Chapter 8

Historical Uses and Cultural Resources

Prehistory

Although human occupation of the northern Sacramento Valley extends back 10,000 years or more, reliable evidence of the presence of such early inhabitants is lacking. If humans did occupy the area during this period, much of the evidence of their presence has been deeply buried under alluvium (Moratto, 1984).

Recent archaeological evidence suggests the earliest residents of the Butte Creek Watershed descended from the Hokan-speaking people and eventually radiated into the northern Sierra Nevada, southern Cascades, southern Klamath, and northern Coast Ranges (Jensen and Associates, 1994). After 100-200 AD, Penutian-speaking people displaced some of the Hokan populations in the Sacramento Valley and the northern Sierra Nevada foothills.

Ethnographically, the project area corresponds roughly to the territory claimed by the Maidu (also known as the Mountain or Northeastern Maidu) and Konkow (also known as the Northwestern Maidu) (Riddell, 1978). The Maidu inhabited an area of northern California extending from Lassen Peak to the Cosumnes River and from the Sacramento River to Honey Lake. Ethnographic boundary zones with other tribal populations are also located in the Butte Creek Watershed. The division of these groups is based on linguistic and environmental differences. Three distinct languages within the Maiduan family Penutian stock have been classified (Shipley, 1964). Several dialects existed within each language.

The Watershed Project study area is located within the original territory of the Northwestern Maidu or Konkow (Riddell, 1978) (see Figure 8.1). The Konkow inhabited the Feather River area west of Richbar, extending to the southwest short of the Sutter Buttes, and along the Sacramento River near Butte City in the south and to Vina in the north. The Konkow shared their southern and eastern borders with the Nisenan, the west with the Momlaki, and the north with the Yan and Northeastern Maidu (Riddell, 1978). They lived primarily in family units in small villages located along streams. Villages were inhabited full-time mainly in the winter months, as spring, summer, and fall were prime gathering and hunting times in nearby foothills and higher elevations. Housing was constructed of bark; earthen materials were most often used only for lodges and sweathouses.

The Konkow were politically organized by tribelet; each tribelet was composed of several villages. When needed for group decisions or activities, a leader for the tribelet was selected from the headmen of the villages. Headmen acted as advisors to the group; they were chosen through the auspices of a shaman for qualities such as wealth, maturity, ability, and generosity.

The Konkow were seasonally mobile gatherers and hunters, subsisting on an opportunistic diet of plants and animals. Acorns were a primary staple for the Konkow of Butte Creek who preferred the seeds of the black, canyon, and live oaks (Kowta, 1988). Pine nuts (digger, Ponderosa, sugar pines), buckeye, nutmeg (Maniery et al., 1985), and manzanita berries supplemented acorns. Roots, bulbs, and wild mint also provided nutrition and doubled as medicinal curatives (Riddell, 1978). Deer and elk were the primary game hunted by individuals and groups of men. Other sources of meat included mountain sheep, bobcat, lion, bear, rabbit, raccoon, squirrel, duck, geese, quail, and pigeon.

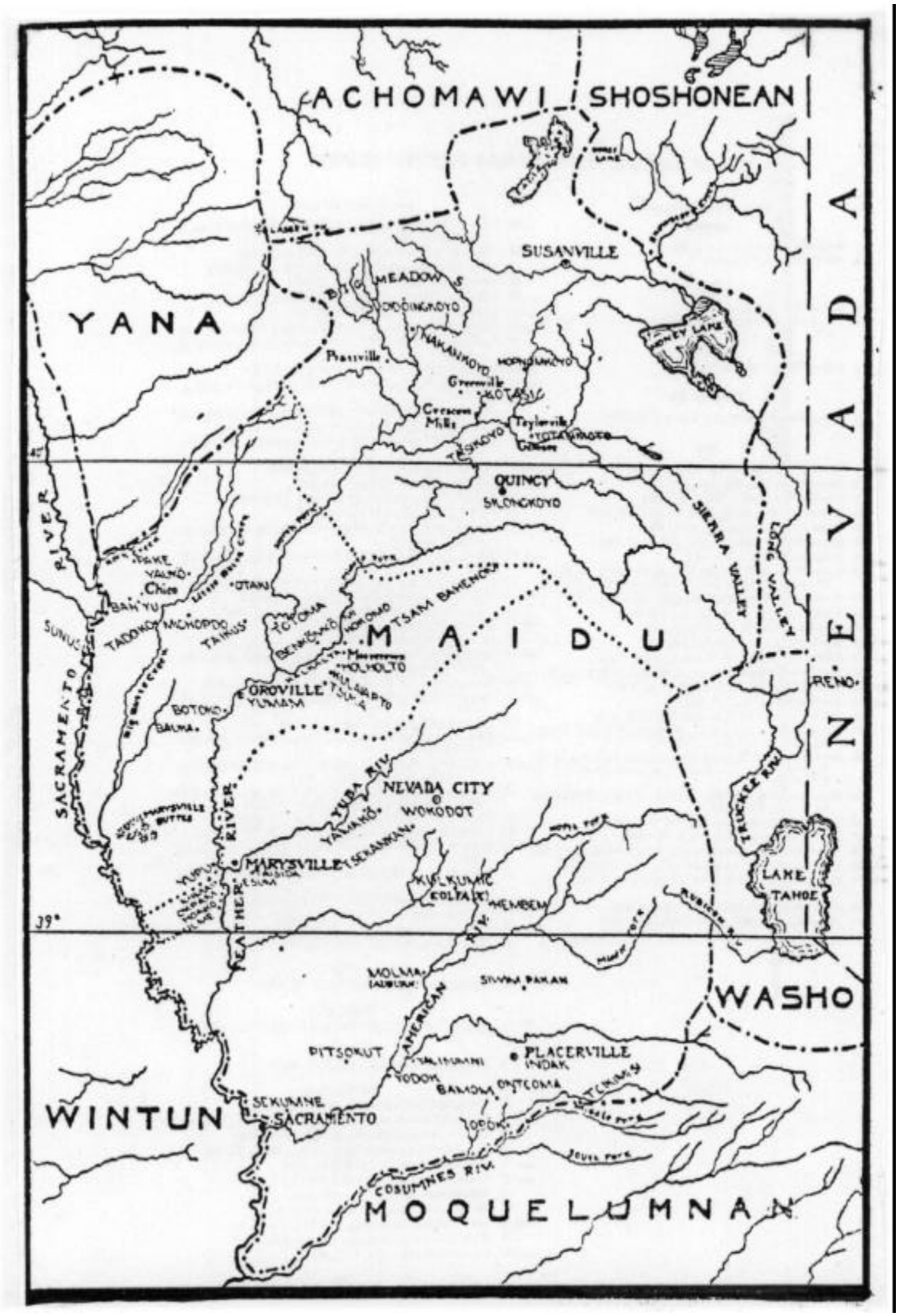

Figure 8.1 Map showing mines in the Butte Creek watershed circa 1945
(Source: Department of Mines and Geology, 1949)

The use of salmon as a primary food source is significant in this analysis of Native American occupancy in the Butte Creek Watershed. Given the relatively low population densities of Maidu in the region, their take of salmon is not considered to have been overly intense. Fish were most often harvested with spears or taken in nets, although occasionally small hooks were made from two pieces of bone tied together. However, despite widespread use of salmon and other fish from the creek, no permanent structures were placed in the water to catch salmon. The Maidu that lived in the foothill region always had a celebration when the first salmon came up the creek. No one could fish for the salmon until a shaman caught one. The shaman would then cook the fish on site and give pieces to everyone present. After this ceremony was complete anyone could harvest the salmon that were migrating up the creek. These celebrations in spring and autumn were important cultural and religious events, as the salmon were regarded as sacred. Fish of many kinds were available but salmon were caught in considerable quantities in the early days (Dixon, 1905). All fish that were ready to lay eggs were handled with care and gently put back in the water. This was a common practice of the Maidu concerning any living animal that was ready to bear young.

As with many other Native American groups in the United States, the Maidu burnt large areas in Butte Creek canyon and in its lower drainage basin to encourage growth of preferred plants (Dempsey, 1996). Centuries of induced burning altered the vegetation distribution in the region by controlling plant succession. The effects of deliberate fires, although difficult to quantify, may be the most significant evidence of Maidu-induced environmental impact in the region.

Despite the long occupancy of these aboriginal people in the Butte Creek drainage area, this group sustained only minor environmental impacts in the region. In contrast, the arrival of Euro-American and Asian settlers not only displaced the majority of native peoples but also brought about significant changes to both land and water ecosystems.

Historical Land Use

Although the first contacts with Euro-Americans occurred in 1808, it was not until 1828 and after that Maidu exposure to Euro-Americans became intensive. The increased contact was a result of fur trapping in the region by Hudson's Bay Company. In 1833, an epidemic, possibly of malaria and smallpox, killed up to 75% of the Konkow population. The establishment of Sutter's Fort in the Nisenan territory in 1839 became the focal point of settlers' and miners' incursions into Konkow lands, especially after the 1848 discovery of gold. The reduction in population as a result of the epidemic left the Konkow unable to resist the overwhelming flood of miners and settlers. Many of the few survivors became wage laborers at mines and ranches, while their language and culture nearly disappeared.

In 1840 Peter Lassen and a partner started a ranch on Deer Creek, marking the first real settlement of Euro-Americans in Maidu territory. Around this time, Oregon settlers opened a new road from the Fort Hall Area on the Snake River in Idaho to the Willamette River in Oregon. This road passed by Goose Lake in Northern California where Lassen decided to extend it for his own use through Maidu country. He brought the road along the Pit River around the east side of Lassen Peak, west to Big Meadow (Lake Almanor) and down to his Deer Creek ranch. The Maidu didn't think much of Lassen, referring to him as a squaw chaser. Maidu tradition actually claims that Lassen was killed by a Maidu man for stealing his wife (Potts, 1977).

