

Grazing on The project area ~~and~~ near surrounding areas

The Surprise Valley region was settled in the 1860's by ranchers and farmers. The oldest structure in Modoc County is a log cabin with loop holes for defense against the Indians built in 1865 by James Townsend on the present site of Cedarville, California.

The first settlers raised cattle primarily. The number of local livestock grazed in the region increased as more of the area was settled and the demand for meat and other livestock products in surrounding regions ^{across} and the nation increased with a growing population.

Migrant livestock, both cattle and sheep, also grazed in the region. They were trailed through in all directions. ~~_____~~
~~_____~~. Grazing by sheep was particularly heavy.

Most of the region consisted of unregulated public land. The grass was free and stockmen vied with each other for it. They grazed as many animals as they could and for as long as possible each year paying little attention to the harmful consequences of such use on the grass and the land. Many held the view that the grass would come back with the next good rains and others--take the grass while it lasts.

The number of livestock grazed on range lands in those early days can only be imagined. It has been estimated that maximum number was reached by 1890 or so--a short 30 or 40 years after grazing was started. By that time and certainly by 1900 the range was very heavily deteriorated. Private as well as public lands were damaged. Most of the damage evident today occurred in those early days of grazing.

stock as possible on the ranges for as long as possible each year. With this heavy use the ranges deteriorated quickly.

Regulation of livestock grazing on lands now under Bureau jurisdiction was first authorized with passage of the Taylor Grazing Act in 1934. The Grazing Service was established initially to administer the lands covered by the act. The Bureau of Land Management was formed from the Grazing Service in 1946.

Because of limited funds and manpower the Grazing Service could exercise little more than custodial management of the lands. But it did start inventorying the resources and carrying out range surveys to determine livestock grazing capacities.

The Bureau proceeded with these efforts and also carried out an adjudication program in which grazing privileges on specified areas were issued to qualified stockmen and stocking rates, seasons of grazing, and other grazing management measures were set. Adjudication on the Tulead-Home Camp Area was not concluded until 1955. So on-the-ground regulated management on the area did not start until 19⁶⁵~~56~~ some 12 years ago.

Nine grazing allotments were established on the area. Grazing capacities for the allotments were set on the basis of standard range surveys. Seasons of grazing and other management measures were determined by accepted methods. The Bureau proceeded with management of grazing using the grazing system that was generally accepted and most widely used on public and private lands at the time--namely continuous moderate or proper use grazing.

The Cressler and Bonner Trading Post

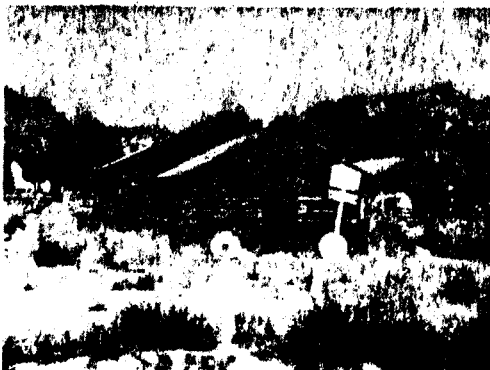
In Surprise Valley there are still standing some of the first log cabins built by white settlers, all loopholed for defense against the Indians. Among these is the log trading post (SRL 14) which was conducted by William T. Cressler and John H. Bonner. The oldest structure in Modoc County, it was built in 1865 by James Townsend, who shortly afterward was killed by Indians. Townsend's widow sold the building to Cressler and Bonner, and in it the partners set up the first mercantile establishment in the county. A thriving trade was carried on, first with emigrants en route to California and Oregon and later with the early settlers of Surprise Valley.

This interesting relic, surrounded by a magnificent grove of trees planted by the original owners, stands in a semipublic park in the center of Cedarville.

The first road from Cedarville to Alturas followed, in a general way, the course of the present scenic highway over the Warner Mountains from Surprise Valley. John H. Bonner, in 1869, was largely instrumental in securing the construction of this road over the Bonner Grade (SRL 15), which was named in his honor. This route, which became an important stage and freight road to Yreka, was maintained by Bonner until 1871, when Siskiyou County took it over.

Indian Battles

The battle of Infernal Caverns, one of the most famous Indian fights in California, took place on September 26-27, 1867, between 110 soldiers led by Lieutenant Colonel George Crook and a band of 75 Piutes, 30 Pit Rivers, and a few Modocs. For some time the Indians, well equipped with arms and ammunition, had been terrorizing the settlers throughout southern Idaho, western Nevada, and northeastern California, and Colonel Crook and his men had been sent to subdue them. The Indians were finally driven into a rough region on the South Fork of the Pit River. Here, before a seemingly impregnable fortress of caves and rocks, a pitched battle took place. The Indians were eventually driven from their stronghold, leaving many of their number dead, but not before eight of Crook's command were killed and 14 wounded.



Cressler & Bonner Trading Post, Cedarville

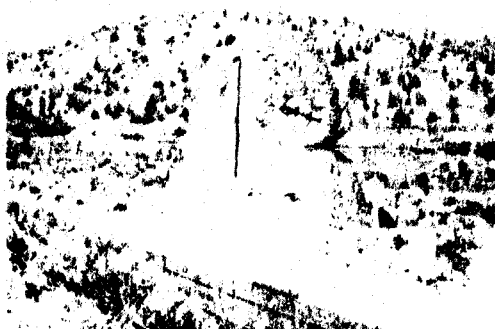
The battleground of Infernal Caverns (SRL 16), where the old fortifications may still be seen, is on the Monroe Ranch about 17 miles south of Alturas. At the foot of the slope the graves of six of the soldiers killed in action have been marked by regulation Army headstones. Lieutenant John Madigan, 1st Cav., who was among those killed, was brevetted posthumously for conspicuous bravery. His body was secretly buried at a spot near the forks of the Pit River not far from Alturas. To reach Infernal Caverns drive 14.5 miles south on Highway 395 from the south limits of Alturas, turning right for one mile on a good road leading to ranch homes. Turn right again at the sign reading "Pit River Ranch Headquarters." Follow this road, keeping to the right, for three and one-half miles to the Monroe ranch house. The six graves are about a mile from this point, and above, in very difficult terrain, are the caverns.

One of the engagements of the Modoc War took place on December 21, 1872, on what was then known as Land's Ranch, at a spot (SRL 108) located within a stone's throw of the old Fremont campsite on the Oregon Trail. Army supply wagons, escorted by a detachment of cavalrymen, had reached camp in safety, but several of the soldiers who had dropped behind were suddenly attacked by Indians in hiding among the rocks above the road. Two men were killed and several wounded.

The last of the engagements which occurred during the Modoc War was fought at daybreak on May 10, 1873, when Captain Jack, leader of the Modocs, led a charge on the military camp at Dry Lake. The soldiers were aroused to a realization of danger by the stampeding of their horses and mules. Wanting vengeance after the long and bitter campaign of the winter and spring, they led a fierce counterattack seldom equaled in the annals of Indian warfare. This battle resulted in a decisive defeat for the Indians and the capture of Captain Jack, thus putting an end to the Modoc War. The site of this important Indian battle is located about half a mile west of the Dry Lake guard station on Highway 139.

