

In June, 1905, three years after Theodore Roosevelt signed the Reclamation Act into law, the first federal reclamation project opened in the Carson Valley of Nevada with completion of a thirty-one mile canal linking the Truckee and Carson rivers. Several years later the old rock-filled timber crib Von Schmidt dam at the outlet of Lake Tahoe was rebuilt as part of this project. Stone and Webster, a powerful eastern power syndicate which had bought out the Truckee River General Electric Company in 1908, completed construction of the existing concrete dam at Tahoe's outlet in 1913. It was the first major storage reservoir on the Truckee-Carson Project (Pisani 1975: 142, 154-186; Fowler 1923: 841).

The power company, farmers, manufacturers and residents of Nevada towns all had interest in expanding water storage reservoirs in the Truckee Basin. During the 1920s the search for new storage facilities intensified. Government engineers, in 1927-28, surveyed reservoir sites at the headwaters of the Truckee River. They recommended five potential sites north of the river. Stampede and Prosser Creek valleys offered the most likely sites. Lake in 1928, the Truckee-Carson Irrigation District bought the right to store 12,000 acre feet at Donner Lake. The drought in Nevada in 1930 prompted Nevada legislators to introduce legislation to finance construction of a new reservoir on the Little Truckee River, and dams at Webber, Independence, and Donner Lakes. The Bureau of Reclamation killed the bill. Not until New Deal monies became available was a new reservoir built on the Little Truckee at Boca (1939) (Pisani 1975: 228-229).

Water development projects for mining, irrigation and domestic consumption and power generation have been an important part of the history of the Tahoe National Forest. Remnants of many of the early systems still exist on the National Forest others have been seriously altered by adaptive use. In 1937 there were sixty-two dams and twenty-one powerhouses within the Forest boundaries (USDA Tahoe National Forest Facts 1937: 14-15).

Grazing on the Tahoe National Forest, 1906-1940.

By the 1880s, California's range lands were fully stocked and the mountain ranges were in strong demand (Burcham 1956: 277). At the height of the range controversy the forest reserves were established and the grazing problem quickly became one of the most perplexing in reserve management. Theories on grazing and its damage to range lands abounded and often times the problem was addressed by distinguishing between sheep and cattle, rather than treating the problem in its broadest context. Transient sheepmen were often blamed for denuded vegetative cover on the

mountains and the consequent watershed problems. Their large bands roamed the country, robbing resident stockmen of what they saw as rightfully theirs. Albert Potter, who would become instrumental in working out Forest Service range policy in cooperation with western ranchers, described the problems of the western livestock business in the late nineteenth century.

In the absence of lawful regulations it was quite natural that the period from 1880 to 1900 should become one of spoilation. The pioneer stockman, eager to reap the fruits of his early efforts, increased herds to the full limits of his ranges. Quick profits, and swollen fortunes naturally lead to speculation and companies were organized to place incredible numbers of stock upon the range. . . . The grazing lands were stocked far beyond their capacity; vegetation was cropped by hungry animals before it had opportunity to reproduce; valuable forage plants gave way to worthless weeds and the productive capacity of the lands rapidly diminished. Class was arrayed against class — the cowman against the sheepman, the big owner against the little one — and might ruled more often than right . . . . Probably no class of men deplored this state of affairs more deeply than did the stockmen themselves, but they were the victims of circumstance and government inaction with no course open to them other than the one they followed. (Roberts 1963: 7-8)

Northern California cattle and sheep ranchers had been grazing their stock on the ranges of future national forests for several decades before the forests began to be created. In the Tahoe National Forest the local cattle business dates back to the gold rush decade. The early ranchers had free, unregulated use of the mountain ranges, just as they did all of the public domain. Competition for grass eventually stimulated demand for control of the public domain by the stockmen themselves. By the early 1900s many progressive stockraisers saw the need for better livestock management, but saw little opportunity for improved practices without some form of range control.

The National Livestock Association (NLA), by the late 1890s, had begun agitating for some effective control of range lands on the public domain. The 1891 act authorizing creation of the forest reserves made no provision for their administration. This aroused unrest and dissatisfaction among stockmen who regarded the reserves a threat to the livestock industry. The Department of Interior, in 1894, forbade livestock within the forest reserves. This ban was later lifted but again in 1897 Secretary of Interior Hitchcock issued a regulation prohibiting pasturing of sheep on all forest reserves, except those in Washington and Oregon (Petulla 1977: 273; Roberts 1963: 23-24).

In 1902 the NLA, unhappy with Interior Department policies, endorsed the policy of administrative transfer of the forest reserves to the Department of Agriculture where Pinchot favored a program of regulated grazing wherein the federal government

would play the role of intermediary among sheep, cattle and agricultural interests. The NLA demanded that the department's policy be evolved in cooperation with national and local livestock associations. The National Wool Grower's Association and livestock associations of various western states adopted similar resolutions at their conventions in the early 1900s (Roberts 1963: 18-33).

At a conference of western livestock growers in 1904, convened at the urging of Secretary of Agriculture Wilson, Albert Potter of the Forestry Bureau and stockraisers developed the basic principles of range management on the national forests. The policies, which were to be instituted on the Tahoe National Forest by 1907, included the following points (Barnes 1913: 216-217; Roberts 1963: 44):

1. In granting permits priority in use of the range would be recognized and a preference given to those who had continuously used the range for the longest period.

2. Changes in the numbers of stock grazed and methods of handling stock would be made gradually and with adequate notice.

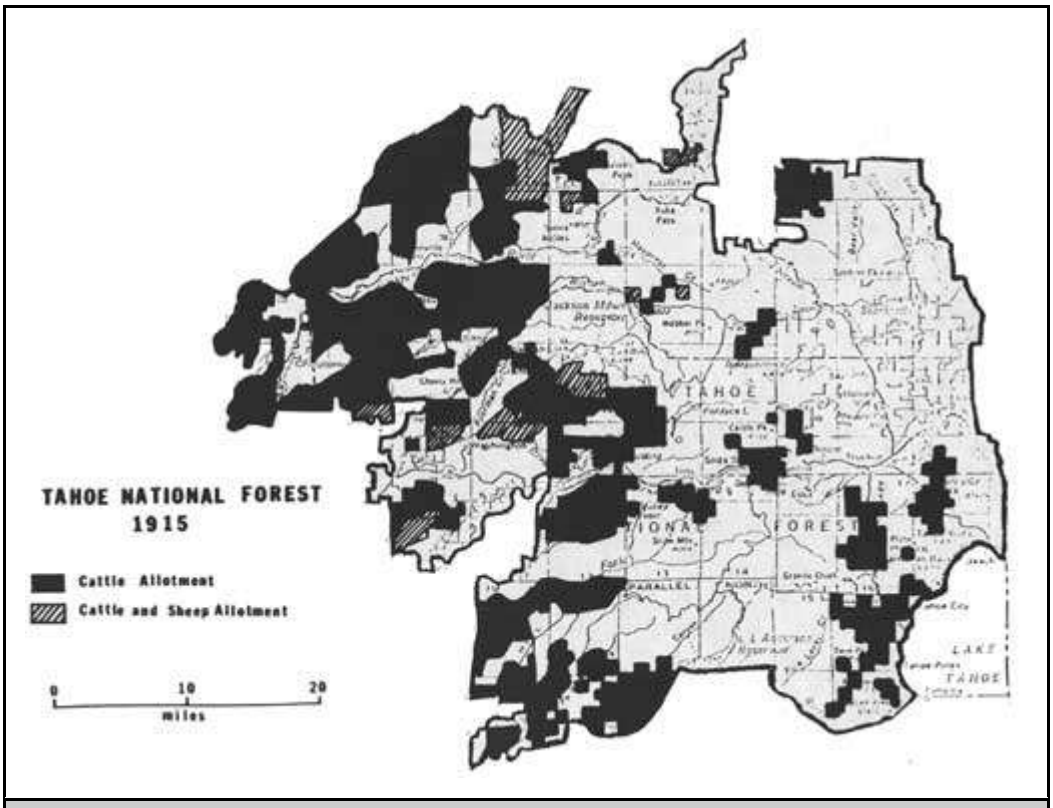
3. Small owners received preference in allotting permits and were initially exempted from reductions in numbers. Protective and maximum limits were established. The protective limit was generally based on the number of stock which the average settler could care for in connection with his homestead and support his family. Maximum limits set the largest number which persons or corporations were allowed to graze.

4. Improvements in forestry and watershed management would be made, if possible, without total elimination of grazing.

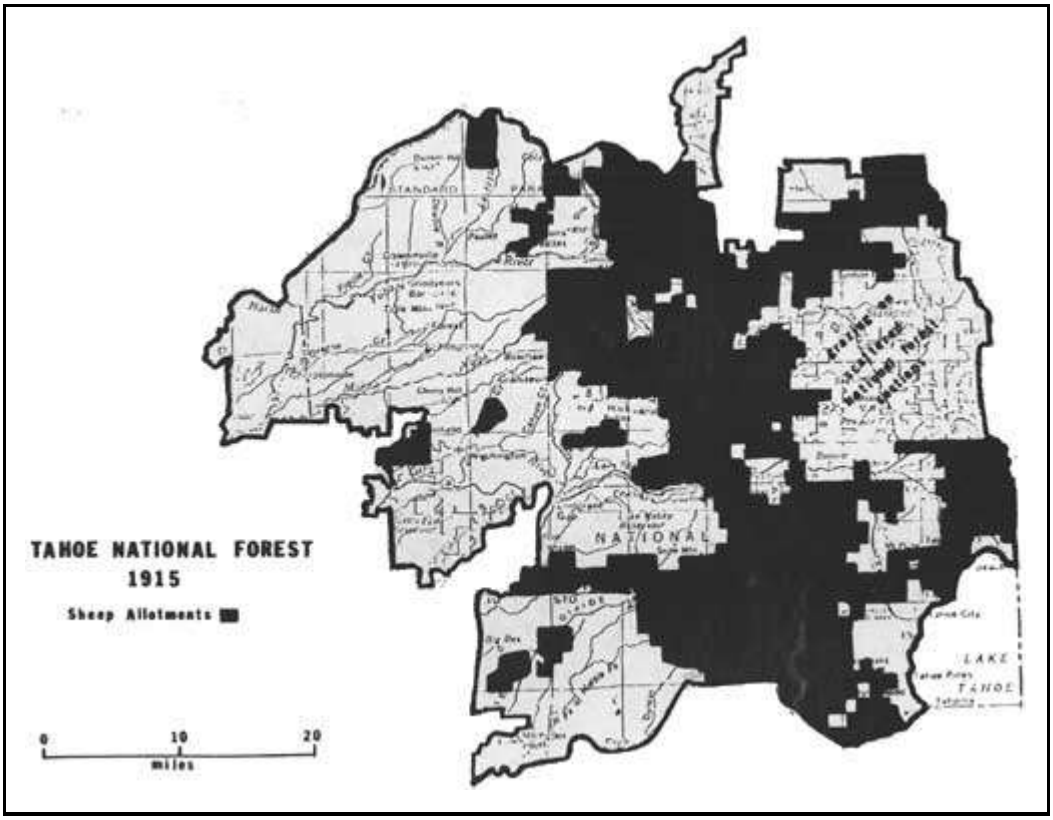
5. Maximum use of forage reserves should be made, consistent with good management practices.