As more white miners and ranchers began appearing on traditional Maidu land there was no initial conflict because the Maidu didn't understand the concept of land ownership. Ranches developed so fast that it wasn't long before the Maidu were left as laborers or homeless wanderers. Finally in 1910 the Maidu presented a case to the U.S. Land Commission and had their claim settled for 75 cents per acre. It is unbelievable that with the amazingly fast settlement of the area that there are no documented Maidu uprisings, but they were notoriously a very peaceable people only having slight conflicts with a neighboring tribe from the Mill Creek area (Potts, 1977).

By 1850, the United States government had passed a series of laws that established reservations for the remaining members of the Konkow Maidu living along Butte Creek. In 1855, up to one thousand people from

By 1850, the United States government had passed a series of laws that established reservations for the remaining members of the Konkow Maidu living along Butte Creek. In 1855, up to one thousand people from several tribes were guarded under tight security at the Nome Lackee Reservation in Tehama County (Hardwick and Holtgrieve, 1996). Riddell, (1978) estimated that there were perhaps only 600 individuals claiming Maidu or Konkow ancestry in the northern California counties of Butte, Plumas, and Lassen in the late 1970's. Although crude census counts often overlooked many individuals in the area, Table 1 below provides evidence that the most drastic decline in population totals of the Maidu occurred in the late nineteenth and early twentieth centuries.

Table 8.1
Total Maidu Population

Year	Population
1846	8,000
1850	3,500-4,500
1852	5,000
1856	2,300
1865	1,550
1880	1,000
1910	900

(Source: Riddell, 1978)

The Butte Creek Watershed area is located on the 1844 Mexican land grant once owned by William Dickey and Edward Farwell. The grant was known variously as Rancho Arroyo Chico, Rancho Chico, and Rancho Farwell. The land was purchased from Dickey and Farwell in 1849 by John Bidwell, who later established the town of Chico (Bidwell 1863). Chico Landing, also known as Bidwell's Landing, is located on the Sacramento River approximately 3,000 feet northwest of the project area. This site was used as a ferry crossing and loading dock and is shown on the 1862 County Map.

In 1863, John Bidwell and a small group of partners purchased a road building franchise for $40,000 from the State of California. Bidwell and his partners utilized the labor of the Maidu people and their knowledge of existing footpaths and game trails to build a road across the Sierra Nevada. Ready for use in 1864, Humboldt Wagon Road provided a new route over the Sierra to access mining areas in Northern Nevada (Bidwell, 1863). The wagon road served many other purposes as well by opening previously inaccessible areas for development. Timber harvest increased dramatically in the region. The road provided a route for cattle drives, as well as for mail service from Boise City, Idaho to Chico beginning in 1866 (Hill, 1997). During the late 1860's and 1870's the road brought settlers into the Butte Meadows and Jonesville areas. Cabins and hotels sprung up along the road, serving as summer retreats and rest stops for travelers. Butte Meadows became the social center of the area hosting a hotel, bar and store (Pers. com. Jessee, 1997).

Logging

The upper basins of Chico Creek and Butte Meadows were at elevations well suited to conifer growth, and the trees were of remarkable size and quality. These forests were made up of huge sugar pines, as well as ponderosa pine, spruce, fir cedar and madrone.

Logging was the second industry to arise in the watershed after mining. As the miners first arrived, they cut just a few trees to build cabins, fences, bridges, to use as fuel and eventually for flumes. Inevitably some of the pioneers turned to harvesting the timber as a source of income, instead of searching for gold. Small mills began to spring up in the mid 1850's but it wasn't until the 1860's that the larger mills began to appear.

It is believed that the first mill in the area was the Woodsum Brothers "lower mill," about 2 miles below Lomo (Pers. com. Nopel, 1998). This mill was built in about 1864 with the completion of the Humboldt Road. The

Woodsum Brothers also had an “upper mill” at Chico Meadows, which was built soon after their first mill. For the next few years the lumber was brought down the Humboldt Road, by wagons pulled by six or eight yoke (teams) of oxen. The oxen were the first animals to be used for labor by the lumbermen. Not only were they used to pull the logs out of the woods to the mill and then down to the valley, but during the winter they were used to trample down the snow on Humboldt Road. The oxen were used until the 1880’s when horses and mules replaced them.

In the late 1860’s, Benjamin F. Allen, George M. Taylor and Charles H. Holbrook bought the Woodsum Brothers upper mill. In 1870 they built the Cascade Mill and at that time joined forces with the Woodsum Brothers, who had retained their lower mill, to form the Butte Flume and Lumber Company (Hutchinson, 1956). At this time more mills began to appear in the upper watersheds of Chico and Butte Creeks.

It was decided in 1872 to build a flume down Chico Creek Canyon and construction began in November of that year. Valley residents' fears about shortages of water were put to rest the following summer when D.S. Baker built a ditch from his spring in Butte Meadows to the flume carrying 600 inches of water (Hutchinson, 1956). In August of 1874 the flume was finished, extending 33 miles from Chico Meadows to the present five-mile picnic area in Bidwell Park. The v-shaped flume was made completely of wood, except for the nails. It was 12 inches across at the bottom, 5 feet across at the top and carried 2 feet of water (Nopel, 1998). Four ditch tender’s cabins were built along the flume with at least two tenders at each cabin.

The building of the flume made the local lumber industry much more economically efficient. Where it used to take two to three days for cut lumber to be loaded and hauled to Chico, now it took just four hours to reach the valley. The first day the flume was opened it carried 100,000 feet of cut lumber down to Chico (Hutchinson, 1956). The local lumber costs dropped drastically and became increasingly more competitive in the larger market. It wasn’t long before Butte County became the leading pine producing county on the western slope of the Sierra Nevada. By 1876 Sierra Lumber Company had moved into the area and bought up all of Butte Flume and Lumber Company’s holdings. The first thing Sierra Lumber did was to relocate the main mill down to the Providence Mill, where Campbell Creek spills into Big Chico Creek. They extended the flume two miles to a new lumber yard at the corner of East Eighth and Pine streets. From there the flume made a 90 degree turn and emptied back into Chico Creek (Nopel, 1998). By the 1890’s Sierra Lumber Company was running one of the largest saw mills in the world.

The first Dolbeer steam donkey engines to be used in the Sierra Nevada were by Barney Cussick at Chico Meadows in 1886 (Hutchinson, 1956). This allowed for logs to be attached to a cable and dragged out of the woods, utilizing steam power. The new Dolbeer engines allowed the smaller mills to be able to move to new locations more often. For example John Hupp ran a mill near De Sabla that he had on skids. He would simply hook up his team of horses and drag the mill to a new spot. It wasn’t long after that steam powered tractors began to be used to haul the cut trees to the mills. This gave rise to the first railroad tracks being built in the area. At first the tracks were simple wooden rails that supported wagons. Soon iron tracks were laid and it was not long before the steam locomotive would be introduced. Although Sierra Lumber never had a complete system of tracks, it still opened up vast areas of timber to be harvested.

In 1903, the Sierra Lumber Company’s mill in Chico burned to the ground. The following year they rebuilt only to have another disastrous fire burn it down. This pushed the company to sell all their holdings, about 90,000 acres, to the Diamond Match Company in 1907 (McGie, 1982).

Diamond Match was a national company based out of the New England area. Diamond Match set up their main mill at Stirling City. They quickly began building a system of railways, utilizing Sierra Lumber Company’s old sections, and discontinued use of the flume. They actually gave permission to people to tear down the flume and use the lumber to build homes. Today there are no known traces left of the flume (Nopel, 1998).

Diamond Match soon constructed railways from Stirling City to Deer Creek, and by 1906, down to Chico. To deal with getting lumber across Butte Creek Canyon, Diamond Match engineers came up with an ingenious idea. At a spot called Incline, dropping down Powelltown Ridge, the cars carrying the lumber were attached to a cable and slowly let down the side of the canyon. At the bottom the cars were attached to another cable,

coming off the other side of the canyon, and pulled by an electric motor across a trestle and up out of the canyon. Although it was a good idea it didn't last long due to the huge amount of time and energy it took (Nopel, 1998).

Diamond Match had been a match making company and it was assumed that they were going to continue that trade in California. They actually engaged in the general lumber business and match production was just a sideline. Diamond Match went on to become known as an early leader in forest conservation, making efforts to make the most out of every tree felled. Eventually, Diamond Match became the first Pacific coast company to be certified by an agency of the Federal government as a sustained-yield operator of timber lands and the first company in California to gain tree farm status (Hutchinson, 1956).

Today the Diamond Match name is still in use but the company has changed ownership several times. In 1988 the Diamond Roseburg Resources Company bought the holdings. Then in 1992 Sierra Pacific Industries took over the company and are the current owners (Bean, 1998). Currently the other responsible entity in the watershed dealing in the timber industry is the U.S. Forest Service, which owns a small amount of land located in the uppermost reaches of the watershed.

Mining

After gold was discovered in Coloma in 1848, people from many parts of the world began to migrate into northern California. Between 1850 and 1855, thousands of these new arrivals from the United States, Europe, and Latin America came to mine the legendary "motherlode" of placer deposits along Butte Creek. By 1853, mining camps had been constructed at Diamondville, Centerville, Whiskey Flat, Forks of the Butte, Coxes Landing, Paradise Flat, and Helltown (Furr, 1968; Mansfield, 1918). All of these places existed as small settlements (along with a Chinese camp and cemetery located between Centerville and Diamondville) at the turn of the century (see Figure 8.2).