Fort Bidwell

Fort Bidwell (SRL 430), at the head of Upper Lake in Surprise Valley, about 30 miles northeast of Alturas and ten miles south of the Oregon boundary line, was named in honor of General John Bidwell. It was established in 1865, and cavalrymen were stationed there to hold in check the marauding Indians of northeastern California, southern Oregon, and western Nevada. Fort Bidwell was finally abandoned as a military outpost in 1893, but until 1930 it was used as a government school for Indians. The boarding school was discontinued that year and the military barracks, formerly used for dormitories, were torn down. The old military graveyard is about all that remains. Newer homes have taken the place of the old quarters in which the Indians long lived, and the 200 acres of fine bottom lands which had been used for the school farm continue to be used by the Indians.



Chimney Rock, near Alturas

Other Historic Sites

Four and seven tenths miles southeast of Cauby on the Centerville Road to Alturas is the site of an Indian attack that has come to be known as the Evans and Bailey fight (SRL 125). S. D. Evans, Sr., and Joe Bailey were killed here in July 1861, while they and their men were driving 900 head of beef cattle from Oregon to the mines at Virginia City, Nevada. A white obelisk stands on a hill to the right of the road.

About seven miles north of Alturas near Highway 395 is Chimney Rock (SRL 109), the remains of the second building to be erected in Pit River Valley. Thomas L. Denson, a California pioneer of 1852, built his cabin here in 1860, utilizing the rock as a chimney by cutting the fireplace and flue out of it.

Seven miles southeast of Tulalake off Highway 139, near the junction of one of the roads leading to the Lava Beds National Monument, are the barracks buildings of Newell, one of the Japanese internment camps of World War II.

SOURCES

- Bancroft, Hubert Howe. *History of California*, Vol. V (1846-48). History Co., San Francisco, 1886. ✓
- Brown, William S. "The Land of Burned Out Fires." *Touring Topics*, XIX, No. 8 (August 1927). ✓
- Bruff, J. Goldsborough. *Gold Rush: The Journals, Drawings and Other Papers of J. Goldsborough Bruff, April 2, 1849-July 20, 1851*, ed. Georgia Willis Read and Ruth Gaines. New York, 1944. ✓
- Burnett, Peter H. *Recollections and Opinions of an Old Pioneer*. D. Appleton & Co., New York, 1880. ✓
- Cleland, Robert Glass. *Pathfinders*, Vol. I of the series *California*, ed. John Russell McCarthy. Powell Publishing Co., Los Angeles, 1929. ✓
- Delano, A. *Life on the Plains and among the Diggings*. Miller, Orton & Mulligan, Auburn and Buffalo, New York, 1854. ✓
- Donnin, May. "The Emigrant Trails into California." Master's thesis in history. University of California, Berkeley, 1921. ✓
- Fremont, John C. *Memoirs of My Life*. Chicago and New York, 1887. ✓
- French, R. A., comp., and Gertrude P. French, ed. *A Historical, Biographical and Pictorial Magazine Devoted to Modoc County*. Alturas, 1912. ✓
- Goldsmith, Oliver. *Overland in Forty-Nine. The Recollections of a Wolverine Ranger after a Lapse of Forty Seven Years*. Detroit, 1896. ✓
- Lipps, Oscar H. *The Case of the California Indians*. United States Indian School Print Shop, Chienawa, Oregon, 1932. ✓
- Ogden, Peter Skene. "Journals of Snake Expeditions, 1827-28; 1828-29, with Editorial Notes by T. C. Eliott," *Quarterly of the Oregon Historical Society*, XI (December 1910), 355-97. ✓
- Reading, Pierson B. "Journal of Pierson B. Reading, Written during His Journey from Westport, Missouri, to Monterey, California, in 1843," *Quarterly of the Society of California Pioneers*, VII, No. 3 (September 1930), 148-98. ✓
- Riddle, Jeff C. *The Indian History of the Modoc War*. Privately published, 1914. ✓
- Sanchez, Nellie Van de Grift. *Spanish and Indian Place Names in California*. A. M. Robertson, San Francisco, 1922. ✓
- Wilkes, Charles. *Narrative of the United States Exploring Expedition during the Years 1838, 1839, 1840, 1841, 1842*. 5 vols. and an atlas. Lea & Blanchard, Philadelphia, 1845. ✓

Mono County

MONO COUNTY was formed in 1861 of territory taken from Calaveras and Fresno counties. (Mono is possibly a corruption of Monache, a name of obscure meaning but said to have been applied to the Indians of the region.) The eastern boundaries were undetermined for several years, and in 1863 Aurora, the first county seat, was found to be in the state of Nevada. Bridgeport then became the seat of government and has since retained that position. The old and beautiful courthouse is still in use. From 1863 to 1870 the boundary lines of Mono County were changed four times, Alpine and Inyo counties each obtaining a portion of it in 1864 and 1870, respectively.

Rock Writings

"Among all the strange symbols inscribed on rock, up and down the globe, and especially in Southwestern America, by peoples since passed utterly out of human knowledge, it would be difficult to designate any more mysterious or fascinating than certain specimens now revealed just without our own doors."

Facing Chalfant Valley 17 miles north of Bishop, there is a high volcanic tableland between the lofty Sierra on the west and the White Mountains on the east. Cut into the eastern escarpment of this rough ridge of rock are the remarkable

The capacity of the area to produce the all-important renewable resources has been greatly reduced by deterioration of the Vegetation on the area has been heavily deteriorated. As a consequence and soil by livestock grazing. The quality of the natural environment as a whole has been seriously degraded.

Most of the damage occurred early in the grazing history of the region in a comparatively short period of 30 to 35 years between about 1865 and 1900. Rangelands throughout the west were heavily stocked and deteriorated at that time. Peak numbers of livestock on western range lands were reached in the 1880's. During this period grazing on public lands was unregulated. The grass was free. Stockmen vied with each other for it and grazed as many stock as possible each year. With this heavy use the ranges deteriorated quickly.

Regulation of livestock grazing on lands now under Bureau jurisdiction was first authorized with passage of the Taylor Grazing Act in 1934. The Grazing Service was established initially to administer the lands covered by the act. The Bureau of Land Management was formed from the Grazing Service in 1946.

Because of limited funds and manpower, the Grazing Service could exercise little more than custodial management of the lands. But it did start inventorying the resources and carrying out range surveys to determine livestock grazing capacities.

The Bureau proceeded with these efforts and also carried out an adjudication program in which grazing privileges on specified areas were issued to qualified stockmen and stocking rates, seasons of grazing, and other grazing management measures were set. Two adjudications

Conditions on range lands in northeastern California, northwestern Nevada and southern Oregon in that early period have been described by local people, travelers and scientists. Their comments and reports are revealing.

Period 1860's - 1900

Grazing started

First settlement in Surprise Valley Region 1860's

Kind of grazing use and effect

Map of early day stock trails, California, Nevada, Oregon through Tuledad-Home Camp Area

Period 1900 - 1934 Taylor Grazing Act (Photo-Likely)

Period 1934 - 1946

Custodial management. Grazing Service. Little funds or manpower.