6. Stockmen should be given a voice in establishing management rules in cooperation with Forest Service officials.

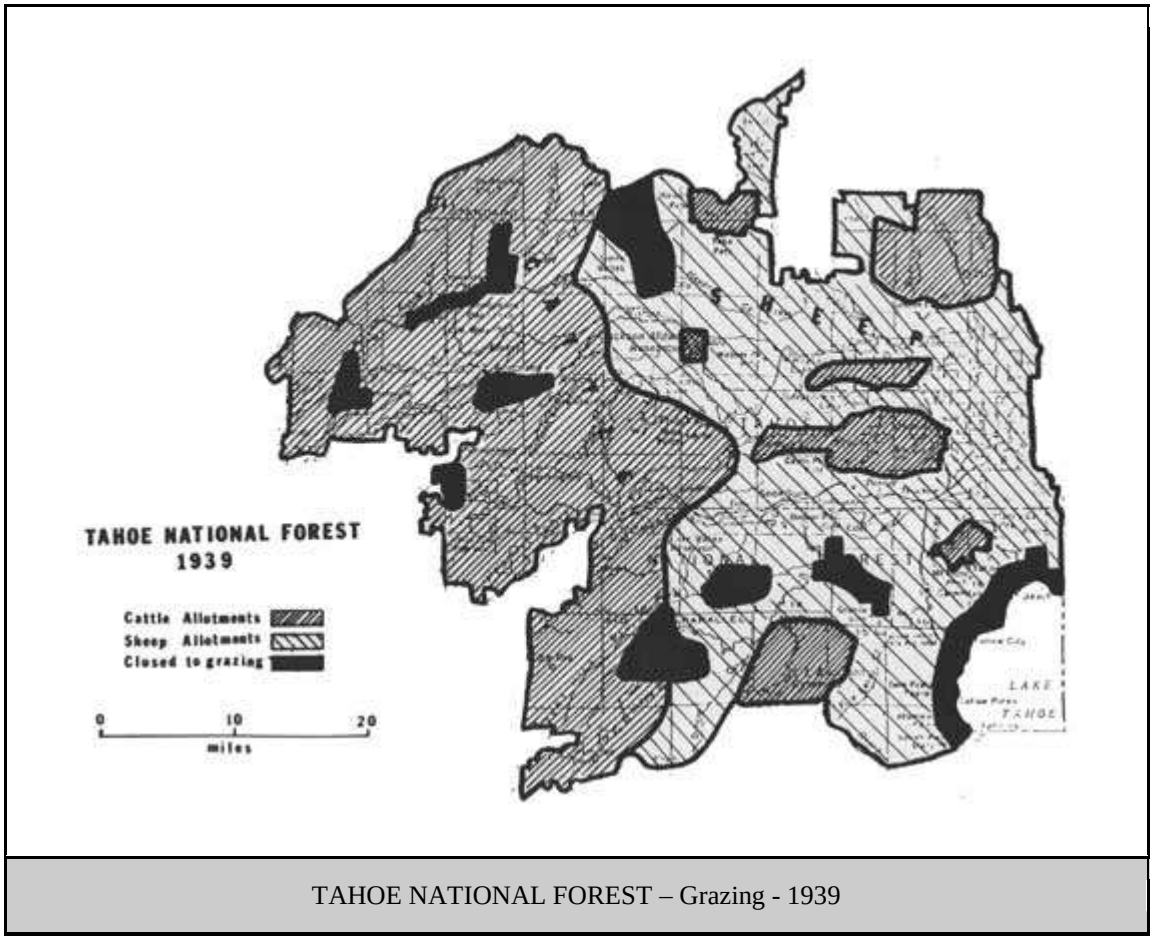
The first grazing regulations of the U. S. Forest Service became effective on July 1, 1905. The application of the grazing system took place on the individual forests. Initial tasks included establishing allotment boundaries, apportionment of grazing privileges among individuals and corporations, and adjudication of their differences and those between them and the Forest Service. On the Tahoe National Forest the task fell primarily on the first Forest Supervisor Madison Elliott and his rangers; after decentralization of the Forest Service administration in 1908, Elliott continued to provide considerable assistance as regional chief of grazing.



TAHOE NATIONAL FOREST – Cattle - 1915



TAHOE NATIONAL FOREST – Sheep - 1915



TAHOE NATIONAL FOREST – Grazing - 1939

As in other national forests, the Tahoe forest officials subdivided the Forest into administrative units laid out on the basis of the types of land, the means of access, and the use made of the land. For grazing administration purposes the units were subdivided into allotments which became the basic unit of forest grazing administration. On the Tahoe National Forest allotment boundaries were commonly drawn in conformance with natural landforms such as canyons, river or creek beds, or ridge tops (Meggers Interview 1982). Configuration of allotments might be further influenced by availability of water resources. In certain sections of the Forest a complex interspersion of Forest land with railroad grant lands, mining claims, or other private holdings caused special problems. The early allotment boundaries typically excluded mining districts, towns, and agricultural settlements. However, grant lands of the Central Pacific Railroad on the eastern side of the Forest were heavily grazed in association with the alternate forest reserve lands (Tahoe National Forest Historic Range Maps, 1907, 1915, 1939).

On the Tahoe National Forest, demand for range allotments at first exceeded supply. At the Second Annual Convention of livestock grazers of the Tahoe National Forest, presided over by Supervisor Elliott, 230 stockraisers attended and among the issues discussed were extension of the Forest, regulation of sheep grazing, and establishment of a new reserve with headquarters in Placerville *(Morning Union* 11/22/08, 11/12/08). Some of the ranchers present came from Forest communities within Sierra, Placer and Nevada counties, however, Yuba and Sutter counties were well-represented as were ranchers from other parts of the Sacramento Valley and the state of Nevada *(Morning Union* 11/12/08).

Determinations of the numbers of stock for each applicant, and the size and locations of each allotment must have been a difficult task. By 1915, allotment lines were fixed and major changes in the broad patterns of range use did not seem to have occurred through 1939 (Tahoe National Forest Historic Range Maps, 1915, 1939). In the most general terms, the western division of the Forest and scattered allotments at the lower elevations on the eastern side were allotted to cattle ranchers. The higher elevations, and the eastern slope, were assessed primarily to sheepraisers. A Special Population Report prepared by Supervisor Bigelow in 1912, estimated the resident stockraiser population within the National Forest boundary at thirty. Of these, eleven occupied Forest land and nineteen private land. Estimates of the "nomadic grazing population" was considerably higher at 269 (Bigelow 1913: 1). A number of these were, of course, herders, linemen, packers, or other employees of cattle owners. Nevertheless, the implication is clear — most of the grazing demand in the 1910s came from foothill ranches, Sierra Valley, or from areas to the east around Reno and elsewhere in Washoe County. This condition persisted at least into the 1930s (Tahoe National Forest Grazing Plan 1930: 2) and undoubtably remains the situation today.

Reflecting Forest Service policy to allot lands to local residents and long-time users, the early permittees included many pioneer ranching families. Descendants of the Peter Yore family controlled the cattle allotment northeast of Camptonville extending between the North Yuba River and Oregon Creek, east to the Humbug Creek drainage (TNF Historic Range Map, 1915). Peter Yore was a pioneer resident of the Camptonville area, having built the old Sleighville House Inn in 1849 on the Sierra Turnpike. In the 1860s the family built the Yore Toll Road, to improve travel to Downieville. A famous landmark on the road, the inn continued to be owned and operated by the Yore family into the 1920s (Sinnott 1978: 289).

North of Downieville the Lavezzola brothers, descendents of an early Downieville ranching, mining and merchantile family, controlled the cattle allotment on both sides of the creek that bears the family name (TNF Historic Range Map 1915). Rangelands associated with the historic Oak Ranch northwest of Downieville were allotted to Austin Sheehan, son of James, who had purchased the ranch in 1867. The Sheehans

lived at the old ranch site until 1917 when they moved to Rackerby. From that time until 1958, they used their ranch and allotment to the north for summer pasture (Sinnott 1978: 292).

Munson Bernard Church controlled several range allotments on the Tahoe National Forest. He possessed a dual cattle and sheep permit on the north slope of San Juan Ridge east of Columbia Hill, and two sheep allotments; one on Poorman Creek west of Gaston, the other surrounding Bowman Lake (TNF Historic Range Map 1915). Church's grandfather, Chandler, came to California in 1850 and was the first settler on the Buckeye Ranch below Indian Springs, Nevada County (Larder and Brock 1924: 1000). Munson and his wife, Kate, who was a grandniece of Commodore Sloat (California's first American military governor), resided on the Buckeye Ranch until 1942 when it was taken over by the government with the establishment of Camp Beale *(Sacramento Bee* 10/11/46).

The Forest Service granted descendants of the Kelly family grazing rights to rangeland in the vicinity of Cisco. Michael Kelly, an Irishman who had immigrated to the United States at an early age and raised livestock in several southern states, came to Mississippi Bar in Sacramento County in the summer of 1851. During the construction of the Central Pacific Railroad, Kelly took sub-contracts to haul granite from the quarry at Rocklin to places along the rail line. By 1867 his son, Maurice, had taken up cattle ranching and within a decade possessed some 1,200 acres of cattle range in the vicinity of Six Mile Valley (Larder and Brock 1924: 527-528).

On the Truckee District, James Joerger and Sons received grazing rights to the Martis Creek Watershed on the basis of their continued use of that area since the mid-1850s. James abandoned gold mining in 1854 and two years later started a dairy ranch in Clarksville, El Dorado County driving his herd over the summit to the Truckee pasture each summer *(Sacramento Bee* 4/15/50). Other examples of pioneer families receiving allotments are numerous. The Turner family settled the Fourrier Ranch between Downieville and Sierra City in the 1850s and later ranched in the Sattley area (Woolbridge 1931: 383-384). Permittee A. S. Nichols introduced the first full-blooded Holsteins into Sierra Valley in the 1880s (Sinnott 1976: 260). A pioneer sheep and wool-grower, Albert Eugene French homesteaded on the Bear River area of Placer County in 1870 (Larder and Brock 1924: 525-526). Each of these individuals obtained grazing rights under early Forest Service allotment policies.

Forest Service policies concerning maximum limits on grazing privileges and application of limitations were often complicated by complex individual, partnership, family and corporate interests and combinations of interest. On the Tahoe National Forest several members of the same family sometimes banded together to control large sheep allotments. D. C. and S. H. Wheeler of Nevada held grazing permits

comprising extensive acreage west and north of Lake Tahoe extending as far north as Sardine Peak and eastward into Nevada. One of their main sheep camps was in the Kyburz Flat region near a major sheep flockway that cut a large arc south around Sierra Valley. The Jensen brothers held permits for a large percent of the sheep range between French Meadows and Lake Tahoe. Fuller and Sons controlled the range near the headwaters of the North Fork of the American River (TNF Historic Range Map 1915). One of the most prosperous pioneer farming and sheepraising families in Placer County, the Aharts, possessed sheep allotments between French Meadows Reservoir and the Forest Hill Divide at the southern extremity of the National Forest (Thompson and West 1882: 386). The Fuller and Ahart families had been running sheep in Placer County at least since the 1870s. Price Blackford and his partner brother-in-law Joseph Hartley held permits to run sheep over much of the area north of Highway 80 between Cisco Grove and Donner Summit, including Fordyce Lake and Lake Sterling. Blackford was born in Grass Valley in 1855 and spent much of his youth hiring out on dairy farms in the mountains. He established his home ranch in 1875 in Yuba County in the vicinity of Wheatland (Delay 1924: 433-434). In 1907, Blackford and Hartley were grazing 5,000 head of sheep on their summer pasture lands *(Dairy Union* 10/2/07).

The average size of cattle allotments on the Tahoe National Forest by 1915 was substantially smaller than sheep allotments and the cattlemen were more numerous. There does not appear to have been any attempt by these small cattle owners to form group organizations for cooperative handling of livestock. As indicated above, sheepmen often combined the herds of several family members into a cooperative partnership that in some cases extended beyond the immediate family. As of 1915, however, there was only one sheep association or company holding grazing allotments on the Tahoe National Forest and it was by far the largest single permittee. The Pyramid Land and Stock Company, a Nevada sheep-raising outfit, grazed their stock on both sides of the Bald Ridge Divide, along the headwaters of the Middle Yuba River and the Little Truckee River; in the mountains west of Sierra Valley at Gold Lake; and on the Bald Mountain Range east of Loyalton. This Nevada-based company, together with the Wheeler brothers, owned grazing rights to perhaps one-third of the National Forest's sheep allotments in 1915 (TNF Historic Range Map, 1915).

Once range allotments were laid out and disputes over grazing rights settled, efforts in management were directed toward range restoration through improvement in the manner of handling livestock. In 1905, Albert Potter argued before the American Forestry Congress that his investigations of the forest ranges indicated damage caused by livestock was most often attributable to grazing too early in the season and poor handling of stock. Lack of range management was as significant a contributing factor

to range destruction as overstocking. In the sheep industry most grazing practices were based on lowest cost of operation. Forest Service management changed some herding practices. Close herding of stock caused much damage to forage and was eliminated, as was long use of bed grounds. Prior to about 1910, herders usually established semi-permanent camps in the center of their range area and herded sheep back to the same camp each night. Thus, bed grounds were denuded and trampled into dust. The Forest Service set limits on the number of days sheep could be bedded at any spot, initially six days; later this was reduced to three. The Forest Service alternate method of herding sheep, known as open herding, which minimized driving and allowed sheep to spread out and graze, resulted in smaller flocks. Whereas herders could drive 1,200 to 2,000 ewes with lambs and 2,000 to 3,500 "dry" sheep under the old system, open herding cut the size of flocks in half (Roberts 1963: 99-101).

On cattle allotments the Forest Service range policy also led to some changes in historic methods of operation. Cattlemen had for many decades established small homestead claims in the mountains where they built small cabins and fenced meadowlands to feed the horses of cattle tenders. With the establishment of allotments care had to be taken to keep stock from straying. Drift fences reduced the time cattlemen spent riding to retrieve wandering cattle, kept cattle within assigned allotments, and prevented unassigned stock from entering. In the broken, mountainous sections of the Forest, boundaries often were drawn along creeks or precipitous slopes which largely precluded the need for fencing (Meggers Interview 1982; Roberts 1963: 101-104).

The Forest Service instituted measures similar to the open herding policy on sheep ranges to cause cattle to distribute themselves and graze all over the range with minimum driving. Cattle were drawn to salt licks located in lightly grazed areas. Water developments, especially piping of spring water into troughs and ponds improved distribution. Programs of predator eradication were worked out with stockgrowers as wolves, coyotes, mountain lions and bears destroyed great numbers of livestock each year. Stockmen associations offered payment of bounties, and hunters established cabins in remote areas which served as headquarters for their operations. The Forest Service assisted in predator control and also instituted programs to control poisonous plants and infectious diseases (Barnes 1913: 226-347).

Wartime demand increased the number of livestock permitted on all national forests from 1914 to 1918. The need for meat and wool increased so radically that the Department of Interior opened the national parks to grazing for the first time. Overgrazing had disastrous effects on the range and much attention was given to reduction in numbers during the 1920s. Sheep took an especially heavy toll on grazing land on the eastern district and the National Forest purchased 20,000 acres from the

Sierra Nevada Livestock Company to help eliminate further destruction to timber lands. Supervisor Bigelow planned to eliminate as many sheep as possible replacing them with small numbers of "locally owned cattle" (TNF Management Plan 1928: 19).