A second boom in mining occurred during the 1880's after new mining techniques and new sources of labor (especially the Chinese) were brought into the area. Although mining activities never regained the momentum of the late nineteenth century, several mines near Toadtown and on Big Butte Creek were pumped out and reopened in the 1930s as a reaction to the hard times of the Depression years (Logan, 1930). Unfortunately records of the amounts of gold extracted were not kept until 1880. Miners were reluctant to divulge exact amounts of gold out of fear that other miners would figure the worth of their claim. Records documenting gold traded for dollars were compiled by the State Department of Mines and Geology and were kept by county, not by individual claims. Records emphasizing precious metals were kept until the 1940s. During the 1940's there were still many sites being mined in the Butte Creek Watershed (see Figure 8.3)

As the gold miners arrived in the foothills of the Sierra Nevada, they began to explore different techniques for extracting gold. At first they simply panned the rivers and creeks for gold that had settled to the bottom of the waterways. In 1850, an early form of the sluice box was introduced known as the "Long Tom." The "Long Tom" was a ten to thirty foot-long wooden trough, positioned at an incline in a creek or river. Gravel was shoveled into the trough and flushed by a continuous flow of water, forcing the heavier gold to settle out through perforated holes in the metal plate into a holding chamber (McGie, 1956). This process was more efficient and allowed miners to band together as companies.

Flume systems were constructed to divert water and regulate the flow into the sluice boxes. A "miner's inch" or approximately 1.5 cubic meters flow per minute was the original unit of measurement used (Rice, 1960). During the summer dry season many streams were totally diverted into the flumes. To ensure adequate flow, water was pumped from deep holes in the creeks and derricks were used to move large boulders. Along with passing over sluice boxes, the flow of flume water rushed over paddle water wheels to provide hydroelectric power to run mining machinery. The flumes were also valued as a fishing tool. Miners rigged burlap sacks at the spillways to catch trout (Hanford, 1993).

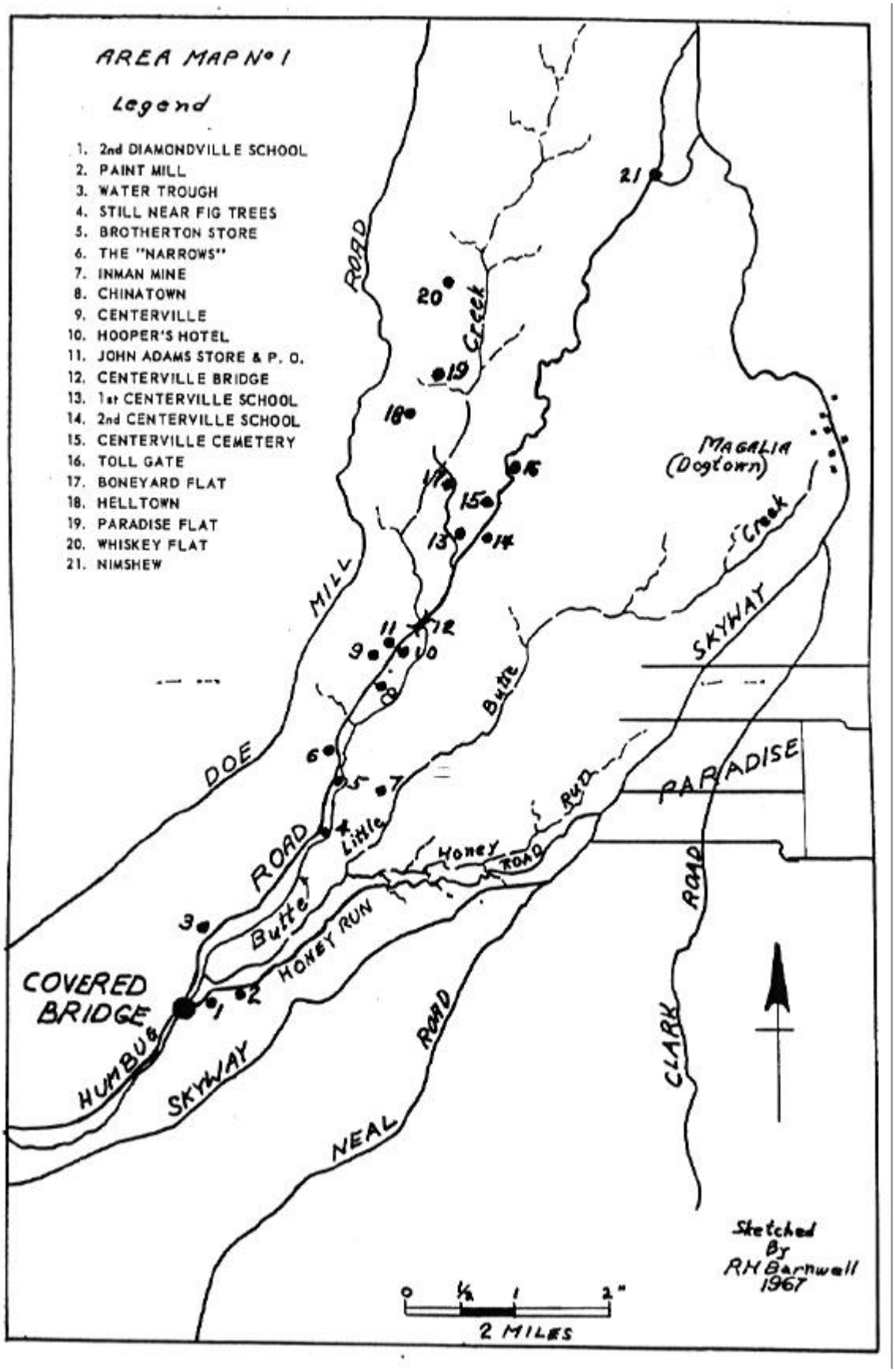

Figure 8.2 Map showing mining camps and cultural centers (Source: Barnwell, 1967)

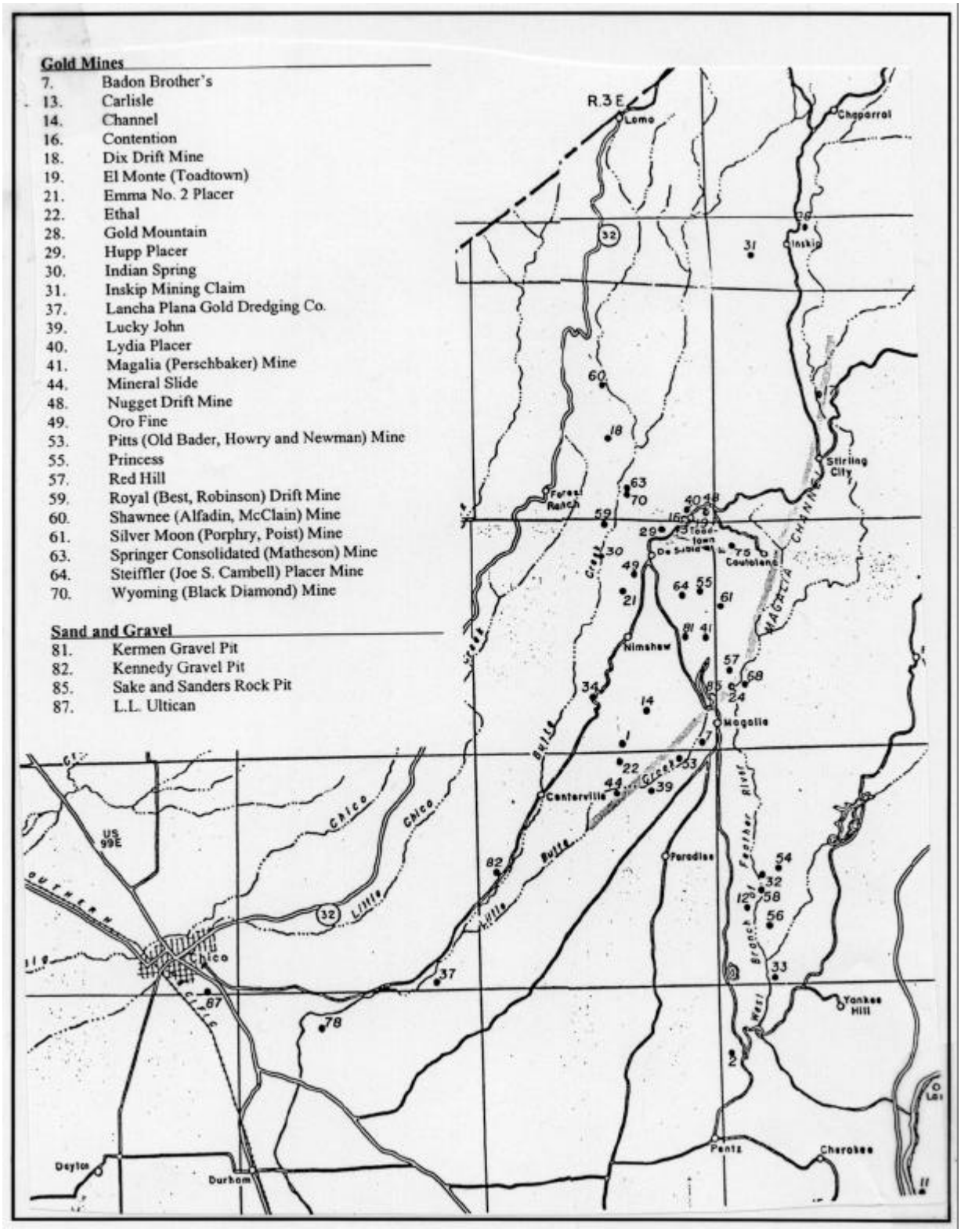

Figure 8.3 Map showing mines in the Butte Creek watershed circa 1945.
(Source: Department of Mines and Geology, 1949)

By the early 1900s dredging of the stream channels and alluvium was a common mining method on Butte Creek. The dredges either worked on the dry, exposed gravel bars or were mounted as floating barges in the water. They used large buckets to scoop gravel and release it atop a conveyor line**.** The gravel was conveyed to a hopper and shaking screens to be washed and sifted. Once the gold was removed, the remnant gravel was dumped in piles, called tailings. Electric-powered machines later replaced the original steam dredges. Various dredges operated on Big and Little Butte Creeks from 1911 to 1952 (Furr, 1968).