Period 1946 - 1965

Formation BLM

Range adjudication

Period 1965 - 1967

Intensive grazing management started - by BLM

Adopted standard grazing management practices

Rest-rotation grazing trials in West

History of livestock grazing

The Surprise Valley region and surrounding areas in California, Nevada, and Oregon were heavily deteriorated by livestock grazing by the turn of the century. Accurate accounts of the condition of those ranges at the time were prepared by Kennedy (1897, 1903) University of Nevada and Griffiths (1902, 1903) U. S. Department of Agriculture. Griffiths travels took him through the Warner Mountains close to the project area. The overall picture painted by those observers was heavy deterioration of the range by livestock grazing by about 1900. The project area was deteriorated to a similar degree and for the same reasons - heavy stocking and disregard for the growth requirements of vegetation.

Kennedy (1897) Northeastern, California

THE ROUTE AND THE OUTFIT

"On June 3, 1901, Dr. P. B. Kennedy left Reno for the Constantia Ranch, in Plumas County, California, and proceeded thence to J. N. Evans' horse ranch near Fort Sate Mountain where he was joined a few days later by Mr. Samuel B. Doten..the party set out on foot to study the ranges lying between horse ranch and Webber Lake. They went slowly through the dry and somewhat barren country lying east of the Constantia Ranch; then passed southward through Long Valley to Chat, California, where they turned to the west, and, passing over a low range of hills, entered Sierra Valley.

"For several days they studied and collected the plants and grasses growing on the hills surrounding the lower end of Last Chance Creek. After leaving the Last Chance country the party passed rapidly southward through the eastern end of Sierra Valley to Loyalton, and thence by way of Lewis' mill to Sardine Valley, and through it to the Little Truckee River. They then traveled up the Little Truckee to Webber Lake, and on June 25th pitched camp at the head of the waterfall below.

"In the region surrounding Webber Lake thousands of sheep owned by Messrs. Van Buren and Flanigan were grazing. The hills were covered with good forage plants, and all the sheepmen were glad to point out those they considered most valuable. Leaving Webber Lake, they went next to Lincoln Valley by a roundabout way over the mountains. The herders whom they met on these fertile ranges gave them much information of the highest importance.

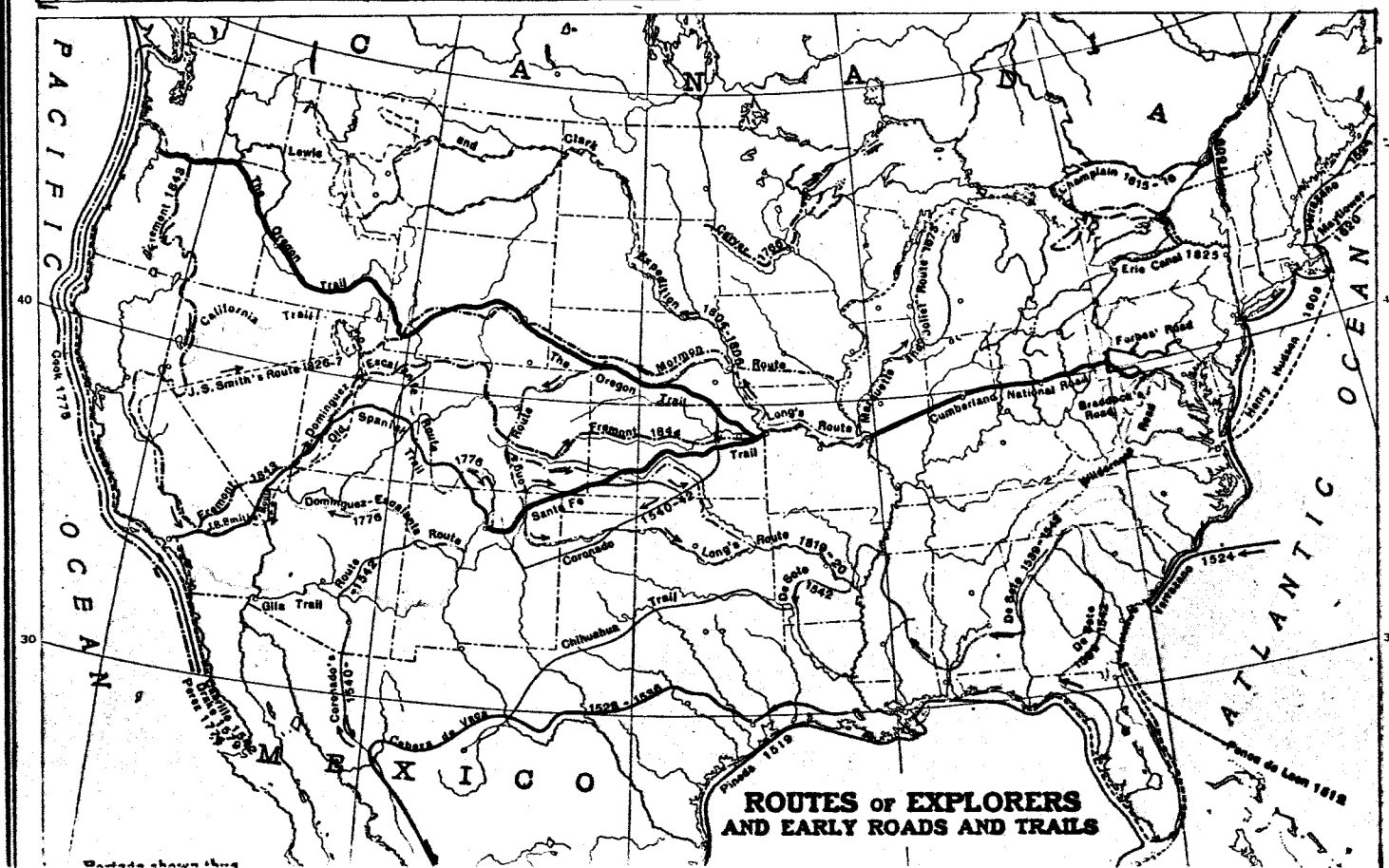
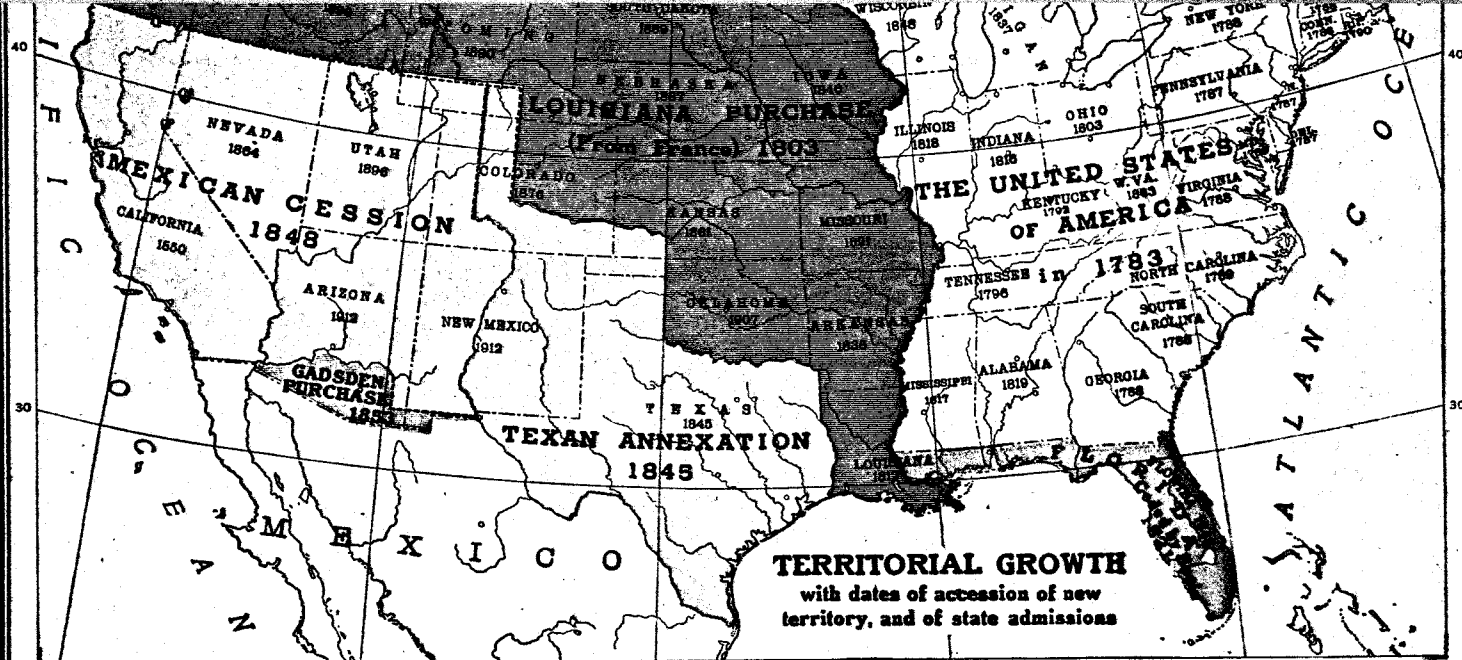
"After a brief stay in Lincoln Valley the botanical outfit was guided by P. L. Flanigan's herders through the mountains to Soda Springs Station on the Southern Pacific Railroad. As Soda Springs Station is an important shipping point for sheep, the region surrounding it is almost barren of all forage plants. On this account the part left at once for Summit Soda Springs, on the American River. For several days they collected the more valuable plants of this region; then they proceeded by way of the wagon road to Talbot's home camp, in the Middle Fork of the same river... then after collecting and photographing the best plants and grasses, they proceeded back through the mountains to Reno, and so brought the summer's work to an end.