Following the war, depression hit the livestock industry, prices for wool and meat dropped quickly and the adverse conditions lasted well into the 1920s (Roberts 1963: 121). Between 1926 and 1930 the numbers of cattle grazing on the Tahoe National Forest dropped by thirty percent, sheep decreased by twenty-five percent. The numbers of sheep continued to drop throughout the thirties, in part because of Forest Service policy, but also because of difficulty in obtaining trustworthy, competent sheepherders.

Livestock Permitted on the Tahoe National Forest*

	1926	1930	1937
Cattle	13,000	8,985	11,650
Sheep	100,000	75,507	65,780

*Bigelow 1926: 6, 1930: 2; USDA, TNF Facts 1937: 11-12.

Basque sheepherders had become indispensable to large stockowners by the 1900s. With the Basque, however, sheepherding was seen as a way to establish their own herds, then sell out, and return to Europe to set up their own business. In the 1920s, immigration restructions setting a low quota for Spanish nations caused a severe shortage in the sheepherding industry which reached crisis proportions. It never fully recovered (Douglass 1980: 59-61).

Recreation on the Tahoe National Forest, 1906-1940.

Mountain people in the early years balanced hard work in the mines, mills and logging camps and hard living conditions with recreation. Excursions on horseback, fishing, hunting, and relaxation at mountain resorts were favorite pasttimes. The mountain resorts at Lake Tahoe and Webber Lake, Coleman's and Freeman's resorts near Gold Lake, fishing at Donner and Bowman Lake, and Campbell's Hot Springs were major attractions. Counties and cities competed in winter "showshoe" races and annual Snowshoe Race Tournaments were held at Alleghany Forest, La Porte, Sierra City and elsewhere throughout the region.

The late nineteenth century brought a surge of interest among Californians in primitive environments for the purposes of recreation. Wilderness camping and mountain climbing were important aspects of this movement and had a special appeal to city people as temporary relief from artificial constraints, the frantic pace of urban

life, and the tyranny of the clock. A form of medical treatment known as the "wilderness cure" enjoyed considerable popularity in California during the late nineteenth century. Such patients under the advice of physicians abandoned normal domestic life for a relaxing outdoor camp existence far removed from settled areas. Physician H. Gibbons described the treatment in a California medical journal in 1876:

'Camping out' is getting to be a common practice with invalids. A party is formed, and some mountain nook or other desireable spot is selected, where, with tents and simple bedding and cooking utensils, the company spend their time in fishing and hunting, and recreation of all kinds; and if happily they possess the intellectual means, in the practical study of the charming Book of Nature. (Quoted in Thompson 1976: 145)

Although medical climatologists considered the Coast Ranges "the acme of wilderness perfection," the Sierra Nevada also received high marks (IBID: 155). Believing that the high mountain air and pure waters of Lake Tahoe possessed special therapeutic qualities, Dr. Charles Bourne of San Francisco established the first health resort on the shores of the lake in the 1870s at Carnelian Bay (Bourne ms).

By the early twentieth century, appreciation of the wilderness had become a national cult, and perhaps nowhere held more national appeal as nature's wonderland than did California. The Central Pacific Railroad provided easy access to the high mountain country of the Sierra from Northern California's major urban centers. With a favored location adjacent to the railroad, the Truckee-Tahoe area became a focal point of early mountain resort development. As mountain roads improved, recreation grew along main traveled routes. By the late 1910s the Lincoln Highway passed through Truckee bringing hundreds of automobile parties to camp on the shores of Donner Lake during the summer months *(Grizzly Bear* 6/18/18: 2) During the 1920s, Sierra County and the Forest Service, under cooperative agreements, improved and widened State Highway 49 over Yuba Pass. That road was oiled for the first time in 1934 making it possible to travel by automobile from Sierra Valley to San Francisco on a hard surface highway. "Gone forever are the dust clouds," boasted Downieville's newspaper, "forgotten are the tortuous curves . . . nothing remains to remind the motorist of them except an occasional grass-grown glimpse of the former roadbed as he rolls along the newly surfaced highway." That same year the connecting road from Sierraville to Hobart Mills was scheduled for paving and oiling *(Mountain Messenger* 6/3/34). Completion of this roadwork made high speed automobile travel possible from the Sierra County towns along Highway 49 to the Victory Highway via Sierra Valley.

It is difficult to overestimate the geographic, economic and social impact of the automobile revolution on mountain communities within the Tahoe National Forest. Perhaps the impact was felt as early as 1915. By that year, roads were sufficiently improved to allow Superintendent Bigelow to travel by automobile when carrying out

his duties on the Forest (Bigelow 1917). Not only was the car a back-to-nature tool for affluent urban dwellers to escape a disturbing urban environment, it modernized rural mountain life. In multiplying the number of miles one could travel in a day, the car upset a variety of traditions that depended on smaller, horse-bound spatial radius. Over time, the car substituted a more regionalized network of road-oriented consumers for the older, more localized community of land-locked producers.

The railroad, improved roads and access to mountain lakes and other camping sites made the Tahoe National Forest a popular recreational playground. In 1905, there were numerous private summer resort homes around Lake Tahoe and some twenty hotels. An estimated 40,000 people visited the lakeshore resorts that year *(Truckee Republican* 9/27/05). The big building boom in summer resorts was just beginning. In 1900 no more than 100 individuals and companies owned property at Lake Tahoe. This changed once the Southern Pacific took over the spur line between the lake and Truckee and popularized the lakefront resorts. Passenger streamers transported tourists about the lake. In the 1910s and 1920s the automobile and cheap gas made summer homes increasingly accessible as well as fashionable. By 1930 the number of lakeshore property owners had jumped to 2,000 (Pisani 1977: 17).

Many of those who owned property at Tahoe hoped to preserve their mountain retreat as a hideaway for California's and Nevada's affluent social elite. Fears that capitalists who owned most of Donner Lake's shoreline would forbid public camping led, in 1911, to a movement "to make Truckee and Donner Lake the great camping region of the common people of California." W. B. Gelatt owned a large tract of land along Donner's north shore which he offered to subdivide and sell to "poor men" in small parcels upon which a "tent, bungalow or summer cottage" could be erected *(Truckee Republican* 4/5/11). Sales were sluggish in spite of his efforts to attract buyers by offering gift lots to the first applicants. Eight years later, Gelatt launched the first comprehensive plan to make Donner Lake into "California's greatest winter and summer resort." Known as "Donner Lake Camp," the working-man's resort consisted of a "large camp of housekeeping tents completely equipped and electric lighted'; sanitary, electric lighted campgrounds for automobile parties; an up-to-date grocery; restaurant; and a large dairy." It boasted of boating facilities; summer hunting, fishing, swimming, hiking motoring, and horseback riding; winter sleighing, tobogganing, skiing and snowshoeing. In addition to the public campground facilities, Gelatt offered individuals opportunity to purchase a limited number of camp and bungalow sites for $95.00 per lot *(San Francisco Examiner* 4/24/19; 5/3/19). For railroad passengers disembarking at Truckee, Gelatt offered a stage service to the resort in a coach driven by his father between Placerville and Virginia City during the Comstock boom *(San Francisco Chronicle* 8/31/19).

In the automobile age, these types of commercial campgrounds became the poorman's summer resort, the cheapest place to spend a family vacation. By 1926 an estimated one-quarter of a million people visited the Tahoe National Forest for recreational purposes. The main attractions were Tahoe, Donner and Independence lakes which were filled to capacity each season. The North Fork of the Yuba was also becoming a popular area for summer resorts, especially those in the vicinity of Goodyear's Bar, Downieville, Sierra City and Gold Lake (Bigelow 1926: 16). The Sierra County lakes region boasted a number of popular resorts with fishing, swimming, boating and lodging available. Among these were Salmon Lake Resort, Lakes Center Camp, Packer Lake Lodge, and Camp Pioneer at the Yuba Pass *(Mountain Messenger* 7/29/34).

Just as the wealthy nineteenth century magnate had built palatial summer cottages in the fashionable resort centers, middle class folk in the early decades of the twentieth century bought up abandoned homesteads or farmhouses for conversion into summer homes. Most were probably primitive cabins, on the order of contemporary hunting shacks. After World War II, cottages were better built and equipped and winterized for year-round use as genuine second homes.

Skiing, the most popular outdoor winter sport in the United States, did not really catch on in this country until the 1930s, when an ingenious Yankee mechanic in Vermont hitched a thick rope to an old Model-T engine and invented the rope tow to haul skiiers back uphill. In the forest communities of the Sierra Nevada, skiing was a way of life during snowy winter months and ski tournaments were an event of immense cultural/recreational significance to the local populace. The Auburn Ski Club developed the first commercial recreational ski resort in the Sierra just below Cisco on Highway 40. Ski areas quickly followed at Soda Springs, Sugar Bowl, and elsewhere along the main highway and railroad tracks where winter access was possible (Meggers/Nelson Interview 1982; Fry 1976: 24).

Increased automobile traffic stimulated by winter and summer recreational developments promptly engaged the attention of private capitalists to the business of accomodating highway travelers. Business competition centered on improvement of campsites, service stations, stores, and "soft drink stations" (Bigelow 1926: 19). The motel industry was born and with it other facilities for those able to pay in what one auto camper called "hoboing delux" (Belasco 1979: 4). By the late 1930s, trailers had become very popular on the roads and with them the auto vacation increased in popularity while promoting at the same time the development of trailer camps. Almost all of the early concessions and stopping places developed along Highway 40 were destroyed when the new trans-Sierra Highway was built.

<u>Forest Service Recreational Developments</u>.

In 1905, Forest Service recreational policy consisted of little more than fish and game regulations, trail marking and road building to enhance access for a public interested in "getting back to nature." Early recreational policy looked to uses that could generate income through special use permits for resorts and summer homes. From 1906 to 1914 Forest Service policy discouraged private investment in recreational improvement of Forest lands through its system of issuing annual permits subject to cancellation at the end of each year. The "Term Permit Act" of 1915 substantially changed Forest Service policy authorizing issuance of long-term permits of up to thirty years. The change in regulations stimulated an increase in second home construction on the California national forests that lasted until the Depression. The national forests charged a fee ranging from $5 to $15 per year, depending on its remoteness from urban areas. Lot size was limited to a maximum of one-half acre and permittees had to demonstrate minimum improvement expenditures and complete approved construction within a specified time period. "Lieu taxes" paid on these residences became an important source of revenue to the counties (Berg 1976: 84-108).

Under provisions in the Term Permit Act, forest rangers had responsibility for locating and surveying recreational sites and exercising controls over their developments. Of the summer home tracts existing on the California national forests in the mid-1970s, 16.5 percent were surveyed in the first five years of the program, 53.6 percent during the 1920s, and only 17.5 percent during the economically troubled decade of the thirties. Between 1915 and 1933, California national forests granted over one-half of the total special permits issued for summer home construction (IBID: 83, 90). On the Tahoe National Forest, rangers surveyed four summer home tracts on Bowman Lake in 1926 and several lots were bought immediately. Tracts at Ramshorn Creek and the North Yuba River near the highway were laid out the following year, as were parcels on Lake Tahoe at Cedar Flat near Carnelian Bay on the Tahoe City-Brockway state highway (Bigelow 1926: 19). In 1937, visitor days by summer home users on the Tahoe National Forest were estimated at 6,200 (USDA, TNF Facts 1937: 3).

Realizing the growing attractiveness of the mountains for recreation, the California National Forests began to advertise its recreational attributes. The USFS, in June of 1915, published a guide to free, unrestricted camping on Forest lands entitled *Handbook for Campers in the National Forests in California* (Bachman 1967: 2). At this time, recreation was seen as a non-commodity use of the National Forest, and therefore was assigned a low priority. In 1916, President Wilson created the National Park Service in the Department of Interior. Stephen T. Mather, chief of the new agency, had been attracting substantial attention to the parks as recreational areas for the newly motorized American wilderness enthusiast. The Forest Service was

threatened with additional transfer of its forest land into the growing park system as the public placed increasing value on wilderness preservation and outdoor recreation. Thus, by the late 1910s, new concepts about the non-productive values of the national forests were challenging traditional utilitarian objectives (Steen 1976: 116-117; Nash 1967: 184).

In 1917, the USFS commissioned landscape architect Frank A. Waugh to conduct a study of the recreational potentials of its forest lands. Waugh toured the nation, inventorying the recreational resources in the national forests. He recommended that sightseeing, camping, and hiking be given equal consideration with economic criteria in forest land management planning (Nash 1967: 184). The USFS established a Branch of Public Relations in 1920 "for more careful planning of methods by which the public interest may be increased in both the protection and use of forests" (Steen 1976: 162).

The Forest Service allotted $2,000 in 1922 to California campground development. It was the first such payment and within two years cabin, campground and picnic sites had begun to be designated and developed. The period from 1925-1932 was a period of experimentation. Recreation expert Dr. D. P. Meinckee advocated designated trails and parking areas to be included in campground designs in 1928; four years later he urged construction of improved campsites with fixed fireplaces and tables, barriers to control automobiles and sanitation facilities (Bachman 1967: 3-4).