The construction of a large-scale system of ditches and reservoirs in the Canyon and elsewhere in the northern Mother Lode region paved the way for hydraulic mining and its near total destruction of creek ecosystems. Hydraulic mining was introduced to reach old riverbeds containing gold bearing ores, covered by ancient volcanic flows. The technique utilized the water pressure from a vertical column of water to spray and erode cliff faces. Water was stored in a holding reservoir, often miles uphill from the mining site, released into flumes and then funneled into vertical pipes, or penstocks. Holding reservoirs were built to supply water during the summer and to regulate the flow of water into the penstocks. Water streamed out of a nozzle, or monitor, at great velocity against the canyon walls (McGie, 1956). Due to the steep slopes in the foothill sections of Butte County, it was possible to have a monitor with a nine-inch diameter project a stream of water 400 feet.

Cherokee Flat Blue Gravel Mining Company was one of the first operations to work Butte Creek with hydraulic monitors south of Centerville in the 1870s. The Red Gravel Mining Company began to operate its massive, gravity-driven equipment near Centerville not long thereafter. At the peak of hydraulic mining, the Spring Valley Gold Mine Company, near Cherokee, used 18 monitors and pulled 40 million gallons of water a day through flumes and ditches from as far as Snag Lake, some 30 miles from the mine site (Hanford, 1993). Water demand increased with the development of large-scale mining technologies. Changes to water-flow measurement units accompanied the mining demands. The miner's inch became an inadequate unit of measurement for flow rates, and was replaced by cubic feet per second. Reservoir water was measured in acre-feet, the amount of water to cover one acre of land one foot deep.

With an increase of water use came the increase of gravel and sediment byproducts. Gravel and sediment debris was dumped into creeks to flow downstream to the valley below. Farmers complained to their legislators about the flooding and excessive silting of the rivers caused by mining operations. The passage of the restrictive Caminetti Act in 1883 and then the Sawyer Decision in 1884, issued an injunction against all hydraulic mining in California rivers (Mansfield 1918, Hardwick and Holtgrieve, 1996). This effectively halted the complete destruction of the Butte Creek Watershed by hydraulic mining companies.

After this act was passed, gold mining activities in the Canyon waned but did not stop completely. In the 1890's, a small operation using water from the old Spring Valley Mining Company and Hendricks Mining Company ditches continued the search for gold near what was then called Toadtown (near the Poumarat Quartz Mine and Mill). Other mining companies continued their efforts north of the small town of Lovelock and along Big Butte Creek at Centerville (Colman, 1960; Colman, 1972). High intensity mining in Helltown ended shortly thereafter and within a couple years the town all but disappeared.

The miners that remained in the area began a simpler form of mining referred to as drift or shaft mining. Shafts were dug into the sides of the ridges to reach the ancient riverbed deposits**.** Gravel was extracted by shovel, loaded into rail carts and transported to be washed by the water of the creek. Drift mining seriously weakened the integrity of the ridge-sides and also left piles of gravel, mud, and loose vegetation up and down the creekside.

Geologists mapped a tertiary riverbed that was named the Magalia Channel. A 54-pound nugget was found in this channel, called the Dogtown Nugget, which remains one of the five largest found in the world. The Magalia channel often extends a few hundred feet beneath the surface. The Magalia mine was over 300 feet deep, out of which miners removed 5800 cubic feet of gravel, yielding $6.4 million worth of gold. The miners hauled a mile of rock 300 feet to the surface to reach the buried gold (McGie, 1956).

Hydroelectric Development

The power demands of shaft mining pushed the development of hydroelectricity. Prior to the 1880's the flat paddle water wheel was the most common way of producing hydroelectric power. In the eastern United States where the rivers drop an average of 10-20 feet per mile, the flat paddle water wheel efficiently produced power. The rivers of the Sierra Nevada drop an average of 175 feet per mile; too much incline for falling water to effectively push and rotate the paddle wheel (Hanford, 1993). A man named Lester Pelton solved this problem.

Lester Pelton was a miner who became a millwright and carpenter in search of a better living. In 1850 he attempted to improve the efficiency of the water wheel by replacing the paddles with buckets. While running his new bucket wheel, Pelton accidentally discovered a method to rotate the wheel more efficiently. He split the spray of water into two streams from the nozzle, and hit two buckets at the same time. After perfecting his design, he went on to patent his new Pelton Wheel, which was proven by UC Berkeley scientists to have an efficiency rate of an unbelievable 87% (Mansfield, 1918). His technology proved successful in the field as well, by the mid-1880's most miners used the Pelton Wheel. The Pelton Wheel was used in the 1890's to turn newly developed electrical generators to produce power to run mining equipment.

In 1899, the Butte County Electric Power and Lighting Company was organized and began construction of the Centerville Powerhouse to supply power to the miners around the Helltown area. An existing flume, currently Lower Centerville Canal, was extended and elevated for water delivery to the powerhouse. The powerhouse was completed in May of 1900, and on May 23 the first hydroelectric lighted lamps, powered from Centerville, were turned on in downtown Chico (Rice, 1960). By August of 1901, transmission lines connected Centerville to several customers including those in Chico, Oroville and its gold dredges on the Feather River, Gridley, and Colusa. By the turn of the century mining became largely cost prohibitive, as productive gold bearing sites became more remote. These events set the stage for electrical generation to emerge as the next utilization of the flows of Butte Creek (Rice, 1960).

Eugene de Sabla, Jr. introduced electrical generation to Butte Creek Canyon. As a young man his father brought him to Arizona to work in one of his copper mines (Hanford, 1998). While in Arizona he befriended Alphonso Tregidgo, a Cornish miner who was one of the directors of the mine. In the early 1890's Tregidgo and de Sabla traveled to Grass Valley together, where Tregidgo became the superintendent in the Grass Valley mines. Tregidgo became interested in the new installments of hydroelectric plants and decided to build one on the South Yuba River large enough to provide power to the mines in the area. He employed de Sabla as vice president, launching his career in the utility business.

In 1895, the partners completed the Nevada Power Plant on the South Yuba River with the financial backing of Romulus Riggs Colgate, the grandson of the founder of the Colgate Soap and Perfume Company. De Sabla, with the continued sponsorship of Colgate, participated in the construction of the mighty Colgate Power Plant on the North Yuba River which was completed in 1899. With several projects under his belt, de Sabla grew more successful in the region and gained support from the Bay Counties Power Company, which by 1901 controlled the Nevada County Power Plant, the Colgate Plant, and the Yuba Power Company Plant on Brown's Valley Ditch (Rice, 1960).

De Sabla scouted further north into the foothills of the Sierra Nevada for potential hydroelectric plant locations to satisfy the San Francisco area's growing demand for electric power. Bay Counties Power Company had already acquired water rights on French Creek, a tributary to the Feather River. De Sabla formed the Butte County Power Company with $1,000,000 in capital stock and an authorized bond issue of $1,000,000 for construction of the plant. All stock was to be owned by Bay Counties and the bonds were to be placed in a bond firm.

A camp was established and preliminary work was underway. The land in the reservoir site had been acquired except one parcel. That parcel was owned by a personal acquaintance of de Sabla and he foresaw no problems

with buying that piece. De Sabla went to French Creek to finalize the proposed construction and negotiate a deal with the property owner. By this point, the sale of the bonds had been confirmed and the final step in the process was to buy the last parcel of land. De Sabla was extremely disappointed to learn the property owner demanded $200,000 or half of Butte County Power Company's stock. Due to this unacceptable asking price, de Sabla ordered the foreman to close down all work, discharge all the men and consider the French Creek Development a dead project, as was the Butte County Power Company (Rice, 1960).

De Sabla continued his search of Butte County for another site on which to locate a project and discovered the potential in Butte Creek. He quickly formed the Valley Counties Power Company with a capital stock of $2,500,000 and an authorized bond issue of $2,500,000. The stock and bonds were to be issued in the same format as for the French Creek development, with the addition that all business of Bay Counties in Butte County would be turned over to Valley Counties. In 1903 de Sabla bought out the water systems of the Cherokee Mining Company, as well as the Centerville Powerhouse and Centerville head-dam and ditch, from Butte County Electric Power and Lighting Company (see Figure 8.4).

At this time Centerville was already delivering power to the valley communities of Chico, Gridley, and Colusa, as well as the gold dredges on the Feather River in Oroville. De Sabla primarily bought out the Cherokee Mining Company's holdings for its head-dam located on Butte Creek. This dam, known today as Butte Head Dam, diverted water into the Cherokee mining ditch, later to be renovated and named the Butte Canal (Maniery et al., 1985). De Sabla had the idea to build another power plant upstream of the Centerville Diversion Dam and double the output of the same amount of water.

A camp was established, called Camp One, at the site of Slater's Dam, the present Lake De Sabla (Rice, 1960). This location allowed for a drop of almost 1,600 feet to the creek. The next step involved locating land to drop the pipelines and build a powerhouse. During de Sabla's initial surveying trip, his team observed the entire bank was eroded to bedrock and would require blasting out an area large enough to build the power plant. A site was blown out on the eastside of the creek and a camp was established.

De Sabla ordered the building of a road from the ridge top down to the creek (Maniery et al., 1985). Although Camp One and Slater's Dam were roughly a mile uphill, five miles of winding road were constructed to safely navigate down to the new campsite. Many other jobs were started simultaneously, such as flume rebuilding, ditch enlargement and expansion of the Centerville plant (see Figure 8.5).

Before the construction of the actual powerhouse began, a boarding house was built for the small community responsible for monitoring the site. The boarding house was built just upstream from the plant and on the same pad that was originally blasted out of the rock, positioning it strategically next to Indian Spring Ravine. Indian Spring supplied enough water to cool the transformers and generators and provide for domestic needs. Many smaller structures were built on the site (see Figure 8.6).