PRESENT CONDITIONS

"A great difference exists as to the degree to which different parts of the summer range have been injured by sheep-grazing. Some sheep-owners are alive to the fact that judicious and scientific methods must be used in grazing on ranges, while others seem to think that it is impossible for the grasses and forage plants to become exterminated, no matter what the treatment. Because of this condition of things, there can be found some ranges on which the feed is almost as plentiful as it was ten years ago, while others can be found that have been cropped closely several times every year, and now produce a very small quantity of forage to the acre. Good forage plants, like the tomato plant, are so severely grazed during the hot summer that the crown is injured and death results. Brush is so constantly nibbled that the branches become

short and destroyed, and, unable to produce leaves, they finally succumb. When the plants, with their roots, are gone, then come the fall rains which wash the rich surface soil into the streams and leave behind poor soil, which soon becomes hard, so that succeeding rains rapidly run off. When the roots of the plants are destroyed there is nothing to hold the soil together, hence it is easily washed, forming gullies which in time become creeks during the rainy season. This condition of the range can be seen from Webber Lake to Soda Springs Station on the north, and from Summit Soda Springs to Soda Springs Station on the south, where every year numerous bands traverse this region to be shipped on the railroad.

"It seems to the writers that with proper care and management the forage on the ranges of the Sierra Nevada visited by them might be made to produce double the amount now growing on them, as devastation has only just begun. Most of the best forage plants are still there, and all they want is an opportunity to reseed themselves at least every other year. The soil is rich and capable of producing a much larger quantity of forage than is now on them. If the present methods on many ranges are continued, within a few years the number of sheep will have to be greatly decreased, more land will have to be rented, and finally the sheep industry, which adds greatly to the prosperity of the State, will come to a close."



MIDDLE AMERICA-Physical and Political



Rango Land Use

Cattle Numbers 17 Western States (SD #199)

page 119

Year	Number
1870	7,907,000
1880	12,981,000
1886	21,549,000

First grazing in U.S

1540 Southern Plains Coronado (Trip)

1700 ^(intermittent grazing)
Continuous grazing

Around missions Southern Arizona
Fort San King (near San Texas)

1710-1810 Missions in Texas, New Mexico
Arizona became livestock center
soon after 1700

1769-1804 California Missions established
livestock at missions 1834
~~cattle, sheep, goats, swine & 50,000~~
~~horses, mules~~

1834

Cattle 478,000

Horses 61,600

sheep } 21,500

Goats

Swine

511,100

1821 Texas still Mexican Territory
Mexican government contracted with Moss
Austin to bring settlers into Texas, many
came 20,000 with cattle. Cattle
multiplied to 10,000 - 1830
330,000 - 1850
533,000 1860

Texas range crowded and heavily grazed
By 1885 more than 5 million cattle
driven north to the rail road at
Abilene. Kansas

Utah Mormons

By 1880 160,000 head cattle in
northern and central Utah

In the 1860s cattle into old mining
areas in Colorado, Montana, Nevada and Idaho
from Utah and California

Sheep

1821 Cattle into Texas from
Mexico

Texas Annexation 1845

Cal Mex

Territory { Cal, Nev, Ariz, Utah, Fort Oregon, Idaho Colo
Mexican Cession 1848

Lewis & Clark Expedition Route

1794-1805 St Louis Missouri to mouth of

Columbia River via Missouri Kansas

(1805-1806)
? Nebraska, Colorado, N Dakota Montana
-Idaho, Oregon

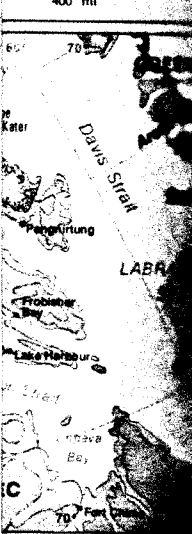
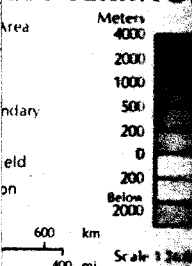
...without charge

ant economic activity of this was derived in the Mackenzie in 1977 and lead is also mined.

g the Mackenzie River on the North and on the northwest production was valuable

de trapping, especially on Great Slave valued at \$3 million. Its on the Snare, Value \$6,000 kW h. n operates seasonally

NORTHWEST TERRITORY



river system and in the southern Arctic waters. A link with the south terminates at Hay River. A system links the Mackenzie Valley to northwest and Inuvik was linked to Yukon roads in 1979. Road and charter air service operate throughout

The Northwest Territories consists of four regions—Fort Keewatin, and Baffin—governed by an elected territorial Council and a federally appointed. The NWT sends two representatives to the House of Commons. In recent years the federal has increasingly relinquished political responsibility to local authorities.

ians belonged to a number of nomadic tribes, most of the Athapaskan language group. The NWT was by fur traders, explorers (especially those seeking West Passage), and whalers in the 18th and 19th and prospectors in this century. It was held by the HUDSON'S BAY COMPANY and was transferred to Canada in 1870. Since World War II the federal government has expended much effort and money on scientific and social-economic development programs in the