During the Depression, use of campground facilities in the national forests increased significantly because camping was a cheap means of vacationing. Estimated visitors at Tahoe National Forest campsites in 1937 was 4,900 (USFS, TNF Facts 1937: 3). In addition to the vacationers, "snipers" sometimes lived for extended periods in the various campgrounds near gold bearing water-courses. On the national level, recreational use of forest lands received truly serious attention during these years with the establishment in 1935 of the Division of Recreation within the Forest Service. Money became available for construction of many recreational facilities under the Depression era CCC and WPA work programs. By the end of the 1930s, professional landscape architects designed much improved campground facilities and recreational specialists were finding their way into staff positions with the Forest Service (Bachman 1967: 5-6; Steen 1976: 209-210).

Other Forest Service Improvements.

Fire prevention has always been a major problem on California national forests where fire susceptibility is high during the dry summer months. A devastating fire broke out in August of 1909 near Michigan Bluff that burnt over 1,000 acres. Exactly one year later, several large forest fires did considerable damage to timber and watersheds

along the Forest Hill Divide. The lessons learned from these destructive fires led directly to construction of fire lookout towers on the Tahoe National Forest. In the summer of 1911, the USFS built its first tower in the California region on the Tahoe National Forest at the top of Banner Mountain (Bigelow 1929: 10-11; *Grass Valley Union* 10/22/55). It is still in use.

The lookout tower has been the hub of fire detection until recent times. During the 1910s and 1920s lookout stations were placed on mountain tops or rocky peaks and were sometimes built on thirty to forty foot piers (Kines 1979: 23-24). The towers served local needs and thus possessed certain limitations as the radius of effective fire detection does not usually exceed 15 miles. In California in 1933 the Forest Service conceived a plan for building fire lookouts of the state into a unified system, with complete coverage from the Klamath Forest on the Oregon line south to the Mexican border. Inspection identified 268 lookout sites throughout California (Brown 1926: 214-215).

Lookout construction took a prominent place in the CCC activities on the Tahoe National Forest. The architectural design of the towers became standardized; the typical lookout was a tall, peaked-roofed 14x14 foot wood frame structure with sloping sides. It could be constructed in about six weeks by a six man crew for about $1,000 (Kines 1979: 23; Meggers/Nelson Interview 1982). CCC building programs also constructed roads and trails to many lookouts and crew members strung telephone lines between ranger stations and the towers. Emergency employment programs of the Depression financed construction of some 200 lookouts in California during the 1930s, and many of the towers now standing on the Tahoe National Forest are products of CCC laborers.

The CCC program recruited thousands of young men to work in forests and parks to help solve the chronic unemployment problems of the Depression. The program was administered by a variety of federal agencies, each with specific areas of jurisdiction (Merrill 1981: vii):

Recruitment was done by the Department of Labor. Transportation, camp construction and management was done by the Army while the Departments of Agriculture and Interior selected the camp sites, planned, designed and supervised the work projects in cooperation with the State Departments of Forests and Parks. Through cooperative arrangements the Corps worked on national, state and metropolitan lands and projects.

Seventy-five percent of all CCC camps worked on projects administered by the Department of Agriculture, more than half of these were employed on national, state and private forests under direction of the U. S. Forest Service (Salmond 1967: 121).

CCC work fell into two broad categories: forest protection and forest improvement. Its tangible accomplishments in the area of forest fire protection were construction of roads, trails, telephone lines and lookout towers — all of which facilitated communications between fire fighting units and enabled supplies, equipment and men to be transported with greater speed (Nelson Interview 1982). One of the most important contributions in timber protection was the great 600 miles long firebreak separating the foothill brushlands from the forested uplands. Many of the CCC boys from the Tahoe National Forest camps spent their winters working on the "Ponderosa Way" firebreak *(Morning Union* 9/17/33). CCC enrollees also functioned as forest fire fighters, some served on permanent fire control, but most contributed as a readily available, mobile reservoir of assistants.

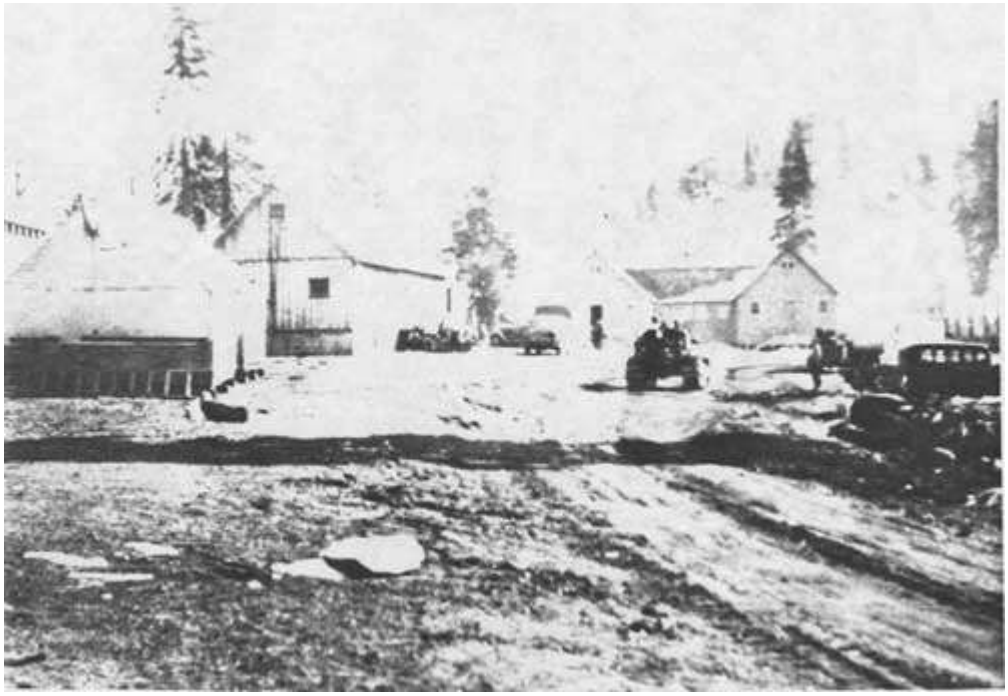
In the category of forest improvements, work took a variety of forms. Structural additions such as warehouses, garages, overnight cabins, shelters, and tool sheds were built to enhance efficiency in forest management. Construction of new campgrounds, timber utilization roads and trails, forest signs, and small dams and culverts kept the young men busy. Reforestation — tree planting and thinning and planting of experimental forest plots — was perhaps the most important aspect of CCC forestry improvement (Salmond 1967: 121-134).

In early May, 1933, a group of 20 young men under the command of Captain Biehl, U. S. Army, reported to Camp Bloomfield. Company 194's first duty that summer was to construct its own campsite. Once this was accomplished, the crew was turned over to the Forest Service for other work. By the end of the summer, eight other camps were distributed throughout the Tahoe National Forest, one in each ranger district (Clyma 1939: 13). Camps were located at North Bloomfield, Baker Ranch, Wild Plum, Sattley, Oak Ranch, Miller Ranch, Little Robertson Flat, Bear Valley, and Truckee (CCC Camps 1933). Where forest protection and construction projects of long duration were underway, the CCC's established smaller temporary spike camps.

CCC camp-types varied from region to region and according to the date of construction. The earliest camps were often simply tents lined up in neat rows. Wooden barracks, however, quickly became the standard style of housing structure. Camp population including supervisory personnel averaged about 200 persons. The camp consisted of four or five barrack buildings, one hundred by twenty feet, together with administration buildings, officer's quarters, a hospital, mess hall, recreational center, a garage, and usually a school/library. The buildings were typically arranged in a roughly "U" shape around an open space used as a sports field and general gathering place (Salmond 1967: 135-136).

None of the CCC camps constructed on the Tahoe National Forest remain today. The early camps were of tent construction and easily dismantled when the site was

abandoned. Later the camps were built of pre-cut portable material of standard design. Thus, the buildings could be taken apart and moved at the end of a work project. It was about 1936 before the prefabricated building designs standardized camp architectural styles. After that date the unique features of each camp had to be embodied in alterations of functional layout, construction of pathways between barracks, adornment of buildings, construction of railings and rustic gates, planting of trees and gardens (IBID: 136-140).



AUBURN SKI CLUB C. C. C. CAMP

SATTLEY C.C.C. CAMP. NOTE EARLY TENT STRUCTURES, 1933.

The CCC conservation work had been so successful that, faced with permanent termination of the program in 1937, the Forest Service and other agencies began to draft legislation making the CCC camps part of a permanent policy of the U. S. government. Instead, the program was extended two years with slight modifications. In 1939, it was extended three more years. During these latter years of operations, CCC units on the Tahoe National Forest were terminated and most activities centered around camps at Grass Valley, Foresthill, and Hobart Mills (Directory of CCC Units, 9th Service Command, 1942). The final years were marked by substantial cutbacks in financing the program and unrest in the camps. When the war in Europe boosted the American economy and improved the employment picture, the need for the program rapidly diminished. The CCC program was terminated in July of 1943 (Salmond 1967: 179-199).

Gathering scientific data on rainfall, snow depth, streamflow, and lake levels has long been an integral aspect of California's attempts to more accurately manage its complex water storage and distribution systems. The earliest precipitation records on the Tahoe National Forest were gathered by individuals and corporations. Station agents for the transcontinental Central Pacific Railroad and the ditch-tenders for the mining and ditch companies customarily kept precipitation gauges at their places of work (Pagenhart 1969: 61). The eccentric water-cure physician and rustic health resort owner, Charles Bourne, kept measurements of rainfall and lake levels at Lake Tahoe

during the 1870s (Bourne MS: np). By the end of the 1890s, the U. S. Geological Survey budget permitted establishment of stream measurement stations along major Western rivers. In 1900, engineers, for example, began monitoring Lake Tahoe's level and daily outflow into the Truckee River (Pisani 1975: 143). Interest in predicting annual stream run-off through scientific analysis began in the 1880s. Dr. Church, the pioneer in the science of snow surveying, established regular measuring stations within the Tahoe National Forest area before the turn-of-the-century. For many years, Forest rangers assisted in collecting this useful data (Nelson Interview 1982).

CHAPTER VI
Concluding Statements

During the gold rush decade the population density of the Tahoe National Forest area was far greater than in any subsequent period of history. Important towns such as Downieville, once inhabited by over 5,000 people, never again attained a size of more than a few hundred. With the exception of the decade of the 1870s, when hydraulic mining output increased rapidly, the regional population declined precipitously from the 1850s into the 1920s. According to census figures, the population estimate of the forest for 1920 can be set at a level of perhaps one-fifth that of 1850. The general decline in population for each of the three counties is clearly reflected in statistics from the U. S. Census Bureau for townships lying wholly or partially within the Tahoe National Forest boundaries. These figures are provided in the following table.

ESTIMATED POPULATION WITHIN TNF BOUNDARIES
() indicates decadal population change in percentages.

COUNTY	1850		1860		1870		1880		1890		1900		1910		1920		1930		1940
Nevada	20583		10933		10861		12571		9440		9670		7957		4656		4818		7350
		(-47)		(-1.0)		(+16)		(-25)		(+2.0)		(-18)		(-41)		(+3)		(+53)	
Placer	10783		5670		5126		5420		4646		3508		2032		772		1516		2045
		(-46)		(-10)		(+6)		(-14)		(-24)		(-42)		(-62)		(+96)		(+35)	
Sierra	3741		7340		5619		6623		5051		4017		4098		1783		2422		3025
		(+96)		(-23)		(+18)		(-24)		(-20)		(+2)		(-56)		(+36)		(+25)	
TOTAL	35107		23943		21606		24614		19137		17195		14087		7211		8756		12420
		(-32)		(-10)		(+14)		(-22)		(-10)		(-18)		(-49)		(+21)		(+42)	

Between 1920 and 1940 the Forest population almost doubled and can be explained largely by improved transportation access which stimulated permanent settlement, migration of urban unemployed to the region during the Depression, and the general prosperity of the mining districts.