As construction of the powerhouse began, de Sabla decided to enlarge Slater's Dam, which then had its name officially changed to Lake De Sabla. During October of 1903 the first penstock was installed followed by another built the following year. Three generators were originally installed at De Sabla, each run by pelton wheels nine feet in diameter, followed by the installation of a fourth larger generator installed on August 22, 1904 (Rice, 1960). Two large oil tanks were also installed 70 feet up the hill. One tank provided oil to run the transformers and the other provided lubricating oil for the machinery and bearings. A head pressure of 1,531 feet was attained as the water flowed down a 36-inch penstock to a point 800 feet above the powerhouse, where it then dropped into a vertical shaft to the plant.

On October 22, 1903, the plant opened, supplying electricity to customers in Chico and the Oroville dredging districts. Surplus power was connected to other Bay County lines. By early 1905 de Sabla was delivering a current 378 miles south to Calaveras, a record for long distance transmission at the time. At first the plant was referred to as the Nimshew Powerhouse, after the small town of Nimshew a few miles from Camp One. The town's namesake was the Nimshew tribe, now extinct, that once occupied the region down to the American River. The powerhouse's name changed from Nimshew after de Sabla's associates decided to name the powerhouse after its founder (McGie, 1956).

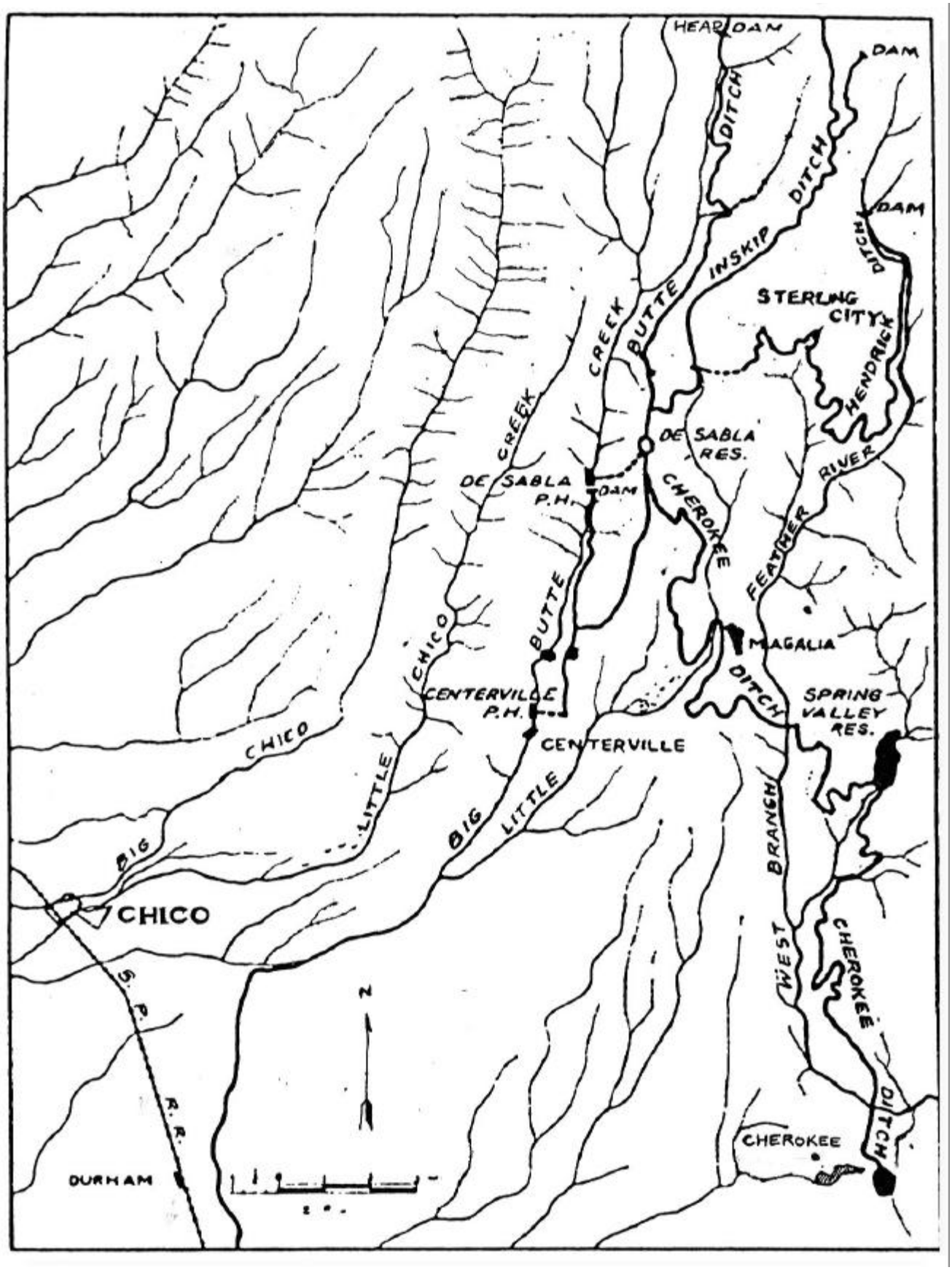

Figure 8.4 Map showing ditch system bought by Eugene deSabla (Source: Rice, 1960)

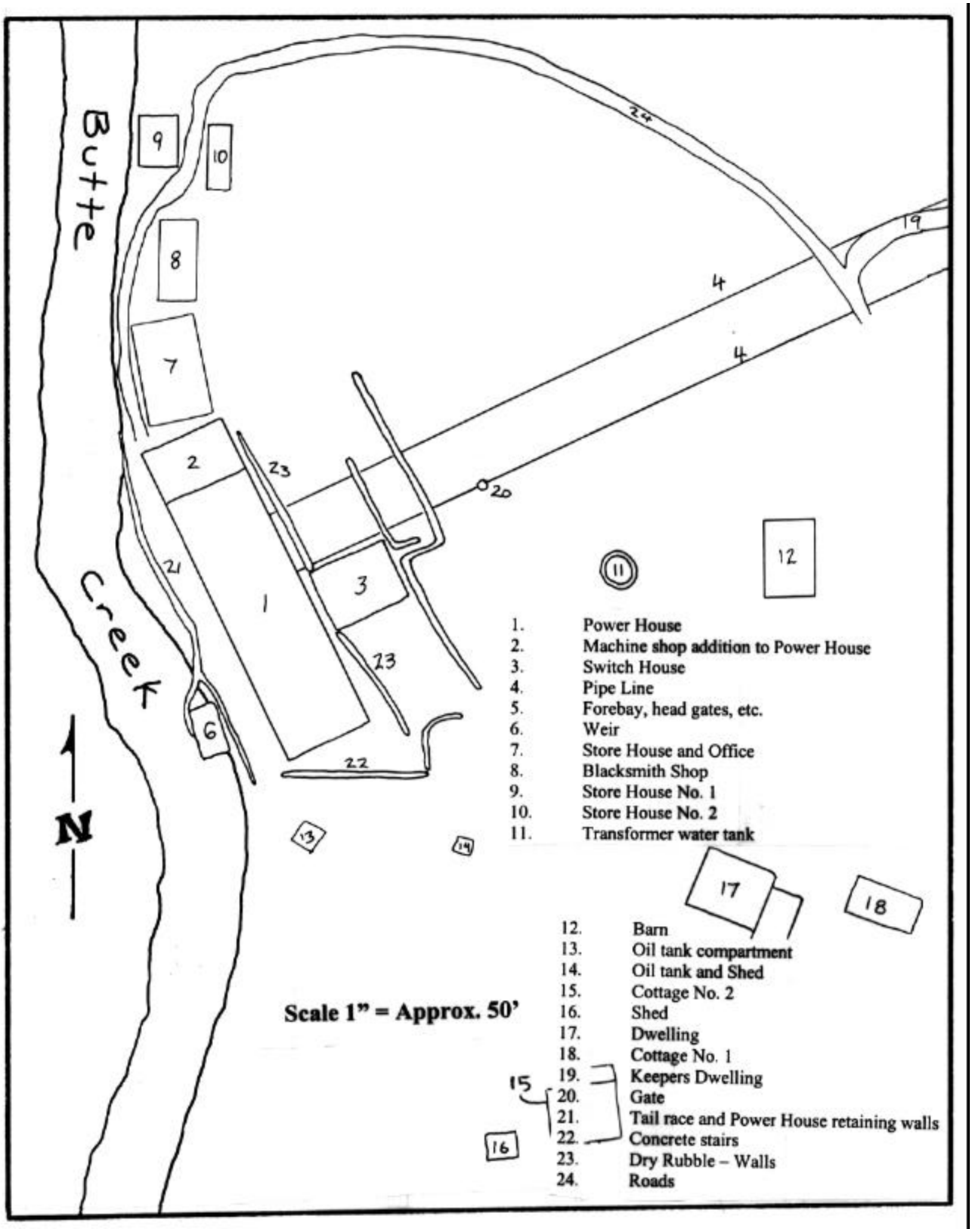

Figure 8.5 Inventory map of Centerville powerhouse (Source: Maniery et al., 1985)