WILLIAM C. WONDERS

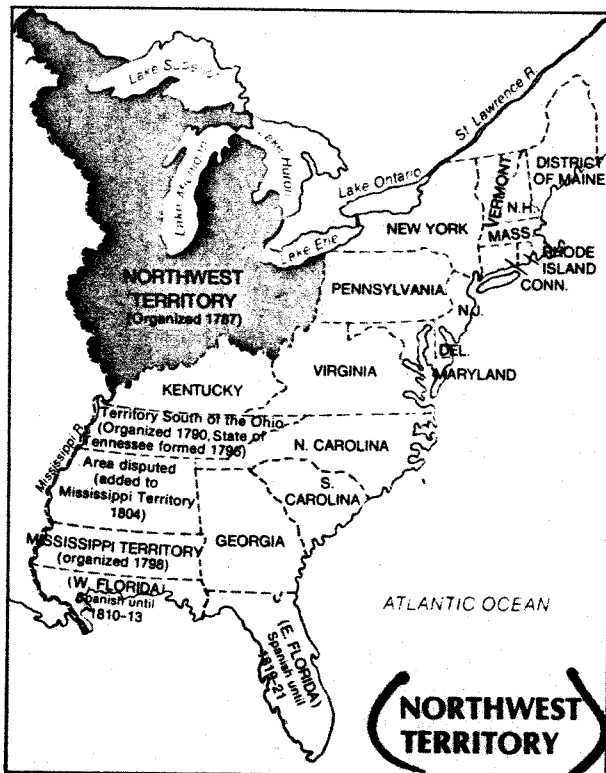
Dawson, C. A., ed., *The New Northwest* (1947); Patterson M., *The Dangerous River* (1972); Phillips, R. A., *Canada* (1967); Wonders, William C., ed., *Canada's Changing*

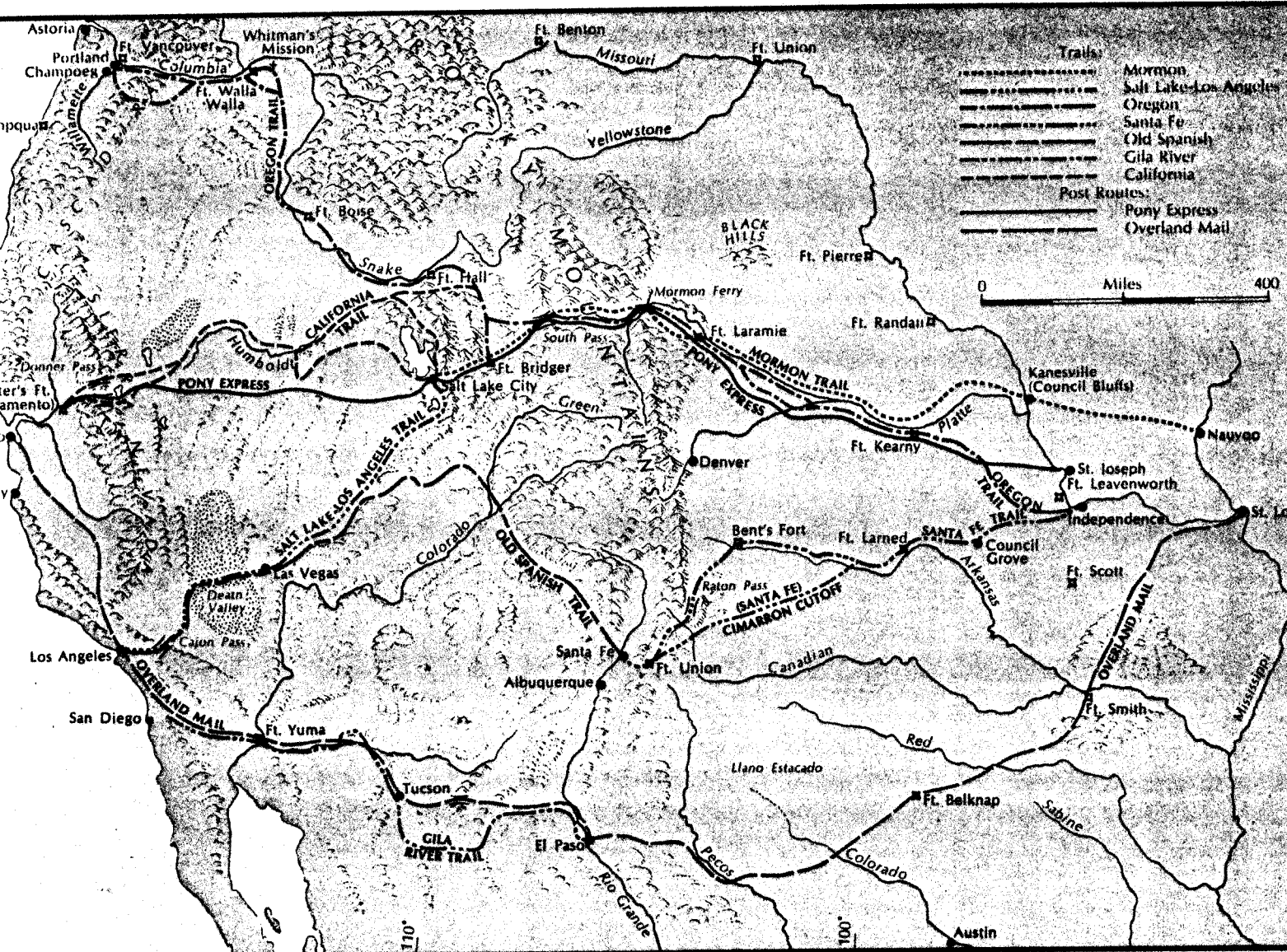
Northwest Territory

The Northwest Territory, officially called The Territory North of the River Ohio, was established by the Continental Congress on July 13, 1787, by the Northwest Ordinance. The territory was later called the Old Northwest. Comprising the area of Pennsylvania between the Ohio and the Missis-

issippi rivers ceded to the U.S. government by individual states in the 1780s, the territory was later divided into the new states of Ohio, Indiana, Illinois, Michigan, Wisconsin, and part of Minnesota. The policies that were devised for the sale of land and for the government in this region established precedents for the settlement of the public domain across the whole of the United States.

The Land Ordinance of 1785 had provided for the survey and sale of mile-square sections of land. After the first sales, in the area that is now eastern Ohio, the federal government began to allow land companies to purchase huge areas farther down the Ohio River. Congress passed the Northwest Ordinance of 1787 to provide for the government of the entire region. The Ordinance was based in part on a plan drawn up by a committee headed by Thomas JEFFERSON in 1784. It stated that no fewer than 3 nor more than 5 states were eventually to be formed from the region and set down an orderly procedure for the creation of these new states. In the first stage the entire Northwest Territory would be ruled by a gov-





Routes to the West

reach a settlement within this remote colony of land titles. Secretary Adams in 1844 with the Oregon and repeated 1. Q. Adams, to divide 49°. But Aberdeen, still refused to abandon the bias. If the question was actual occupation, then it would be difficult to division. North of the cover and along Puget 700 British subjects, a well afford to wait. river fur trade was profitable, and the me American immigrants. Dr. McLoughlin's suggestion Fort Vancouver and erected a new post island.