One of the most marked characteristics of the Tahoe National Forest population has been its geographic mobility. Many miners arrived at the diggings without any intention of remaining there for a long period of time. Once in the gold fields they moved about at the slightest news of rich diggings elsewhere. They rushed from

stream to stream throughout Northern California, into Nevada and Arizona; over the Inland Empire of Washington, Idaho, and Montana; to the Rocky Mountains and the Black Hills; even into Canada. Wherever they went, merchants and farmers, freighters and lawyers followed. Loggers moved their mills and camps whenever they finished cutting over a new area. Industrial practices in the lumber and mining industries helped stimulate a high level of geographic mobility since they attracted young unmarried men without roots in the region. William S. Eggleston who worked in the Alleghany mines during 1923 recalled how jobs were filled in construction, lumber and mining camps from the "Slave Market" in San Francisco:

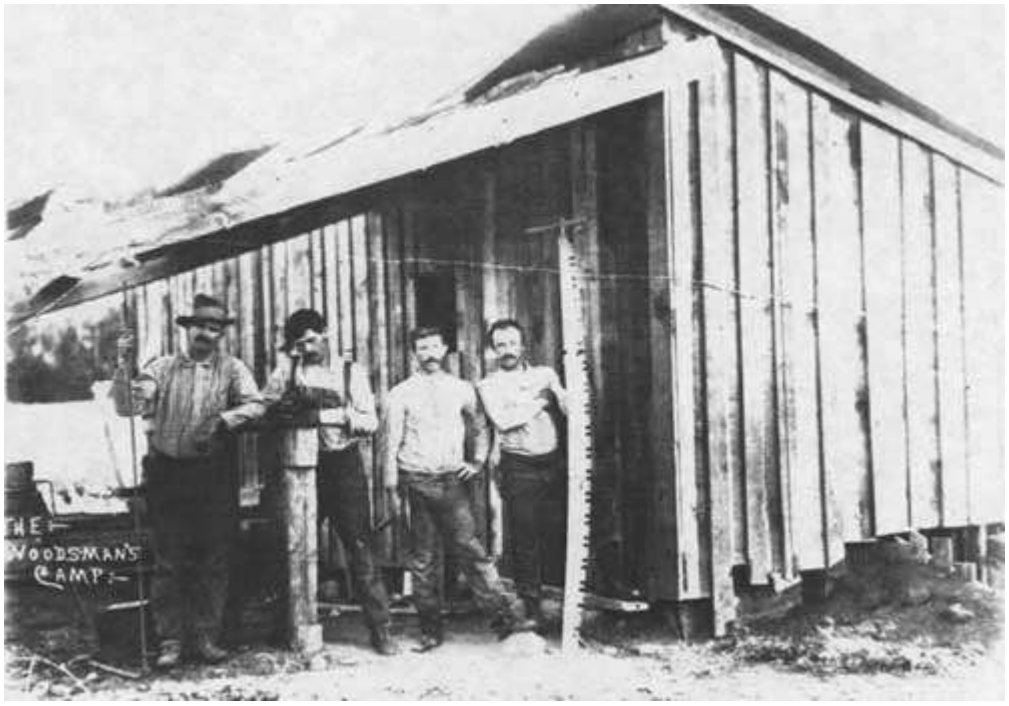
The San Francisco office was nothing fancy. It was in the warehouse district and was just a single room on the ground floor of a rather ramshackle building. The room was rectangular, about 30 feet long and 20 wide. A rough wooden table with attached sitting benches occupied the center of the room. In the middle of the table was a large bowl of smoking tobacco with packets of brown cigarette papers scattered about the bowl. Miners and cow-punchers all rolled their own as did most other working men of that time.

On the walls were mounted blackboards, each section devoted to a particular industry that made a practice of hiring day labor. There were ranch jobs, construction jobs, jobs in the woods, and mining jobs. Each section listed jobs available and the daily or monthly wages paid. For instance, in the mining section were listed: Timberman — $5.00 per day; Mucker or Trammer — $4.00 per day; Miner-machine — $4.50 per day.

In one corner of the room was a small cubicle with a clerk sitting at a small desk. After looking over the board to see which job you could qualify for, you went to the door of the small office and told the man at the desk which job you wanted and, if the job was out of town, you were given a railroad ticket or a stage ticket to get to the job. If you stayed on the job a month, the fare was cancelled out. So, for one dollar, you could not only get a job, but you got your transportation. (Eggleston 1981: 49-50)

The proportion of the Forest population living this transient lifestyle was extremely high. Supervisor Bigelow's special population report for the Tahoe National Forest estimated that of the 8,860 persons living or working within the boundaries of the Forest in 1912, 4,101 or 46.3 percent were transients. These were not drifters, nor irresponsible loafers, but working men holding down jobs on the Forest. Almost one-half were employed in the lumber industry; seventeen percent were engaged in some form of prospecting or mining; less than seven percent were herders, packers, or otherwise employed by ranchers; miscellaneous "other occupations" and temporary Forest employees accounted for the balance (Bigelow 1913: 1).

Sometimes the movements of these people were seasonal. Circumstances that caused them to move from place to place were obviously in some cases related to the natural rhythms of nature. Forest employment in the construction lumber and ranching business was largely seasonal. Mining work was also often ended with the advent of winter.



TEMPORARY LOGGING STRUCTURE

FIR CAMP, FOREST HILL; 1924 FIRE FIGHTER'S PAYDAY

What difference did it make that people on the Forest in earlier times moved from place to place and job to job with such frequency? Certainly it made difficult the formation of communities and worked against social integration of people into the places in which they worked and lived. Transiency introduced instability into the society of the region and makes problematical to the modern observer even the definition of the population of any one place. Needless to say, these factors make it much harder to study a community as a working organism over time. Did population estimates of a place, in the eyes of contemporary observers upon whom we rely so heavily for information comprise the people living there for any specified period of time, or all those present at any one moment even though they would be gone within hours, days, or weeks? As late as the 1930s, population statistics for towns within the Forest gathered by the U. S. Census, the Forest Supervisor, the Resettlement Administration, Rand-McNally and Hammond differ significantly. Hobart Mills' population was variously recorded as 400, 510 and 609; North Bloomfield's estimates ranged from 510 to only 50 persons; Sierra City recorded populations of 250, 510 and 189 (USFS 1937: 2).

The implications of transiency in understanding community development and the day-to-day lives of the common man on the Tahoe National Forest are clear enough. Answering such basic questions as how the historic communities were structured, how the parts of society worked together, what underlying forces eventually altered both

structure and function will be a difficult task for future researchers. In the gold rush mining economy of the 1850s (and later), and in the logging towns and camps, transient laborers were every bit as important as agriculturalists, merchants, and corporate miners. If nothing else, they were producers and consumers. An assessment of how the economy functioned and how the society was structured must take into account all of these participants. Only through detailed historical analysis and synthesis together with archeological field work will be begin to understand and appreciate even the most rudimentary details of the lives and values of these predominantly anonymous people.

Answering questions about some of the key processual change that occurred on the Tahoe National Forest is a task far beyond the scope of this historical overview. We have here provided a basic outline of the major periods of economic and social development, discussed transportation improvements and methods, industrial technologies, land use patterns, resource development, conservation policies and have tried, where possible, to assess their impact on the region and its inhabitants. Our research raised many interesting challenges for the historical archeologist, cultural resources managers, and social and economic historians.

CHAPTER VII
Research Problems and Directions

Historians interested in regional historical projects often discover themselves in a peculiar conceptual and methodological bind. On the one hand, most of the published works available to them on the region, counties, or communities represent what might be termed "old" or "popular" history — studies of local elites, early transportation routes, railroad building, the lumber industry, the discovery of gold, and so on. Typically, these histories are narrative, anecdotal, or topical and often focus exclusively on exceptional individuals and dramatic events. On the other hand, scholarly "social scientific" or "community studies" approaches using quantitative data and focusing on analysis of broad social or economic processes as they are manifested on the regional or local level is beyond the financial scope of most projects. In any case, these techniques have been most effectively applied to single towns, rather than whole regions. No community in the Tahoe National Forest has benefitted from such a study. To the degree possible, we have tried to combine these two poles, to look at broad patterns as they were manifested in a regional context, but also to deal with unique characteristics of purely local significance.

Surveying the relevant data base turned out to be a task of mammoth proportions. Relevant materials are scattered in a wide variety of research depositories and often exist in a raw form and in such massive quantities that time limitations prevented their use. The California Forest and Range Experiment Station, for instance, compiled a *Bibliography of Early California Forestry*, that runs some sixty-nine volumes. The catalog contains approximately 30,000 abstracts on records from newspapers, diaries, books, periodicals, documents and maps; it would take several weeks to peruse its contents. The USFS headquarters in Nevada City has a wealth of historical information scattered in storage boxes, in map file drawers, in file cabinets; it has a good photograph collection, land use records, cultural resource site forms, and other information. Each of the counties have large collections of official documents, manuscripts, business records, photographs, biographical files, etc. Information in the California State Library and the Bancroft Library is astounding in its quality and sheer quantity. In terms of the information base, the research problem does not lay in lack of basic information, but in managing an overabundance of materials — in viewing, analyzing and synthesizing them.

Future research on the Tahoe National Forest will need to address several perplexing questions. Some of the general concerns can be taken up point by point.

1. No area in the Northern Sierra has benefitted from a "community studies" approach to social and economic history. They could be of great value to historical archeologists involved in cultural resources mitigation activities. Take for instance the history of a mining town. The mining town stands almost alone as a phenomenon of frontier America. Other boom towns existed in the United States, but never in such large numbers or with such significance in American history. California mining towns served as the prototype. The mining town was different from other communities. In comparison to Eastern towns and villages, it was disorderly and unstable. Its birth and growth were quick, its life often short, and its decay rapid. On the Tahoe National Forest several towns have gone through recurring cycles of boom and decline. What sectors of the community persisted through these cycles allowing the towns to survive? The towns served the needs of a large surrounding area, its business and social districts were larger than appeared warranted by the needs of the immediate community. The towns were cosmopolitan and the population transitory. We know little about life in the major towns and much less about the surrounding settlements dependent on them. What was the spacial association between business and residential districts and what was life like in these places? How did it change over time?

Standard accounts of California mining and miners after the gold rush have put only slight emphasis on such matters as ethnicity, family life and living patterns. The work of Rodman Paul (1947, 1963) gives the general outlines of society in the mines as do the journals of the miners themselves, but there as been little detailed research into the structures of individual communities. The one exception perhaps, is Ralph Mann's useful comparative study of the social structure of Grass Valley and Nevada City from 1850 to 1860 in which he uses statistics and computer analysis to give a detailed picture of these mining towns, showing how different local economies resulted in contrasting social styles.

Social historians cannot depend on the sparse biographical material available for significant individuals to form generalizations about the lives of the general population. The case study approach only gives an aura of generality. Unfortunately, we now depend on this type of evidence almost exclusively. The sources for a comprehensive grass roots social history of California mining towns and cities are probably available for many areas — manuscript census schedules, city directories, local tax records, school records, mining district records, mining patents, store ledgers, etc. To trace and analyze the career patterns of occupational and ethnic groups in the region would require computer assistance. But it would allow for examination and comparison of the life of ordinary people and the structural and functional evolution of mining settlements (or other types of communities on the Tahoe National Forest).

Perhaps suggesting such studies is overly ambitious in these times of fiscal restraint, but asking these types of questions and piecemeal applications of the "community studies" approach in the long run will be a major benefit to cultural resource personnel struggling to understand an ethnically diverse population, one with a high rate of turn-over that in all likelihood left an eclectic legacy of material culture.

2. Comparative studies of mining and logging settlements. How did a hydraulic mining town differ from a quartz mining center of similar size in terms of ethnic composition, organization of workforce, prosperity of workers, labor-management relations, spatial organization of residences and business centers, clustering of residential areas, degree of geographic and social mobility?

It seems clear that the nature of gold deposits had a strong influence in determining population characteristics. Placer deposits after the mid-1850s tended to attract a larger number of the poorer elements within the mining population. By the 1870s the Chinese were the most prominent single ethnic group in the placer diggings. In the quartz districts, corporate mining developments created a larger working class population comprised largely of white miners.

In the lumber industry there is an obvious contrast between east and west slope industrial development. One of the key questions to be explored here is the adoption of new technologies by different types of operators and its subsequent impact on cutting methods and employment practices.

3. Functions and spatial associations of roadside inns on major routes and laterals and their evolution over time. On the main routes (which in some cases have not yet been precisely located) there were stage stations every three miles on the average. On laterals which sometimes extended as long as 30 miles between important settlements and were regularly traveled, were there regular pack train or wagon camping places, stage stops, or did local ranches and farms serve a dual function as quasi-wayside inn and boarding house?

4. There was a dramatic decline in the number of small farm/ranch complexes on the Forest in the latter nineteenth century. Why? What was their relation to the local town economy and surrounding mines or logging camps? Did they have significant multiple functions as service centers for traders as well as being producers of foodstuffs for the local population. What was the impact of improved transportation and eventually introduction of the automobile travel on this local economic nexus?

5. The population of the Tahoe National Forest declined steadily from the late 1850s into the 1920s. Were some occupational or social categories more likely to persist in the area? What kind of people remained and what impact did it have on the general

historical processes of the region? How can we expect the archeological data base to be affected by these demographic changes?

6. When did the general shift occur in construction of roads from ridge top routes to river routes? What impact did it have on local and interregional travel and on settlements associated with the old and new routes?

7. There is a great need for a more comprehensive compilation of hydraulic mining water developments within the forest: dams, with dates of construction; ditches and canals and flumes, with dates of construction; capacities of the various systems; laterals, small canals, small reservoirs. A literature search, mapping project, and collection of other background information would be helpful. A good deal of this information is available for the major companies' systems that were developed to deliver water from the South Yuba to the San Juan Ridge. Less is known of the North Yuba ditches and canals, and those of Placer County on the North and Middle American Rivers that served the Forest Hill District.

8. Nineteenth century tourism/recreation is a subject about which little is known. Are any of the buildings currently existing at the alpine lakes that are remains of these early resorts?

9. There should be an effort to more closely locate, and perhaps mark, the route of the major trans-Sierra roads (Henness Pass, Pacific Turnpike, Dutch Flat and Donner Lake, and Yuba Gap) on the forest. Associated sites along the routes, such as waystations and ranches have potential to yield significant information about the lives of pioneer settlers in the region. These sites will come under greater scrutiny by historians as the new revisionist studies of the great American folk migration to the Pacific increasingly show that the success of the migrants was based largely on cooperation and interaction between the migrants and many temporary and permanent inhabitants of the west (see Unruh 1979).