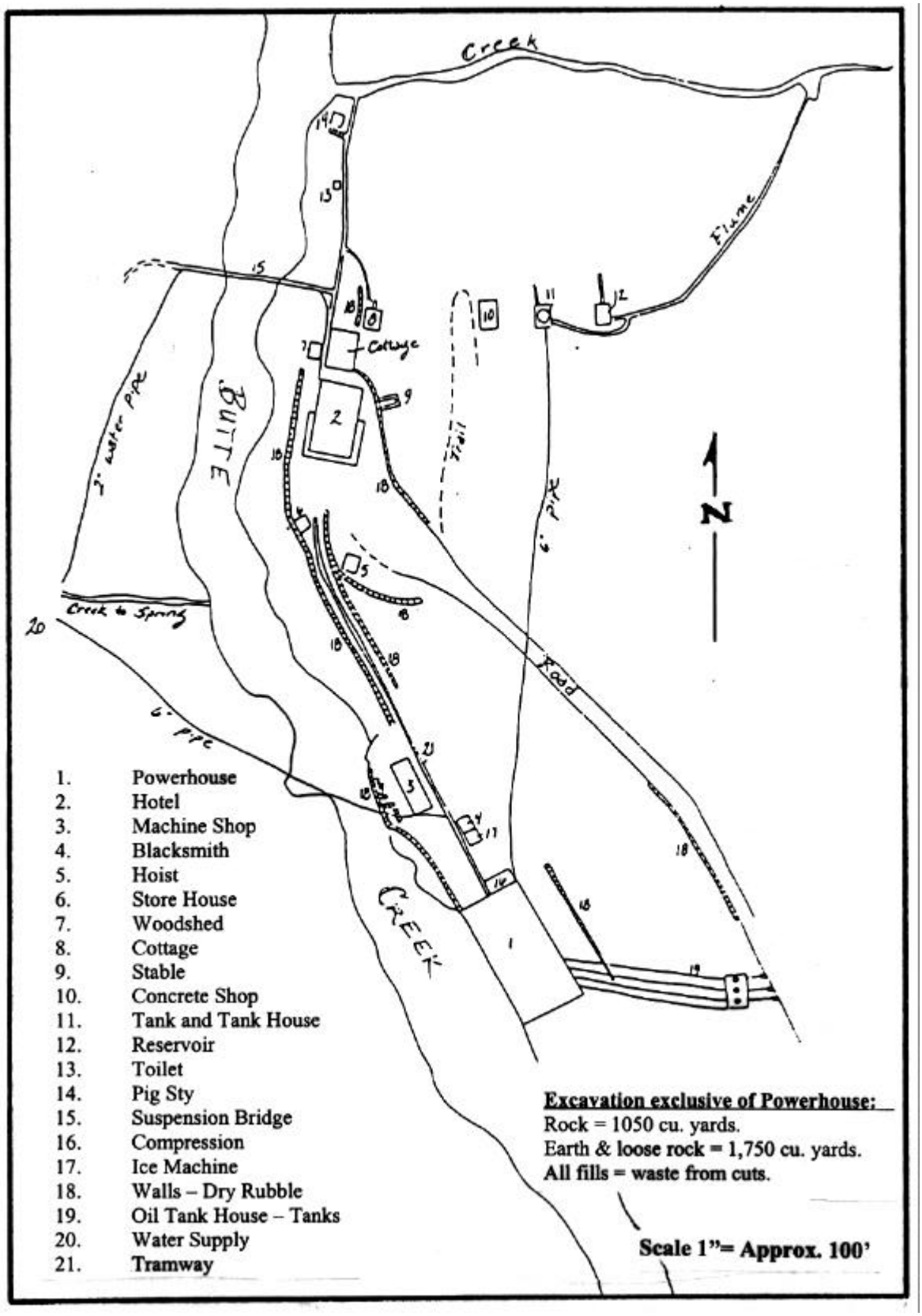

Figure 8.6 Inventory map of DeSabla powerhouse (Source: Maniery et al., 1985)

The system was in order and running within a year. Over the next couple years the crews continued to modify the canals and ditches that provided water to Lake De Sabla. Originally, Butte Canal and Upper and Lower Centerville Canals were the only sources of water to the powerhouse. Butte Canal was initially a mining water ditch built in the 1850's, and was later renovated and expanded in 1872-1873 by Cherokee Flat Mining Company, later becoming the Spring Valley Mining Company. The canal was used to bring water to hydraulic mining sites at Cherokee Flat and Helltown. De Sabla's group modified the canal to bring water to the Lake De Sabla site.

Upper and Lower Centerville Canals were also old mining ditches. Lower Centerville Canal was originally John Hupp's Mining ditch, which was used to transport water to his Red Gravel Gold Mine in Helltown. De Sabla's group modified portions of Upper Centerville Canal to transport water during low flow events directly from Lake De Sabla to Centerville Powerhouse. Shortly thereafter, de Sabla bought the Hendricks Canal for its diversion dam on the West Branch of the Feather River, originally known as Meacham's Dam and now referred to as Hendricks Head Dam, to carry more water into the system (see Figure 8.7). Portions of Hendricks Canal date back to the gold rush but the majority of the present route was built by W. C. Hendricks and Company in 1870-1872. The canal was one of the largest in the area and used to supply water to hydraulic mining operations in Morris Ravine, approximately three miles northeast of Oroville.

De Sabla's team renovated and enlarged Hendricks Canal. The course of the canal was altered slightly to connect with Toadtown Canal. Toadtown Canal was another old Spring Valley mining ditch that imported West Branch water into Butte Canal one and a half miles above Lake De Sabla. By joining these two ditches de Sabla doubled the energy output of the two powerhouses. The acquisition and renovation of the canal system was completed by 1908 (Maniery et al., 1985). Water from Lake De Sabla currently flows through De Sabla Powerhouse, is released back to Butte Creek, and then quickly diverted by the Centerville Head Dam into eight miles of flume terminating 600 feet above Centerville powerhouse. From here the water drops into a penstock to the powerhouse and returns to Butte Creek.

After the water ditches and flumes were in working order, few alterations were made to the system until 1917, when Butte and Centerville head dams were re-built. In 1928, a 30-inch pipeline replaced the two 24 inch penstocks at Centerville. The new pipeline was made of reconditioned wrought iron siphon pipe originally installed by Spring Valley Mining Company in 1870 and 1873. In the 1950s the Hendricks/Toadtown Canal was abandoned where it passes Stirling City. An underground tunnel was constructed to bypass this section, leaving five miles of canal empty. Centerville was converted to semi-automatic operation in June of 1959. The associated buildings and unused equipment disappeared within a few years following.

Between 1900 and 1959, the Centerville and De Sabla Powerhouses played important roles in the lives of Butte Creek residents. The projects provided jobs for the men in the canyon who had not reached their dreams during the gold rush. De Sabla Powerhouse was torn down by 1963. Both were replaced by smaller semi-automatic plants built on the same respective sites. The associated buildings and community around De Sabla also disappeared.

Today the De Sabla-Centerville system is in regular use, contributing electricity to the main grid of transmission lines that reach destinations throughout the western United States. The two head dams on Butte Creek and the Hendricks Head Dam remain in working condition and continue to divert water to their respective flumes. The flumes and ditches are still in working condition, requiring occasional repairs. Except for old building pads, rock walls and few artifacts, little remains of the communities once centered on these sites. The Centerville Powerhouse is currently the oldest of 65 hydroelectric powerhouses in the entire PG&E system and its future is uncertain. Conservation concerns have led to talk of removing the Centerville Head Dam to allow for possible salmon migration farther up Butte Creek (Johnson and Kier, 1998). If the dam were removed, the Centerville site might be sold or become a historical landmark. De Sabla is run by microwave signals from the Rock Creek Plant on North Fork Feather River, and will likely continue producing hydroelectric power for many years to come.

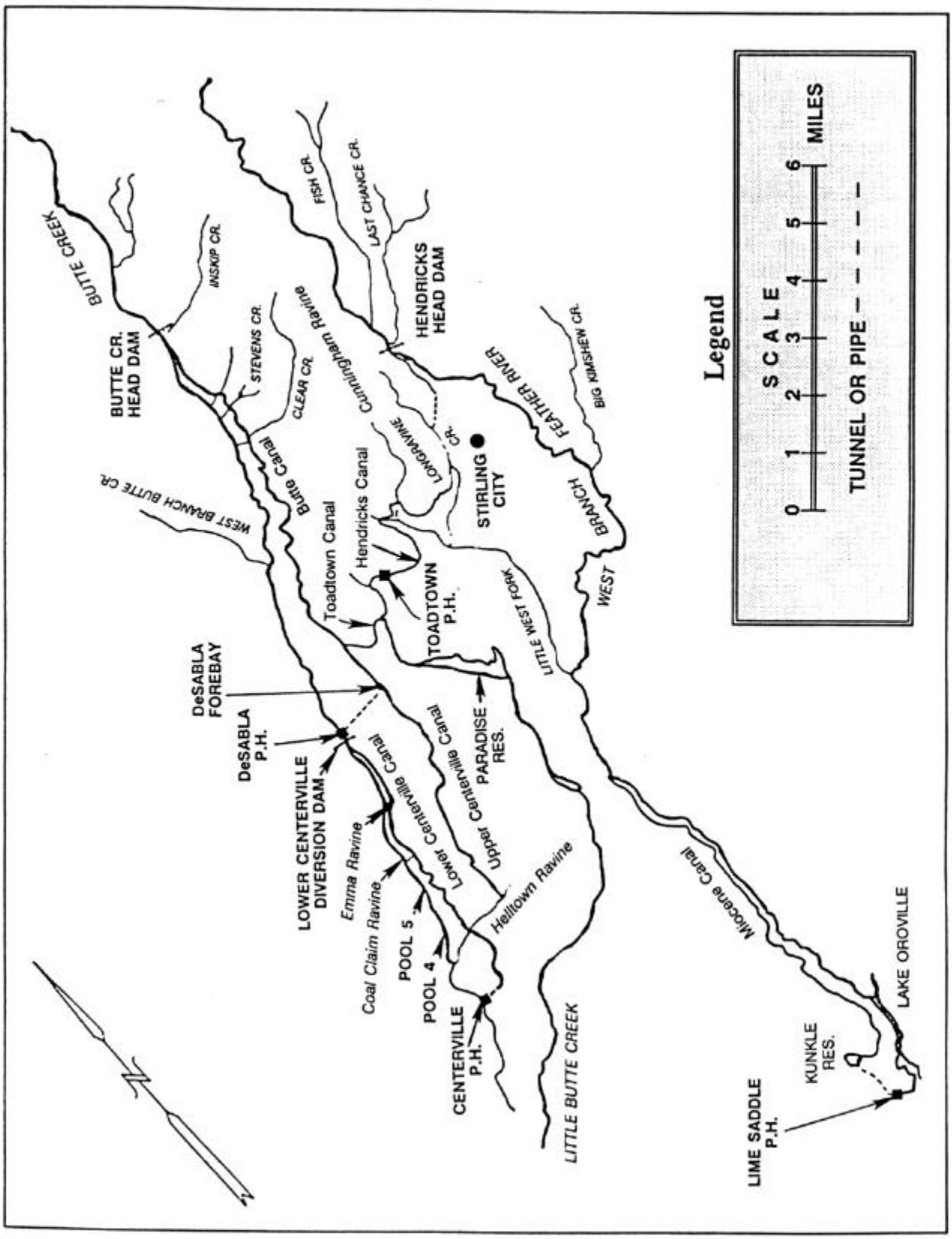

Figure 8.7 Map showing renovated ditch network for DeSabla-Centerville hydroelectric system (Source: PG&E, 1993)