By this time the expedition become President. He American title to the 34° 40', was 'clear and Congress for authorization agreement never intended to risk of Oregon. His ambition which probably meant not care to fight England. Thus, when Lord passed to extend the in latitude 49° N to Puget through Juan de Fuca Island to Canada, Polk British offer to his country the Senate decided to coin the slogan 'agreed, and on 15 June was ratified. Thus was of the 3000-mile frontier United States.

Landing 1st Trip

THE
WEST INDIES

San Salvador Is.

Watling Is.

Landed

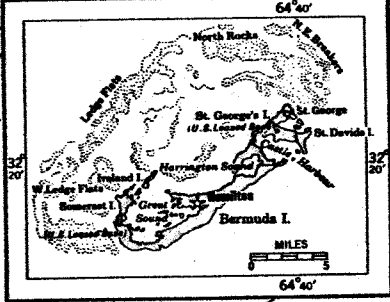
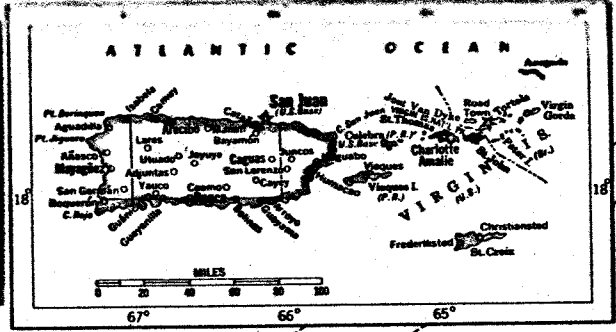
Oct 12, 1492

CONIC PROJECTION
SCALE OF MILES

SCALE OF KILOMETRES

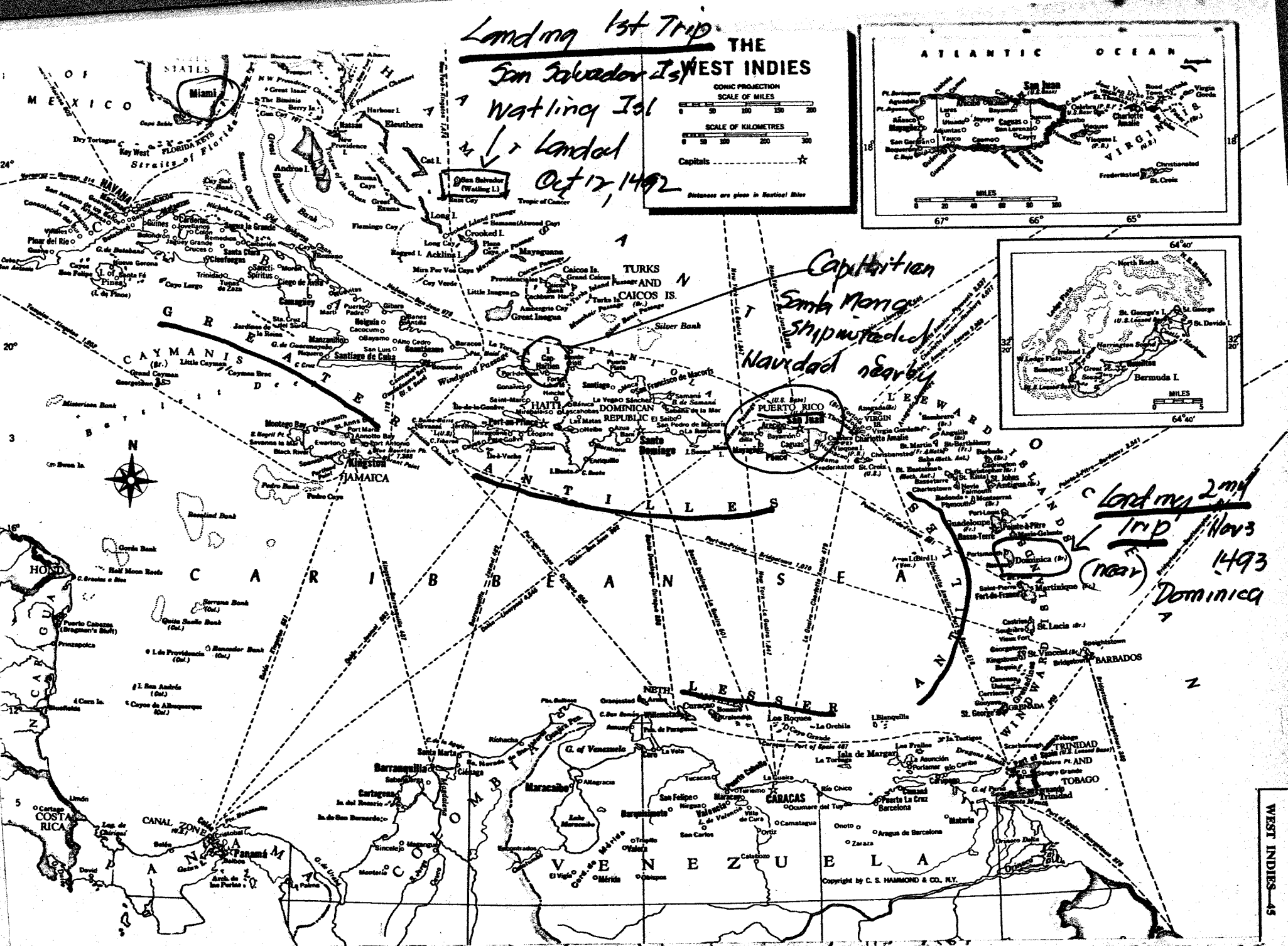
Capitals

Distances are given in Nautical Miles



Capitulation
Santa Monica
Shipwrecked
Navidad nearby

Landing 2nd Trip
Nov 3
1493
Dominica



GRAZING HISTORY

Historical range conditions in the area have generally been described as consisting of luxuriant native bunchgrasses saddle high, fertile meadows and vast sagebrush flats of waving grasses (Brown, 1945).

By the 1840's, these range resources were subjected to pioneer impact with up to 2,000 head of livestock per wagon train. As many as 100 wagon trains (Wentworth, 1948) and 8,000 people per year used the Applegate and Lassen Trails and the Townsend Road. By 1879, the settler impact was in full swing. A single drover had as many as 30,000 cattle (Range History of Nevada) and 12,000 cattle were on the Bare Ranch alone.