Most of the histories of overland travel only cover the period through 1849. George Stewart's (1952) coverage is an exception, yet he devotes only a few pages to the entire decade of the 1850s. John Unruh provides good general information on that decade, however local studies of the changing travel conditions of the 1850s and 1860s and road development throughout the last half of the 19th century are needed.

10. We know very little about pre-National Forest grazing practices on the Forest. How did local ranchers establish boundaries to "customary" grazing area? Did they make strategic homestead purchases? If so, what types of improvements were made on their properties? To what degree were the informal patterns of prior use given

sanction by early USFS grazing policies? How did forest policy change fundamental patterns in the operation of large-scale or transient sheepmen on the forest?

11. Physical remains of Forest improvements demonstrating major accomplishments of the conservation movement are potentially significant historical artifacts. The Banner Mountain lookout tower was the first fire lookout construction in the California Region; representative lookouts and other improvements constructed by the CCC's deserve careful consideration as potentially important historic resources.

CHAPTER VIII
Management Recommendations

National Register forms held at the State Historic Preservation Office in Sacramento indicate that there are approximately twenty historic sites listed, one determined eligible, and three pending in Nevada, Placer, and Sierra counties. Of these the vast majority are located in the most densely populated settlements of the region — Auburn, Roseville, Nevada City, Grass Valley, Lake Tahoe, and the Truckee vicinity. Only eight of the twenty-four sites are located within the administrative boundaries of the Tahoe National Forest: two are related to transportation, two to mining, three to water development, and one to recreational history.

It has been difficult to make meaningful judgments about the Tahoe National Forest's cultural resources' significance in American history largely because of the problems related to defining just what constitutes a historic property. Most of the land under Forest Service jurisdiction has always been in the public domain. Few impressive architectural structures in private ownership have been constructed on the Forest, the size of existing settlements seem insignificant in modern times, and the 160 acre farming and ranching homestead sites are commonplace, as are the mining and logging sites of the region. Nevertheless, humble buildings that are an integral part of the Sierra landscape are important markers of basic cultural processes. Many of the historic properties remain that evoke a sense of the mountain agricultural, logging, and mining frontier heritage:

Buildings: farmhouse, ranches, ditch tender's cabins, wayside inns, general stores and saloons, fire lookout towers, cabins, bunkhouses, cookhouse, and CCC campsites.

Districts: mining towns, mountain resort complexes, railroad communities, logging towns.

Structures: bridges, ditches and canals, dams, mines, flumes, logging railroads, mills, tramways, chutes, snowsheds, and other engineering achievements.

Objects: industrial machinery for the mining, logging, farming, ice industry; boats, trains, Basque tree carvings.

Sites: early mining camps and town sites, sites associated with emigrant travel, sawmill and logging camp sites, ranching camp sites.

While perhaps few of the properties or sites associated with these historical activities would currently be determined eligible for listing on the National Register, it is

important to keep in mind the Register is very incomplete and evaluation criteria has undergone subtle changes. Fresh scholarly research constantly sheds new light on categories and properties which were earlier thought to be insignficant and there will always be properties which future surveys will "discover" as significant. In recent years the focus of historical inquiry has shifted clearly to increasing concerns over the lives of ordinary people. A similar broadening of the social perspectives of preservationists can redirect concerns and attentions more and more to the dwellings and structures of everyday life. Industrial archeology has become an increasingly popular concern among scholars. Folk architecture, farm and community layouts and planning are features of the cultural landscape that increasingly engage cultural geographers, architectural historians, and historic preservationists.

Evaluations of historical resources for National Register eligibility regularly takes place on the National Forest without attempts at formal listing. This occurs when a potentially eligible property or site might be adversely affected by a federal project such as a timber sale highway or access road construction, water developments, or recreational site development. In such cases, the geographical extent of the cultural resources survey is defined and limited by the project boundaries. This approach to resources management poses some special problems. Sometimes vast geographical areas must be covered in a limited amount of time. Protection of resources lying outside the project boundaries suffer from lack of any sense of urgency to do something about managing the historic resource, even though its existence is acknowledged.

This situation compounds one of the most difficult and important aspects of defining the significance of historical properties — the problem of establishing site boundaries. Sometimes many components must be evaluated to properly establish a property's significance. Consider, for example, an early mining settlement. The mine itself probably does not give significance to the area, but must be evaluated in association with mining structures, milling and transportation improvements, water developments, worker's habitations and outbuildings, and other physical aspects of the mining settlement. Clearly, all of these properties have a provable historic association to the mining site and considered as a whole, have a much greater significance in terms of yielding information about the historical patterns and processes of local and regional development.

In the case of hydraulic mining and its associated water developments, the resource base may be scattered so widely that they do not constitute an identifiable whole that could be included in a historic district. Other existing historic resources on the National Forest have similar qualities — consider, for instance, logging operations and emigrant trail or road related properties.

There are two seldom-used provisions for managing and preserving such resources under National Register guidelines. Multiple Resource Nominations (MRN) allow associated properties not constituting a district, to be evaluated individually and included for evaluation and listing under one nomination cover. This approach can expedite the conduct of surveys of large areas, avoids duplication of effort, and can help strengthen nominations by establishing the relationship among all the properties being evaluated for listing. This format may prove extremely helpful in establishing a historical context for evaluating properties of local and regional significance (Interim Guidelines, How to Complete National Register Multiple Resource Nominations, n.d.).

A second format, the Thematic Resource Nomination (TRN), has special potential for application to resources existing within the Tahoe National Forest. Under the TRN criteria, the existing resources must be clearly defined by geography and specific theme. Successful TRN nominations include such properties as: Frank Lloyd Wright buildings in Los Angeles, resort hotel complexes in Maine, or the Santa Fe Trail in Kansas. Portions of the Oregon Trail possessing historical integrity have also been preserved over an area covering several states by the application of this Nomination format (Interim Guidelines, How to Complete National Register Thematic Resource Nominations, n.d.).

The difference between a MRN and a TRN is that the latter results from studying a particular category or class of historic resources rather than all the resources within a given geographic boundary. The TRN must consist of a finite group of resources related to each other in a distinguishable way. It focuses on a historical theme, rather than a particular resource and provides an organizing principle to identify all eligible properties spread throughout a broad area. The area chosen is dictated by choice of theme and there appears to be no prohibition in terms of identifying an administrative unit as an appropriate geographic base. Thus, under this format, it may be possible to nominate "hydraulic mining dams in the Tahoe National Forest" or "Emigrant Trail sites in the Tahoe National Forest" to the National Register.

There are also some specific sites that might be considered for nomination to the National Register that are now known to exist on the Forest. Bowman Dam, originally an early hydraulic mining dam, was in the 1920s, adapted for use by irrigationists and hydroelectric power interests; it merits further study as a significant historic site. The ditch tenders' cabins described in Tahoe National Forest Archeological Site Forms are significant in their association with early hydraulic mining systems. Apparently an old cabin as well as a more modern two-story structure exists on one site (TNF Archeological Site Form 05-17-55-81). The Buckeye Hill hydraulic diggings (T16N/R10E MOM) is the site where Antoine Chabot first tested his pioneering hydraulicking device. The Henness Pass Road or associated artifacts and sites would

seem to merit careful consideration as an important trans-Sierra supply route. Apparently some of the buildings associated with the stage stop and resort at Webber Lake are still standing (TNF Archeological Site Form 05-17-56-12). "The Flats" area of San Juan Ridge has special significance not only for the number of mining towns and camps that once dotted the area, but also because of its location as the great channel through which all of the great hydraulic mining ditches of the San Juan Ridge ran. Here companies switched water from one ditch to another to distribute water where needed. Of course, deserted mining towns that have some of their historic integrity deserve special attention as suggested in several places above. The Banner Mountain fire lookout, the first in the California Region, has special significance to regional forestry history.

Difficult problems in effective historic preservation efforts and cultural resources management on the Forest must address complex and multifaceted issues. Studies such as those outlined in Chapter VII.1 must be conducted on an on-going basis, perhaps in cooperation with interested local citizens or historical organizations. There is a great need to make documentation broader, more systematic, and more retrievable.

Archeological Site Forms on file in the Forest demonstrate clearly that a great percentage of the cultural sites found on the forest have been remains from the historical period. In most cases, the forms only describe resources at the site, no effort has been made to adequately consider their potential significance in the context of national, state, or local historical themes or processes. To our knowledge, no professional historian has ever been employed in the Tahoe National Forest's cultural resources unit. Perhaps the best method to improve overall management practices related to protecting the historical resources would be simply to fill the next available vacancy with a historian trained in California history and with experience in cultural resource studies. Such an addition would bring insights of the historical profession to the day-to-day decisions that affect the resource base, assure that historic preservation values are considered in the planning stages of projects, and improve record collection and management practices.

CHAPTER IX
Research Locations

1. Study Area Sources:

Tahoe National Forest Headquarters — records related to timber, range, and recreation management and uses; diaries of ex-forest service personnel; photographs; cultural resource site forms; forest maps; land status maps; historical atlases.

County Historical Society libraries — assessment records, historic maps; biographical files; local historical publications, business records; newspaper clippings; manuscripts; county government publications; photographs; directories; pioneer reminscences.

2. Davis-Sacramento Sources:

Government Documents Section, California State Library — as a regional federal documents depository it receives all federal publications relevant to California; also contains a complete collection of state publications.

California History Room, California State Library — newspaper holdings for most study area publications; U. S. manuscript census returns, 1850-1900 for population; 1850-1880 for manufacturing and agriculture; information index on topics and people in California history; published works on California history; maps; photographs; rare books; manuscripts; tourist and emigrant guides.

U. S. Bureau of Land Management — mining and land patent records; survey notes; historic maps.

State Office of Historic Preservation — National Register of Historic Places site nomination forms.

Peter J. Shields Library, UC Davis — published works on California history; periodicals; maps.

Physical Sciences Library, UC Davis — United States Geologic Survey and California State Minerologist annual reports.

3. Bay Area Sources:

Bancroft Library — published works and rare books on California history; manuscripts; business records; maps; doctoral dissertations and masters theses; historic maps; Bancroft Scraps; newspapers; emigrant guides; gazeteers and atlases; oral interview tapes; photographs.

School of Forestry Library, UC Berkeley — forest industry publications, early California forestry bibliography; logging histories; state and federal publications relating to forestry history.

California Historical Society Library — biographical information; photographs; business records; manuscripts; published literature on California history.

Society of California Pioneers — specializes in information on individuals and families who came to California before 1852; photographs and biographical information.

Main Library, UC Berkeley — dissertations and theses on California history and geography.

BIBLIOGRAPHY

Books

_____.
1882 The Illustrated History of Plumas, Lassen and Sierra Counties San Francisco: Fariss and Smith.

_____.
1882 History of Placer County, California. Oakland: Thompson and West.

Amy, G. and O.
1856-58 G. and O. Amy's Marysville Directory. San Francisco: G. and O. Amy.

Barnes, Will C.
1913 Western Grazing Grounds and Forest Ranges. Chicago: The Breeder's Gazette.

Bartis, Peter.
1979 "Folklife and Fieldwork." Publications of the American Folklife Center, No. 3. Washington DC: American Folklife Center, Library of Congress.

Bean, Edwin F.
1867 Bean's History and Directory of Nevada County. Nevada (City): Edwin F. Bean.

Bean, Walton.
1978 California: An Interpretive History. New York: McGraw - Hill Company.

Billington, Ray Allen. (ed.)
1966 Frontier Thesis: Valid Interpretation of American History? New York: Holt, Reinhart and Winston.

1970 Westward Expansion: A History of the American Frontier. New York: The MacMillan Company.

Blackford, Mansel G.
1977 The Politics of Business in California, 1890 - 1920. Columbus: Ohio State University Press.

Borthwick, J.D.
1907 The Gold Hunters. New York: International Fiction Library.

Browne, John Ross
1869 Resources of the Pacific Slope. New York: D. Appleton.

Calef, Wesley
1960 Private Grazing and Public Lands: Studies of the Local Management of the Taylor Grazing Act. Chicago: University of Chicago Press.

Carpenter, J.E.
1958 California Winter Sports and the VIIIth Olympic Games, 1960 at Squaw Valley. San Francisco: Feardon Publishers.

Caughey,John W.
1970 California: A Remarkable State's Life History. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

1948 Gold is the Cornerstone. Berkeley: University of California Press.

Chamberlain, William Henry
1879 History of Yuba County. Oakland: Thompson and West.

Chinn, Thomas W. (ed.)
1969 A History of the Chinese in California: A Syllabus. San Francisco: Chinese Historical Society of America.

Clyma, Irwin (ed.)
1939 Tahoe Tales: Highlights of Camp Life as Recorded by the Annual Staff of Company - 914 CCC, Camp Forbes F-314. Auburn, California: n.p.

Coy, Owen C.
1948 In the Diggings in Forty-Nine. Los Angeles: California State Historical Association.

Cronise, Titus F.
1868 The Natural Wealth of California. San Francisco: H.H. Bancroft.

Cross, R.H.
1954 The Early Inns of California. San Francisco: R.H. Cross

Delay, Peter J.
1924 History of Yuba and Sutter Counties. Los Angeles: Historic Records Co.

Durrenberger, R.W.
1959 Geography of California in Essays and Readings. Los Angeles: Brewster Publications.

1960 Patterns on the Land: Geographical, Historical, and Political Maps of California. Northridge, California: Roberts Publishing Co.