For most of the 20th Century, the De Sabla-Centerville system was the only hydroelectric generation on Butte Creek. In 1991 the Forks of the Butte Power Plant was installed just upstream of the De Sabla Power Plant**.** The plant is owned and operated by an organization in New York called Energy Growth Group I. Their system includes a 15-foot high diversion dam located 1/4 to 1/2 of a mile downstream of the Garland Road bridge (Ponderosa Way). The dam diverts a maximum of 250 cfs into an 11 foot-wide conduit tunneled through the east side of the canyon for almost two miles (Maniery et al., 1985). The water is used to run two turbines with associated generators inside the power plant. A minimum flow must be maintained on the section of the creek where the Forks of the Butte system is located, in order to provide sufficient flows for fish and wildlife habitat. If the minimum flow can not be maintained, the plant automatically shuts down (see Geology, Basin Morphology, and Hydrologic System chapter). Due to the recency of the plant's installation, minimal flow data is available.

Agriculture History

Ranching

The earliest forms of intensive agriculture in the Butte Creek Watershed began with the influx of population that came with the Gold Rush. Animal husbandry dominated the scene and consisted of raising livestock on the large open ranges in the valley. During the 1840's and 1850's local ranchers raised range cattle, sheep, and hogs. They quickly learned that during the summer dry season there was very little feed available for the cattle and sheep in the valley. After realizing there were plentiful grazing lands in the mountain meadows to the east, the first local cattle drives began. Ranchers from Chico and the surrounding areas would gather their cattle together in the spring and drive them up the Campbell Trail, which followed Cohasset Ridge, to Butte Meadows. The drives consisted of several hundred to several thousand head of cattle and lasted from seven to ten days, depending on the number and type of cattle being driven (Roney, 1997). The cows and calves traveled the slowest and were taken on the first trip. A "dry herd" of steers and heifers followed with the bulls being driven separately to avoid conflicts.

Butte Meadows became a popular gathering place, with its corrals provided to sort out the herds by brands. Many families kept traditional grazing grounds on privately owned or leased land, while others let their cattle disperse from the corrals to graze freely for the summer. Fences lined the hotels, cabins and stores along Humboldt Road to keep cattle on the drive trail. The sheep herds were often grazed alongside the cattle and managed in similar ways (Roney, 1997). In September and October, the herds were again rounded up in the Butte Meadows corrals to be sorted and driven back to the valley. The Meadows are still grazed, but the cattle drives ceased in the 1950's, giving way to trucks for transporting the livestock (Roney, 1997). At present, there are almost 85,000 acres within the watershed that are utilized as grazing lands, making up about 17% of the total land coverage.

Original Crops

The first crop to be successfully cultivated in the Sacramento Valley was wheat. The first wheat was planted by John Sutter at his fort, near the American River. Word of his success spread throughout the valley. Up to this point people of the valley generally believed that the only good land for farming was along the creeks and rivers. The introduction of wheat dispelled this myth as it was found that it would thrive in the open plains of the valley. The wheat grown was of an extremely hearty strain and could endure the clay soils found throughout the valley plain. The first centers for wheat production in Butte County were around Hamilton and Bidwell's Arroyo Seco Ranch in 1853 (McGie, 1982). By 1854, the farmers were providing enough grain to meet domestic needs but had no market for the surplus. In 1861, the valley's wheat industry got its big break as France and England experienced shortages of wheat, partially due to the Civil War reducing shipments from the Northern United States. The wheat strain, being so hearty, was able to endure the 4-5 month sea voyages to the new markets (Hardwick and Holtgrieve, 1996). During this period the original Mexican land grants were beginning to be sub-divided and miners were moving out of the mountains to try their luck at farming. These events marked the transition from mining to agriculture as the main industry in the valley/foothill

region. By 1865 farmers were experimenting with other grain crops such as barley, oats, and hay, along with the first attempts at fruit crops such as apples, peaches, oranges, and grapes for wine.

The man leading the way in wheat production was Dr. Hugh Glenn, a dentist who came in search of gold, and later began buying land along the Sacramento River in the present Glenn County (Mansfield, 1918). He was the first to experiment with the adobe soils away from the river and was extremely successful. In 1882 he owned 55,000 acres producing wheat. Wheat became the backbone of the valley economy, growing from 200,000 acres in 1866 to over 1 million acres in 1882 (McGie, 1982). Conflicts began to emerge between the livestock ranchers and the wheat farmers and early orchardists. It was becoming a problem to keep the livestock from wandering into the fields and orchards and causing damage to crops. The problem escalated until, in 1872, a law was passed that required ranchers to build fences around their range lands to keep their livestock out of neighboring crop fields (McGowan, 1967). Traditional ways of harvesting were quickly found to be inefficient and during the 1870's and 1880's, plows, threshers and other labor saving devices were brought into use. These improvements boosted the wheat production in the state to levels rivaling any area in the world. After the 1880's, wheat steadily became less profitable due to soil exhaustion and increased national and world production. Growers continued until 1903 due to money invested in machinery and use of land that would only grow shallow-rooted crops.

Irrigation

With the decline in wheat production vast acreages became available for other crops but the need for more water had to be addressed. From the 1850's to 1870's specialty crops, mostly fruits and vegetables, were in production but were much more difficult to grow and market than the hardier grains. In 1887, the Wright Act was passed which made it legal for farmers with land not located on a river to organize irrigation districts and bond their property to develop the necessary facilities (McGee, 1980). As the first local irrigation systems developed it became possible to grow more successful vine, row, and orchard crops. Grapes, used for wine, were the first successful fruit to prosper from the new small scale irrigation systems. Henry Gerke, a German born miner who became a farmer, was the first to cultivate and export wines from the area. He became one of the largest land holders in the valley and with his success founded the town of Vina (Mansfield, 1918).

Ground water as a source for irrigation lagged behind surface water in the Sacramento Valley. The early settlers of the valley used ground water for domestic use and stock supplies. It was not until 1879 that a well was dug for irrigation purposes. This 7 meter deep well was dug on the Blowers Ranch near Woodland. Its success caused an increase in drilling to tap the new source of water for irrigation. Development continued to be relatively slow due to the high cost of drilling equipment and in most areas there was sufficient surface water supplies. As drilling equipment improved and prices dropped, the use of wells proliferated. Also large farm plots were being divided into smaller 10 to 20 acre plots that had no existing surface water canals accessing the land. This made drilling wells more economically preferable on these lands. The first reliable study done on ground water use in the Sacramento Valley was a USGS report (Bryan, 1923). This report reveals that in 1913 approximately 41,000 acres of land in the Sacramento Valley was irrigated by ground water from 1,664 wells. A DWR report from 1929 found that just over 500,000 acres in the valley were irrigated about 205,000 acres utilized ground water (Olmsted and Davis, 1961). By 1970 approximately 29 percent of water used for irrigation in the Sacramento Valley was coming from wells.

The first commercial attempts at orchard crops were citrus plants around the Thermalito and Palermo areas. With the cessation of hydraulic mining in 1884 the old mining ditches became an integral part of the emerging irrigation canal systems. In the late 1880's, Thermalito and Palermo districts were receiving water through old mining ditches including the Miocene ditch (McGowan, 1967). The first citrus crops did well and irrigated orchard lands began to expand. As fruit farming became a larger industry the need to preserve the surplus for transportation was encountered. In 1882 the first fruit cannery was established and many more were built in the following years along the railroads and rivers, especially near the Marysville-Yuba City area (McGee, 1980). Oranges dominated the areas first receiving irrigation water and were a relatively successful crop up until the 1930's when market conditions changed, reducing the value of the crop. Then in 1932 there was a harsh, deep freeze that killed over half of the trees in the valley and they were never replanted. Today citrus is only produced commercially on a relatively small scale in Butte and Glenn Counties (McGie, 1982).

Other orchard crops, such as olives and almonds, were found to be successful along the foothills utilizing the new irrigation methods. Olives thrived alongside the citrus trees in the Thermalito and Palermo areas near Oroville. Down further on the valley floor, Durham grew to become one of the main almond growing regions in the valley. Almonds were first planted there in 1875 by Judge Pratt, the former owner of the Aguas Frias Rancho (Mansfield, 1918). The first commercial orchards were planted in 1895 and did so well that by 1909 the Durham Almond Growers Association was formed. It was not long before Durham's almonds were noticed by the rest of the state and in 1913 they became associated with the California Almond Growers Association. By 1940 the Chico-Durham area was producing enough almonds to make them the most important tree crop in Butte County (McGee, 1980).

In 1900 two men, Duncan C. McCallum and Thomas Fleming, became partners and constructed an irrigation canal to better supply the Gridley and Biggs areas. In 1905 they secured enough support around the Gridley area to begin construction of a canal. On June 9, 1905, Butte County Canal was completed. It was 14 miles long, 30 feet wide and cost $200,000 (McGee, 1980). The canal, which later became known as Sutter-Butte Canal, led to increased land values around Gridley and many new people moved to the area. The value of the crops being produced in the area also increased many times.