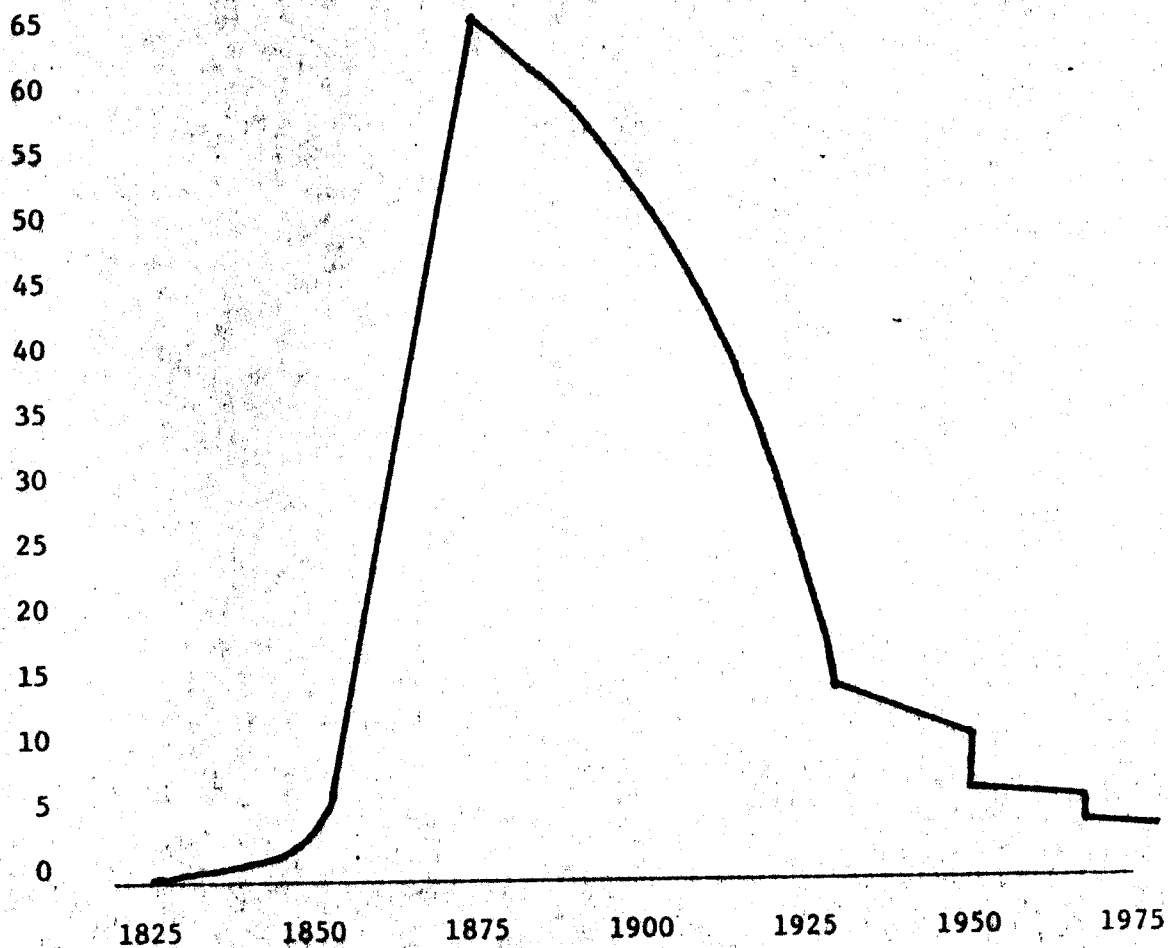
During the period of 1887-1890, about 350,000 sheep were trailed through the middle of the study area over the Lyons Trail (Wentworth, 1948). Sheep numbers continued to grow until 200,000 grazed the area in 1929.

This period also witnesses an increase in horse numbers. Horses released or lost by travelers became so abundant that severe forage competition resulted and 1,000 horses were killed followed by a killing of 600 more horses in 1908-1909 and 1,200 in 1921-1925. Prior to the turn of the century, horses numbered 600-1,000 on many ranches as they were raised for sale (Brown, 1945).

By the time the Taylor Grazing Act was passed in 1934, the numbers of animals had declined drastically (FIGURE 1-4).

FIGURE 1-4
TREAND IN NUMBERS OF AUs WHICH HAVE GRAZED THE STUDY AREA
(Sheep, Cattle and Horses)

Total
Yearlong
Animal Units
(1,000's)



With the Taylor Act came the first effort at regulation of the grazing use of public lands. Two adjudications with substantial reductions in grazing permits were accomplished by the Bureau--the first in 1949-52 and the second in 1965-68 (TABLE 1-10).

The peak of grazing use in the study area occurred during the years 1875-1880 with a total of 60,000 to 65,000 yearlong animal units of sheep, cattle and horses (Comacho, Kingston, 1977). The peak was roughly 16 times the 3,941 yearlong animal units of sheep, cattle and horses presently allocated.

TABLE 1-10
GRAZING HISTORY OF STUDY AREA
(Sheep, Cattle and Horses)

<u>Date</u>	<u>Significance of Date</u>	<u>Total Yearlong Animal Units</u>
1875-80	Peak of livestock numbers	62,500
1929-34	Taylor Grazing Act Priority Period	12,880
1949-52	First Adjudication	7,531
1965-68	Second Adjudication	4,133
1977	Current Allocation	3,941

stock as possible on the ranges for as long as possible each year. With this heavy use the ranges deteriorated quickly.

Regulation of livestock grazing on lands now under Bureau jurisdiction was first authorized with passage of the Taylor Grazing Act in 1934. The Grazing Service was established initially to administer the lands covered by the act. The Bureau of Land Management was formed from the Grazing Service in 1946.

Because of limited funds and manpower the Grazing Service could exercise little more than custodial management of the lands. But it did start inventorying the resources and carrying out range surveys to determine livestock grazing capacities.

The Bureau proceeded with these efforts and also carried out an adjudication program in which grazing privileges on specified areas were issued to qualified stockmen and stocking rates, seasons of grazing, and other grazing management measures were set. Adjudication on the Tulead-Home Camp Area was concluded in 1955. So on-the-ground regulated management on the area did not start until 19⁶⁵~~56~~ some 12 years ago. ✓

? Nine grazing allotments were established on the area. Grazing capacities for the allotments were set on the basis of standard range surveys. ✓
Seasons of grazing and other management measures were determined by accepted methods. The Bureau proceeded with management of grazing using the grazing system that was generally accepted and most widely used on public and private lands at the time--namely continuous moderate or proper use grazing.

HISTORY OF LIVESTOCK GRAZING

The Surprise Valley region and surrounding areas in California, Nevada, and Oregon were heavily deteriorated by livestock grazing by the turn of the century. Accounts of the condition of these ranges at that time were prepared by Kennedy (1897, 1903) University of Nevada, and Griffiths (1902, 1903) U.S. Department of Agriculture. Griffiths travels took him through the Warner Mountains close to the project area. The overall picture painted by those observers was heavy deterioration of the range by livestock grazing by about 1900.

Kennedy (1897) Northeastern, California

"A great difference exists as to the degree to which different parts of the summer range have been injured by sheep-grazing. Some sheep-owners are alive to the fact that judicious and scientific methods must be used in grazing on ranges, while others seem to think that it is impossible for the grasses and forage plants to become exterminated, no matter what the treatment. Because of this condition of things, there can be found some ranges on which the feed is almost as plentiful as it was ten years ago, while others can be found that have been cropped closely several times every year, and now produce a very small quantity of forage to the acre. Good forage plants, like the tomato plant, are so severely grazed during the hot summer that the crown is injured and death results. Brush is so constantly nibbled that the branches become short and destroyed, and, unable to produce leaves, they finally succumb. When the plants, with their roots, are gone, then come the fall rains which wash the rich surface soil into the streams and leave behind poor soil, which soon becomes hard, so that succeeding rains rapidly ran off. When the roots of the plants are destroyed there is nothing to hold the soil together, hence it is easily washed, forming gullies which in time become creeks during the rainy season. This condition of the range can be seen from Webber Lake to Soda Springs Station on the north, and from Summit Soda Springs to Soda Springs Station on the south, where every year numerous bands traverse this region to be shipped on the railroad.