Egan, Ferol
1977 Fremont: Explorer for a Restless Nation. Garden City, New Jersey: Doubleday.

Edwards, W.F.
1883 Tourists' Guide and Directory of the Truckee Basin. Truckee, California: Republican Job Print.

Fatout, Paul
1969 Meadow Lake: Gold Town Bloomington: Indiana University Press.

Fry, Amelia R.
1976 DeWitt Nelson: Management of Natural Resources in California, 1925 - 1966. Berkeley: Regional Oral History Office, Bancroft Library.

Galloway, John Debo
1947 Early Engineering Works Contributory to the Comstock. Reno: University of Nevada Press.

Giffen, Helen S. (ed.)
1966 The Diaries of Peter Decker, Overland to California in 1849 and Life in the Mines 1850 - 51. Georgetown, California: Talisman Press.

Greever, William S.
1963 The Bonanza West: The Story of the Western Mining Rushes, 1848 - 1900. Norman: University of Oklahoma Press.

Gudde, Erwin, and Elizabeth K.,
1960 California Gold Camps: A Geographical and Historical Dictionary of Camps, Towns and Localities Where Gold was Found and Mined; Wayside Stations and Trading Centers. Berkeley: University of California Press.

Haskins, C.W.
1890 The Argonauts of California: Being the Reminiscences of Scenes and Incidents that Occurred in California in Early Mining Days. New York: Howard and Hulbert.

Hittell, John S.
1874 Resources of California. San Francisco: A. Roman.

Huntley, Sir Henry Vere
1856 California: Its Gold and Its Inhabitants. London: T. C. Newby.

Jackson, W. Turrentine 1968 The Enterprising Scot: Investors in the American West After 1873. Edinburgh: Edinburgh University Press.

Jackson, W. Turrentine and Donald J. Pisani
1973 A Case Study in Interstate Resource Management: The California - Nevada Water Controversy, 1865 - 1955. Davis: California Water Resources Center. (Contribution #142).

Kelley, Robert L.
1959 Gold vs. Grain: The Hydraulic Mining Controversy in California's Sacramento Valley. Glendale: the Arthur H. Clark Co.

Kirker, Harold
1973 California's Architectural Frontier: Style and Tradition in the Nineteenth Century. Santa Barbara: Peregrine Smith Inc.

Kraus, George
1969 High Road to Promintory. Palo Alto: American West Publishing Co.

Larder, W.B., and M.J. Brock
1924 History of Placer and Nevada Counties. Los Angeles: Historic Record Co.

Levinson, Robert E.
1978 Jews in the California Gold Rush. New York: KTAV Publishing House.

Lewis, Oscar
1957 Here Lived the Californians. New York: Rinehart and Co., Inc.

Lingenfelter, Richard E.
1974 The Hardrock Miners: A History of the Mining Labor Movement in the American West, 1863 - 1893. Berkeley: University of California Press.

Lyman, Stanford M.
1974 Chinese Americans. New York: Random House.

McEntee, James J.,
1940 Now They are Men: The Story of the CCC. Washington D. C.:

Marsh, George Perkins
1864 Man and Nature; of, Physical Geography as Modified by Human Action. New York: Charles Scribner Company.

Merrill, Perry H.
1981 Roosevelt's Forest Army: A History of the Civilian Conservation Corps. Montpelier: Perry H. Merrill.

Millard, Baily
1924 History of the San Francisco Bay Region. San Francisco: The American Historical Society, Inc.

Morgan, Dale (ed.)
1959 Overland Diaries of James A. Pritchard from Kentucky to California in 1849. Denver: F.A. Rosenstock.

Myrick, David F.
1962 Railroads of Nevada and Eastern California. Berkeley: Howell-North Books. vol. I.

Nash, Roderick
1967 Wilderness and the American Mind. New Haven: Yale University Press.

Nasitar, Abraham P.
1934 The French in the California Gold Rush. New York:

Paul, Rodman W.
1947 California Gold: the Beginning of Mining in the Far West. Lincoln: University of Nebraska Press.

1963 Mining Frontiers of the Far West: 1848 - 1880. Albuquerque: University of New Mexico Press.

Petulla, Edwin
1977 Environmental History of the United States. Berkeley: University of California Press.

Pinchot, Gifford
1910 The Fight For Conservation. Garden City, New Jersey: Doubleday.

Rensch, Hero E., Ethel G., and Mildred B. Hoover
1932 Historic Spots in California. Stanford: Stanford University Press. (3rd Edition revised and edited by Wm. Abeloe, 1966)

Roberts, Paul H.
1963 Hoof Prints on Forest Ranges: The Early Years of National Forest Range Administration. San Antonio: The Naylor Company.

Rolle, Andrew F.
1978 California: A History. Arlington Heights, Illinois: AMH Publishing Corp.

Rowe, John
1974 The Hard - Rock Men: Cornish Immigrants and the North American Mining Frontier. New York: Harper and Row.

Rowse, A.L.
1969 The Cousin Jacks: The Cornish in America. New York: Charles Scribner's Sons.

Salmond, John A.
1967 The Civilian Conservation Corps, 1933 - 1942: A New Deal Case Study. Durham, North Carolina: Duke University Press.

Shinn, Charles Howard
1948 Mining Camps: A Study in American Frontier Government. New York: Alfred A. Knopf. (originally published in 1885).

Sinnott, James J.
1972 Downieville: Gold Town on the Yuba. Volcano, California: The California Traveler, Inc.

1977 History of Sierra County: "Over North" in Sierra County. (vol 5). Fresno: Mid-Cal Publishers.

1973 History of Sierra City; History of Goodyears Bar. (vol 2). Volcano: The California Traveler.

1976 History of Sierra County; Sierra Valley, Jewel of the Sierras. (vol 4) Pioneer, California: the California Traveler, Inc.

1981 History of Sierra County; Alleghany and Forest City, Treasure Towns. (vol 3) Fresno: Mid-Cal Publishers.

1978 History of Sierra County: A General History of Sierra County (vol 4). Fresno: Mid-Cal Publishers.

Slyter, Robert I. and Grace I.
1972 Historical Notes of the Early Washington, Nevada County, California Mining District. Washington, California: Slyter.

Spence, Clark C.
1970 Mining Engineers and the American West. New Haven: Yale University Press.

Steen, Harold K.
1976 The US Forest Service: A History. Seattle: University of Washington Press.

Stewart, George R.
1936 Ordeal By Hunger. Boston: Houghton Mifflin Co.

1962 The California Trail: An Epic with Many Heroes. New York: McGraw Hill Co.

Unruh, John D.
1979 The Plains Across: The Overland Emigrants and the Trans-Mississippi West, 1840 - 1860. Urbana: University of Illinois Press.

West, Elliot
1979 The Saloon on the Rocky Mountain Frontier. Lincoln: University of Nebraska Press.

Whitney, Josiah D.
1880 The Auriferous Gravels of the Sierra Nevada of California. Cambridge: Josiah D. Whitney and Harvard College Museum of Comparative Zoology.

Wiltsee, Ernest A.
1931 The Pioneer Miner and the Pack Mule Express. San Francisco: California Historical Society.

Woolbridge, Jessie Walton
1931 History of Sacramento County, California (3 vols.). Chicago: Pioneer Historical Publications Company.

Wyman, Mark
1979 Hard Rock Epic: Western Miners and the Industrial Revolution. Berkeley: University of California Press.

Zube, Ervin H. and Margaret J.
1977 Changing Rural Landscapes. Amherst, Massachusetts: The University of Massachusetts Press.

Dissertations and Theses.

Berg, Donald J.
1976 Second Homes on the National Forests: Changing Patterns and Values of Recreational Land Use in California. Doctoral Dissertation, University of California, Berkeley.

Burcham, Levi T.
1956 Historical Geography of the Range Livestock Industry of California. Doctoral dissertation, University of California, Berkeley.

Bramkamp, Lynn
1969 "The International Union of Mine Mill and Smelter Workers in Nevada County, California: 1937 - 1938" Masters thesis, California State University, Sacramento.

Floyd, Donald R.
1967 "The Role of Narrow Gauge Railroads in California's Transportation Network". Masters thesis, University of California, Berkeley.

Itogawa, Eugene M.
1974 "The Natural Ice Industry in California". Masters thesis, California State University, Sacramento.

Kincaid, Elbert A.
1922 The Federal Land Grants of the Central Pacific Railroad. Doctoral dissertation, University of California, Berkeley.

Margo, Joan
1947 "The Food Supply Problem of the California Gold Mines". Masters thesis, University of California, Berkeley.

McGowan, Joseph Aloysius
1949 Freighting to the Mines in California, 1849 - 1859. Doctoral dissertation, University of California, Berkeley.

Pagenhart, Thomas H.
1969 Water Use in the Yuba and Bear River Basins, California. Doctoral dissertation, University of California, Berkeley.

Pisani, Donald J.
1975 Storm over the Sierra: A Study in Western Water Use. Doctoral dissertation, University of California, Davis.

Wallach, Bret
1966 "The Central Pacific Land-Grant in Placer County". Masters thesis, University of California, Berkeley.

White, Nathan L.
1961 "The Interrelationship Between the Gold Mining Period in Sierra County, California, and the Development of the Sierra County Lumber Industry". Masters thesis, University of the Pacific.

Williams, Stephen
1930 "The Chinese in the California Mines: 1848 - 1860". Masters thesis, Stanford University.

Government Documents.

Averill, Charles V.
1942 "Chromium", in California Journal of Mines and Geology 33 (1): 70 - 93.

Ayres, R.W.
1958 History of Timber Management in the California National Forests, 1850 - 1937. Department of Agriculture, US Forest Service.

Bachman, Earl E.
1967 Recreation Facilities. . . A Personal History of Their Development in the National Forests of California. USDA, US Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley.

Brown, William S., and S.B. Show
1944 California Rural Land Use and Management: A History of the Use and Occupancy of Rural Lands in California. San Francisco: USDA, Forest Service.

California Division of Mines
1945 Consolidated Index of Publications of the Division of Mines and Predecessor, State Mining Bureau, 1880 - 1943 Inclusive. (Bulletin 131) San Francisco.

California Division of Mines
var. Report of the State Minerologist, (1880 - 1942) Sacramento: State Printing Office.

California Lake Bigler Forestry Commission
1885 Report. Sacramento: State Printing Office.

California State Board of Fish Commissioners
1895 Report. Sacramento: State Printing Office.

California State Mining Bureau
1906 Register of Mines and Minerals. Sacramento: State Printing Office.

1902 The Minerals of California and County Atlas. Sacramento: State Printing Office.

1923 Mineral Production for 1922. Sacramento: State Printing Office.

California State Resources Agency, Department of Parks and Recreation
1979 Survey of Cultural Resources at Malakoff Diggins State Historic Park. Sacramento: State Printing Office.

California Surveyor General
1856 Annual Report for 1855. Sacramento: State Printing Office.

Clar, C. Raymond
1969 California Government and Forestry - II; During the Young and Rolph Administrations. Sacramento: Division of Forestry.

Clark, William B.
1970 Gold Districts of California (Bulletin 193). Sacramento: California Division of Mines and Geology.

Davidson, H.S.
1888 Second Biennial Report of the California State Board of Forestry, for the Years 1887 - 88. Sacramento: State Printing Office.

Fowler, Frederick
1923 Hydroelectric Power Systems of California. USGS Water Supply Paper No. 493. Washington D. C.: Government Printing Office.

Friedhoff, William H.
1944 The Mining Claim Problem in the National Forests of California. USDA, Forest Service. San Francisco: US Forest Service.

Hittell, John S.
1884 "Table Showing Fineness of California Gold". In: California State Mining Bureau 4th Annual Report, p. 219. Sacramento: State Printing Office.

Jackson, W. Turrentine
1967a Historical Survey of the Stampede Reservoir Area in the Little Truckee River Drainage District. Historical Section, the National Park Service, Department of the Interior.

Jackson, W. Turrentine
1967b The North Bloomfield Mining District. Sacramento: Department of Parks and Recreation, State of California.

Jenkins, Olaf P. (ed.)
1948 Geologic Guidebook Along Highway 49 -- Sierran Gold Belt: The Mother Lode Country. (Bulletin 141. San Francisco: Division of Mines.

Keeper of the National Register
n. d. "Interim Guidelines, How to Complete National Register Multiple Resource Nomination Forms". Washington D. C.: National Park Service.

n.d. "Interim Guidelines, How to Complete National Register Thematic Group Nomination Forms". Washington D.C.: National Park Service.

Knowles, Constance
1942 Lumbering History of the Truckee Basin: 1856 - 1936. Berkeley: Division of Forest Survey, California Forest and Range Experiment Station.

Land Planning Committee of the National Resources Board
1935 Certain Aspects of Land Problems and Government Land Policies, Part VII. Washington D.C.: Government Printing Office.

Leiberg, John B.
1902 Forest Conditions in the Northern Sierra Nevada, California. Washington D.C.: Government Printing Office. USGS Professional Paper No. 8.

Lindgren, Waldemar
1896 The Gold - Quartz Veins of Nevada City and Grass Valley Districts, California. Washington D.C.: Government Printing Office. Extract from USGS Report XVII, part 2.

1911 The Tertiary Gravels of the Sierra Nevada of California. USGS Professional Paper No. 73. Washington D.C.: Government Printing Office.