The advancement of irrigation also prompted the growth of dairy/alfalfa farms in the valley. With sufficient water reaching the valley floor, farmers could grow enough alfalfa on their land to feed their dairy cattle. This also resulted in the establishment of cooperative creameries, with the first large one being built in Gridley (McGowan, 1967).

With more water being brought across the valley through canals, a new crop came on the scene. In 1908, William Grant interested the United States Department of Agriculture in the benefits of growing rice in Butte County. W.W. Mackie recommended that experiments be made to determine the best strains of rice to grow. It was determined that 275 different varieties would be planted on the land of the Balfour-Guthrie Company, which was just west of Biggs (Hardwick and Holtgrieve, 1996). In 1912, varieties were chosen and commercial planting began. The first commercial crop of 1,000 acres was planted near present day Richvale. By 1918, there were 30,000 acres of rice being grown in Butte County (McGee, 1980). Since then, rice has grown to become the dominant crop in the Northern Sacramento Valley. Today, within the Butte Creek Watershed, rice fields cover almost 159,000 acres, or about 31% of the land coverage.

McCallum and two new partners continued to push the advancement of irrigation by securing water rights and a right of way off Hamlin Slough in 1908. They began surveying the area but no work was ever done. The rights were then passed to a financial group in San Francisco, who sold it to the Great Western Power Company. Great Western went on to organize a subsidiary company known as the Western Canal Company. In 1915, the first section of the Western Canal was completed and in May of that year the Feather River was diverted into the canal to irrigate 20,000 acres of rice and 10,000 acres of fruit orchards (McGee, 1980). The general layout of the present canal was finished by 1917, with the siphons under Cottonwood and Dry Creeks and the dams on Butte Creek being completed. In 1930, PG&E bought the Great Western Power Company with the canal as part of the transaction (McGie, 1982). Since then, other modifications have been made as demands for water for rice have increased. In the late 1980's the system was purchased from PG&E and was formed into the Western Canal Water District (WCWD). The most recent change is the newly constructed siphon under Butte Creek finalized in the fall of 1997 (see Geology, Basin Morphology, Hydrologic System chapter).

With the system of irrigation canals and ditches in place, local groups began to organize irrigation and water districts. In 1916, the Paradise Irrigation District was formed, followed by the Glenn-Colusa Irrigation District in 1920. In 1930 the Richvale Irrigation District was organized and by 1942 the Biggs-West Gridley Water District had its beginning. Durham created its own irrigation district in 1948, and in 1952, the Butte Water District was formed to serve the Gridley and East Biggs areas. The land served by these districts varied greatly, from just 93 acres for the Durham Irrigation District to 121,592 acres under the Glenn-Colusa Irrigation District. There were many other water and irrigation districts that were formed and disappeared or were absorbed by other districts.

A section of particular interest regarding mining, and later agriculture, is the Cherokee Canal Strip. This unique, human-made landform is like no other. One of the resulting effects of hydraulic mining was the deposition of large amount of debris that washed down the creeks to settle out on the valley floor. David Gage and Louis Glass, partners who owned the Spring Valley Mining Company, already owned 2,300 acres of land along Dry Creek that was to be used as a dump canal for their mine (Mathys, 1973). To help solve the farmers' concerns, Spring Valley erected a brush dam to hold back debris. Silt and water still passed through but was contained between six-foot levees. As more silt accumulated more levees were built to contain the sediment, which became known as "slickens". Hydraulic mining practices were outlawed in 1884 but due to Spring Valley's investment in protecting farm lands they continued to mine. By 1887 the Spring Valley Mine was closed partly due to the huge expense of containing the debris. Glass and Gage both moved on but Gage continued to officially own what was referred to as the Cherokee Strip (Mathys, 1973).

In 1900 Sacramento Northern Railway wished to gain a right of way to cross the "slickens". Gage went to look at the land and found a six-foot high strip of soil devoid of rock. Cottonwoods and willows grew so thickly that it was difficult to get through them. But what really caught Gage's eye was a vast amount of burr clover. Burr clover was considered to be the best cattle fattener around, so Gage decided to try his luck raising cattle. The Gage family built a house and began the Gage Brothers Ramada Ranch. By 1912 they were running a very successful cattle ranch as noted in the Chico Daily Enterprise from June 3, 1912:

> A trainload of the fattest and biggest steers that will be shipped out of California this year, according to buyers, are being loaded on the cars today in Chico. Over 200 of the steers are four and five years old, many weighing 1,600 to 1,700 pounds. The steers were fattened by Gage Brothers on their slickens ranch, a sediment formed by the impounding of debris from the Cherokee mines and peculiarly adapted to the growing of burr clover, a fodder esteemed by cattleman as next to corn for 'finishing' beef cattle.

The high cost of raising cattle made the Gage ranch a short-lived enterprise. In 1915, one of the brothers, Edward became interested in orchards. He had land cleared, and in 1916 planted, 500 acres with almonds and prunes which grew successfully (Mathys, 1973). A few years later the Western Canal was built across the lower end of the strip. This set up the eventual introduction of rice on this very well drained soil, where it has prospered ever since. Today, the Cherokee Canal is used as an irrigation canal, drainage ditch, and flood protection for the surrounding agricultural lands.

At present, agricultural lands cover about 65% of the area in the Butte Creek Watershed. Rice covers the most area, followed by grazing lands, orchards, and field and row crops. There continues to be an extensive system of canals and ditches that are used to irrigate and drain the agricultural lands. For more information about the plumbing of the watershed refer to the Hydrology chapter of this document.

Levee History

Up until the 1950's, the only levees on Butte Creek were locally built agricultural levees that local interests constructed to keep high flows from destroying their lands. The first levees were built in the 1890's and were about 6 feet high and extended from about one mile upstream of the Chico-Oroville Road downstream about 14 miles (War Department, 1940). On December 22, 1944, Congress passed the Flood Control Act (the Act), which referred to the Sacramento River and its major and minor tributaries. This legislation authorized construction of levees and channel enlargement of upper Butte Creek. According to the Act, upper Butte Creek refers to the area from and including the Little Chico Creek Diversion downstream 18 miles to a spot southwest of Nelson and Richvale. The project was placed under the authority of the U.S. Army Corps of Engineers, Sacramento District.

The Corps divided the project into two parts. In 1952, the first part of the project was completed. It consisted of levee construction and channel improvement from Highway 99 downstream 8.7 miles. The project included the improvement of locally constructed levees to comply with project standards, as well as building new levees where local ones did not exist. The project standards called for levees on both sides of the creek to have a 12-foot crown width, slopes of a ratio of 2:1 on the landside and 3:1 on the riverside, and a minimum 30 foot riverside berm. It also allowed for channel enlargement to the extent necessary to obtain the needed material

for construction of the levees. Downstream from the end of the levee project, flood flows enter the Butte Basin and levee construction and channel improvements were not deemed necessary. In 1957-1958, part two of the project was completed. First a concrete diversion structure was built connecting Little Chico Creek to Butte Creek. The second part of the project covered the area from the beginning of the Little Chico Creek Diversion downstream 9.3 miles. On the diversion channel intermittent levees were built on the right bank with heights ranging from 7 to 13 feet. On Butte Creek the left bank levee is 7.2 miles long and the right bank levee is 7.1 miles long. These also have side slopes of 2:1 on the landside and 3:1 on the riverside. A minimum 30 foot berm was also provided with the levees ranging from 7 to 14 feet in height and having a 12 foot crown, allowing for a patrol road. Refer to Levee and FEMA Zone Map for locations of levees (see Map Appendix).

After the construction of the levees the Little Chico Creek Diversion was engineered to hold 4,500 cfs with no freeboard. Butte Creek, downstream from the diversion channel to where Sacramento Northern Railway crosses the creek, was constructed to contain 40,000 cfs with no freeboard. From the Sacramento Northern Railway crossing downstream to the end of the levees the capacity is estimated at 27,000 cfs with a 3 foot freeboard.

The construction of the diversion channel and levees was designed to provide flood protection to Chico from flood flows on Little Chico Creek. They also provide flood protection to Durham, as well as, 45,000 acres of agricultural land with related buildings and homes, Highway 99E, several county highways, and three railroads (Gaines, 1997).

Currently the levees are maintained by the State Reclamation Board. They issue permits for all actions that influence the levees, from a simple sign being posted to installing pipelines that cross the levee. Unfortunately, the Reclamation Board does not keep a consolidated log book of the permits that they issue so it is not possible to show all the projects that have taken place on the levees since they were built. The Reclamation Board also performs a yearly integrity assessment of the levees and oversees maintenance issues. Again, they do not have adequate records of their assessments to provide the information to the public (Padilla, 1997).

Vegetation Change

Significant impact on the vegetation of the Butte Creek Watershed was caused in large part by destructive mining techniques, population growth, and agricultural and livestock production. Introduced annuals gradually replaced native perennials, in part, due to historic development of the watershed (Davy, 1902, Heady, 1977, Keter, 1995). J.E. Perkins reported in 1864 that:

> Less than ten years ago, the traveler, would ride for days through wild oats tall enough to tie across his saddle, now dwindled down to stunted growth six to ten inches with wide reaches of utterly barren land (in Keter, 1995).

These changes, beginning with the introduction of wild oats and possibly red stemmed filaree by early Spanish in the Sacramento Valley, may have become well established by the time of the Gold Rush (Davy, 1902). The destruction of natural ecosystems in Butte Creek's downstream region was accelerated by the introduction of large number of livestock and feral pigs after 1865. Small barley grasses may have first entered the study area in the wool of sheep, as did the seeds of other exotic species (annual grasses and shrubs).

NOTE For The Following Chapter On Fire:

Preparation of this chapter is ongoing. What follows is background information on fire hazard and fire history in the Butte Creek Watershed.

Topics of emergency response to fires and analysis of future needs for watershed fire protection are being prepared and will be distributed as soon as possible.