May, Richard H.
1953 A Century of Lumber Production in California and Nevada. Berkeley: California Forest and Range Experiment Station.

MacBoyle, Errol
1918 Mines and Mineral Resources of Nevada County. Sacramento: State Mining Bureau.

Merrill, O. C.
1912 Truckee - Carson - Lake Tahoe Project. US House of Representatives, 62nd Cong., 2nd Session, House Document no. 451. Washington D. C: Government Printing Office.

Public Lands Commission
1880 Report of the Public Lands Commission Relating to Public Lands in the Western Portion of the U.S. and to the Operation of Existing Land Laws. US House of Representatives, 46th Cong., 2nd Session, House Ex. Doc. No. 46. Washington D.C.: Government Printing Office.

Show, S.B.
1926 Timber Growing and Logging Practice in the California Pine Region. Department Bulletin No. 1402, USDA. Washington D.C.: Government Printing Office.

Sudworth, George B.
1900 Stanislaus and Lake Tahoe Forest Reserves, California, and Adjacent Territory. USGS Annual Report, pp. 499 - 560, in US House of Representatives, 56th Cong, 2nd Session, House Document 35, no. 5. Washington D.C.: Government Printing Office.

U.S. Census Bureau
var. Population. 1850 through 1940. Washington D.C.: Government Printing Office.

U. S. Department of the Interior
1885 Annual Report. Washington D.C.: Government Printing Office.

1896 Annual Report. Washington D.C.: Government Printing Office.

U.S. Treasury Department
1869 to 1877 Statistics of Mines and Mining in the States and Territories West of The Rocky Mountains; Being the (First through Eighth) Annual Report(s) of Rossiter M. Raymond, United States Commissioner of Mining Statistics. Washington D.C.: Government Printing Office.

Vivian, Thomas J.
1890 Internal Commerce of the United States: California. US House. of Representatives, House Ex. Doc. 6 part 2, 51st Cong, 2nd Session. Washington D.C.: Government Printing Office.

Weeks, Davis et. aix.
1942 Land Utilization Statistics for the Northern Sierra Nevada. Forest Service Release no. 3. Berkeley: California Forest and Range Experiment Station.

Wright, Charles W.
1936 "Essentials in Developing and Financing a Prospect into a Mine" in California Journal of Mines and Geology 32(1), 167 - 188.

Periodicals

Bartlett, W.C.
1900 A Year in Forest Reservations. Overland Monthly 35 (3): 245-250.

Berry, Swift
1913 Shake-making and Tray Mills in California National Forests. Forest Quarterly 9 (3): 388-392.

Blackburn, George M.
1980 Review of The Saloon on the Rocky Mountain Mining Frontier. Western Historical Quarterly 11 (4): 446-448.

Brown, A.A.
1936 Planning Fire Lookouts in California. American Forests 42 (5): 214-215.

Burroughs, R.D.
1953 The Big Wheels: Origin of the Big Wheels Used in Early Lumbering. American Forests 59 (2): 16-18, 43.

Clark, William B. and Williard F. Fuller, Jr.
1981 Mining For Gold in California: The Original Sixteen-to-One Mine. Journal of the West 20 (2): 53-59.

Coffer, William E.
1977 Genocide of the California Indians: With a Comparative Study of Other Minorities. The Indian Historian 10 (2): 8-15.

Douglass, William A.
1980 The Vanishing Basque Sheepherder. American West 17(4): 30-31, 59-61.

Drury, Ruth
1969 Miles Goodyear. Sierra County Historical Society 1(1): 4-9.

DuBois, Coert
1915 The National Forests of California. California's Magazine 1(1): 116-122.

Eggleston, William S.
1981 Mining for Gold in California: Reminiscences of an Old Timer. Journal of the West 20 (2): 48-52.

Ellenwood, F. A.
1915 Sheep and Wool in California. California's Magazine 1(1): 585-590.

Goodwin, Victor O.
1979 The Ice Industry in the Verdi-Truckee Region. Washoe Rambler 3 (1): 3-8.

Jones, Pat
1976 Truckee. Nevada County Historical Society 30 (3): 1-7.

Kines, Pat Decker
1979 The Vanishing Lookout Tower. Landscape 23 (1): 23-27.

MacKensie, Donald E. and Elwood R. Maunder
1972 Logging Equipment Development in the West. Forest History 16 (3): 31-33.

Mei, June
1979 Socioeconomic Origin of Emigration: Guangdong to California, 1850-1882. Modern China 5 (4): 463-501.

Mills, Knowlton
1914 Fire Protection in California. American Forestry 20 (9): 679-683.

Mitchell, Stewart
1950 Crossing the Sierra. California Highways and Public Works Centennial Edition September 9, 1950: 49-68.

Pisani, Donald J.
1977 Lost Parkland: Lumbering and Park Proposals in the Tahoe - Truckee Basin. Journal of Forest History 21(1): 4-17.

Pratt, M.B.
1910 Comparison of Large and Small Sawmills on Tahoe National Forest. Forestry Quarterly8 (2): 169-173.

Raup, H.F.
1951 The Italian - Swiss in California. California Historical Society Quarterly 30 (4): 13-31.

Rawls, James J.
1976 Gold Diggers: Indian Miners in the California Gold Rush. California Historical Society Quarterly 55 (1): 28-45.

Rickard, T. A.
1950 The Gold Rush of '49. The British Columbian Historical Quarterly 14 (1): 50-68.

Rolle, Andrew F.
1955 Italy in California. Pacific Spectator 9 (3): 407-422.

Roske, Ralph J.
1963 The World Impact of the California Gold Rush, 1849-1857. Arizona and the West 5 (3): 187-232.

Roth, Joan
1969 A History of Sierra Valley. Sierra County Historical Society 1(4): 2-9.

Rotter, Andrew J.
1979 Matilda for Goodness Sake Write: Women and Families on the Argonaut Mind. California History 58 (2): 128-141.

Rutledge, Peter J.
1970 Two Views of the Dolbeer Donkey. Forest History 14 (1): 19-29.

Sterling, E.A.
1905 The Influence of Private Timberland Ownership on the Forest Policy of California. Forestry and Irrigation 11(8): 376-381.

Stevens, Moreland L.
1969 Forest City Revisited. Sierra County Historical Society 1(3): 2-5.

Strang, Arthur
1969 A History of the Cattle Business in Sierra Valley. The Sierra County Historical Society 1(2): 1-8.

Strong, Douglas H.
1981 Preservation Efforts at Lake Tahoe, 1880 to 1980. Journal of Forest History 25 (2): 78-97.

Thompson, Kenneth
1976 Wilderness and Health in the Nineteenth Century. Journal of Historical Geography 2 (2): 145-161.

Tooker, Richard H.
1970 Two Views of the Dolbeer Donkey. Forest History 14 (1): 19-29.

Westfall, John E.
1971 The Population of Sierra County in 1910. Sierra County Historical Society 3 (1): 6-17.

Williams, Asa S.
1908 Logging By Steam. Forestry Quarterly 6 (1): 1-33.

Wilson, Norman L. and Arlean H. Towne
1978 Nisenan. In Robert Heizer, ed. California: Handbook of North American Indians v.8 . Washington D.C.: Smithsonian Institute. 387-396.

Woyski, Margaret S.
1981 Women and Mining in the Old West. Journal of the West 20 (2): 38-47.

Wright, D. M.
1941 The Making of Cosmopolitan California: An Analysis of Immigration, 1848-1870. California Historical Society Quarterly 19(4): 323-348, 20 (1): 65-79.

Wyman, Mark
1974 Industrial Revolution in the West: Hard Rock Miners and the New Technology. Western Historical Quarterly 5 (1): 39-57.

Maps

Ailing, Mark N.
1911 Map of Sierra County, California. n. p.

California State Mining Bureau
1902 Map of Placer County, California. n. p.

1903 Map of Sierra County, California. n.p.

Crossman and Cochran
1867 Map of the County of Sierra. San Francisco: Britton & Rey.

Doolittle, A.J.
1868 Township and County Map of the Central Part of California. San Francisco: Doolittle.

Gibbs, Charles D.
1851 A New Map of the Gold Region in California. New York: Sherman and Smith.

Goddard, George H.
1857 Britton and Rey's Map of the State of California. San Francisco: Britton and Rey.

Hartwell, J.G.
1880 Map of Nevada County, California. San Francisco: W. T. Galloway

Hendel, Charles W.
1874 Topographical Map of Sierra County, California. San Francisco: Britton and Rey.

Miller, Fred
1913 Nevada County, California., Official Map. n. p.

Milleson, M. and Adams R.
1851 A Complete Map of the Feather and Yuba Rivers, with Towns, Ranches, Diggings, Roads, Distances. Marysville: R.A. Eddy.

Punnett Brothers
1898 Map of Sierra County, California. Seattle: Punnett Brothers.

Trask, John B.
1853 Topographical Map of the Mineral Districts of California. San Francisco: Britton and Rey.

United States Department of Agriculture, Forest Service
1907 Historic Range Map USDA, Tahoe National Forest.

1915 Historic Range Map. USDA, Tahoe National Forest.

1928 Tahoe National Forest, California. Washington, D.C.: USDA.

1939 Historic Range Map. USDA, Tahoe National Forest.

1962a Forest Hill and Big Bend Districts, Tahoe National Forest. San Francisco: USDA.

1962b Sierraville District, Tahoe National Forest. San Francisco: USDA.

1962c Downieville, Camptonville, and Nevada City Districts, Tahoe National Forest. San Francisco: USDA.

1962d Truckee District, Tahoe National Forest. San Francisco: USDA.

1977 Tahoe National Forest, California. Washington, D. C.: USDA.

various Proclamation Map Atlas. USDA, Tahoe National Forest, Headquarters, Nevada City.

Uren, E.C.
1887 Official Map of Placer County, California. San Francisco: Britton and Rey.

Warner, L.F.
1913 Map of Placer County, California. n. p.

Weddell, P. M.
1930 Map of Historic Emigrant Road. n. p.

Westcoatt, N.
1861 Official Map of Yuba County, California. San Francisco: Britton and Company.

Manuscripts.

_____.
1923 The Irrigation of Nevada County. Typescript, Tahoe National Forest Historical File, Tahoe National Forest Headquarters.

_____.
ca. 1978 National Register Nomination Form: Summit Soda Springs. Typescript at California Office of Historic Preservation.

_____.
1937 Tahoe National Forest: Facts. Typescript, Tahoe National Forest Historical File, Tahoe National Forest Headquarters.

Berry, Swift
1915 Lumbering in the Sugar and Yellow Pine Region of California. Typescript, Tahoe National Forest Headquarters.

Bigelow, Richard L.P.
1913 Special Population Report of the Tahoe National Forest for the Calender Year 1912. Typescript, Tahoe National Forest Headquarters.

1926 Tahoe National Forest: Description and Typography. Typescript, Tahoe National Forest Headquarters.

1917 Letter, Bigelow to C.H. Shinn, March 20, 1917. Tahoe National Forest Historical File, Tahoe National Forest Headquarters.

1930 Tahoe National Forest: Description and Topography. Typescript, Tahoe National Forest Headquarters.

Bourne, Charles
n.d. Papers. ms, San Francisco: California Historical Society.

Conway, Marion F.
1980 National Register Nomination: Foote's Crossing Road. Typescript at California State Office of Historic Preservation.

Graves, _____.
1913 Letter, Graves, _____ to Strong _____. Tahoe National Forest Historical File, Tahoe National Forest Headquarters.

Hittell, John S. and Theodore H.
n.d. Hittell Clipping Scrapbook. Berkeley: Bancroft Library.

McCauley, Eliza A.
1852 Diary. Typescript, Tahoe National Forest Headquarters.

Moore, Augustus
1878 Pioneer Experiences, ms, Berkeley: Bancroft Library.

Orr, George R.
1918 Logging Chute Study on the Plumas National Forest. Typescript, Tahoe National Forest Headquarters.

Perkins, E. Douglas
1849 Diary. Typescript, Tahoe National Forest Headquarters.

USDA, Forest Service
1930 Grazing Plan: Tahoe National Forest, 1930. Typescript, Tahoe National Forest Historical File.

1928 Tahoe National Forest Management Plan. Typescript, Tahoe National Forest Historical File.

1937 Facts About the Resources and Use of the Tahoe National Forest in California and Nevada. Typescript, Tahoe National Forest Historical File.

1933 CCC Camps on the Tahoe National Forest, 1933. Typescript, Tahoe National Forest Historical Files.

1942 Directory of CCC Units, 9th Service Command. Typescript, Tahoe National Forest Historical Files.

Newspapers.

Alta California (San Francisco)

California Illustrated Times

Daily Democrat (Nevada City)

Daily Morning Union (Nevada City)

Grass Valley Union

Grizzly Bear

Mining and Scientific Press (San Francisco)

Morning Sun (Meadow Lake)

Mountain Messenger (Downieville)

Oakland Tribune

Pioneer Western Lumberman (Portland)

Placer Herald (Auburn)

Sacramento Bee

Sacramento Union

San Francisco Bulletin

San Francisco Call

San Francisco Chronicle

San Francisco Evening Bulletin

San Francisco Examiner

San Francisco Post

Sierra County Tribune (Sierra City)

Sierra Citizen (Downieville)

Truckee Tribune

Truckee Republican

Virginia City Union