"It seems to the writers that with proper care and management the forage on the ranges of the Sierra Nevada visited by them might be made to produce double the amount now growing on them, as devastation has only just begun. Most of the best forage plants are still there, and all they want is an opportunity to reseed themselves at least every other year. The soil is rich and capable of producing a much larger quantity of forage than is now on them. If the present methods on many ranges are continued, within a few years the number of sheep will have to be greatly decreased, more land will have to be rented, and finally the sheep industry, which adds greatly to the prosperity of the State, will come to a close."

NE Calif.

Kennedy (1897) Northeastern, California
THE ROUTE AND THE OUTFIT

"On June 3, 1901, Dr. P. B. Kennedy left Reno for the Constantia Ranch, in Plumas County, California, and proceeded thence to J. N. Evans' horse ranch near Fort Sate Mountain where he was joined a few days later by Mr. Samuel B. Doten..the party set out on foot to study the ranges lying between horse ranch and Webber Lake. They went slowly through the dry and somewhat barren country lying east of the Constantia Ranch; then passed southward through Long Valley to Chat, California, where they turned to the west, and, passing over a low range of hills, entered Sierra Valley.

"For several days they studied and collected the plants and grasses growing on the hills surrounding the lower end of Last Chance Creek. After leaving the Last Chance country the party passed rapidly southward through the eastern end of Sierra Valley to Loyalton, and thence by way of Lewis' mill to Sardine Valley, and through it to the Little Truckee River. They then traveled up the Little Truckee to Webber Lake, and on June 25th pitched camp at the head of the waterfall below.

"In the region surrounding Webber Lake thousands of sheep owned by Messrs. Van Buren and Flanigan were grazing. The hills were covered with good forage plants, and all the sheepmen were glad to point out those they considered most valuable. Leaving Webber Lake, they went next to Lincoln Valley by a roundabout way over the mountains. The herders whom they met on these fertile ranges gave them much information of the highest importance.

"After a brief stay in Lincoln Valley the botanical outfit was guided by P. L. Flanigan's herders through the mountains to Soda Springs Station on the Southern Pacific Railroad. As Soda Springs Station is an important shipping point for sheep, the region surrounding it is almost barren of all forage plants. On this account the party left at once for Summit Soda Springs, on the American River. For several days they collected the more valuable plants of this region; then they proceeded by way of the wagon road to Talbot's home camp, in the Middle Fork of the same river... then after collecting and photographing the best plants and grasses, they proceeded back through the mountains to Reno, and so brought the summer's work to an end.

PRESENT CONDITIONS

"A great difference exists as to the degree to which different parts of the summer range have been injured by sheep-grazing. Some sheep-owners are alive to the fact that judicious and scientific methods must be used in grazing on ranges, while others seem to think that it is impossible for the grasses and forage plants to become exterminated, no matter what the treatment. Because of this condition of things, there can be found some ranges on which the feed is almost as plentiful as it was ten years ago, while others can be found that have been cropped closely several times every year, and now produce a very small quantity of forage to the acre. Good forage plants, like the tomato plant, are so severely grazed during the hot summer that the crown is injured and death results. Brush is so constantly nibbled that the branches become

short and destroyed, and, unable to produce leaves, they finally succumb. When the plants, with their roots, are gone, then come the fall rains which wash the rich surface soil into the streams and leave behind poor soil, which soon becomes hard, so that succeeding rains rapidly run off. When the roots of the plants are destroyed there is nothing to hold the soil together, hence it is easily washed, forming gullies which in time become creeks during the rainy season. This condition of the range can be seen from Webber Lake to Soda Springs Station on the north, and from Summit Soda Springs to Soda Springs Station on the south, where every year numerous bands traverse this region to be shipped on the railroad.

"It seems to the writers that with proper care and management the forage on the ranges of the Sierra Nevada visited by them might be made to produce double the amount now growing on them, as devastation has only just begun. Most of the best forage plants are still there, and all they want is an opportunity to reseed themselves at least every other year. The soil is rich and capable of producing a much larger quantity of forage than is now on them. If the present methods on many ranges are continued, within a few years the number of sheep will have to be greatly decreased, more land will have to be rented, and finally the sheep industry, which adds greatly to the prosperity of the State, will come to a close."

Conditions on range lands in northeastern California, northwestern Nevada and southern Oregon in the 1800's have been described by local people, travelers and scientists.

"Life was hard for the Modoc pioneers. However, the valley lands were fertile and the ranges covered with luxuriant native bunch-grass, saddle high."

(Brown, Wm., 1945)

"When the first pioneers settled in Modoc County, the entire county was covered with a stand of waving grasses. Not only was this true of the valley meadows, but also of the vast sagebrush flats and mountain areas."

(Brown, Wm., 1945)

"Luxuriant valleys and hills lay in the warm sunshine, tall waving grasses testified to the richness of the soil. Above these towered virgin forests and sprinkled over the whole were lakes, rivers and streams of crystal clear waters in which myriads of fish were to be found."

(Tierney, H., 1946)

"During the years of 1865 to 1880, it was possible to ride for miles in almost any direction without seeing a fence. The fact that the range seemed unlimited caused the stockmen to think it was not necessary to put up hay and prepare for winter."

(Pease, R., 1965)

Such comments and reports about the lush vegetation that thrived on the rangelands and natural meadows are borne out by the numbers of livestock and horses that grazed the Tuledad/Home Camp study area at the peak of the range livestock industry.

The following is the summary statement extracted from a report developed through an intensive literature search, records search and personal interviews (Camacho, Kingston, 1977).

Summary

Hypothesis: The Home Camp and Tuledad Planning Units of the Surprise Resource Area were significantly impacted by overgrazing prior to the 1930's and the passage of the Taylor Grazing Act.

The geographic overview suggests that the region is volcanic tableland with climatic variations that create a sensitive environment for the vegetation. The most sensitive part being the bunchgrass which has been subjected to past overuse.

The concern of this study begins with the initial impact (1828-29) caused by early explorers as they paved the way for the larger migrations later.

The vanguard of the army of immigrants begins in the 1840's and immediately we begin seeing proof of overgrazing along the trails. The three main trails that had impact either by drawing people into the area or by actually overgrazing the area were the Applegate Trail, the Lassen Trail and the Townsend Road. The Applegate provides the most direct impact by bringing as many as 100 wagon trains and 8,000 people per year near the fringe of the Home Camp Unit during peak years. Since most people brought livestock with them, as many as 2,000 head with a single wagon train, the trails were soon overgrazed.

During the 1850's-1860's and 1870's, the valleys were settled with Surprise Valley receiving its first settlers in 1865. Drought conditions in the lower valleys influenced the trailing of thousands of cattle into the area. The cattle trailing grew in leaps and bounds until its peak year, 1878, when a single drover (Peter French) had as many as 30,000 in northwestern Nevada and the Bare Ranch in lower Surprise Valley had 12,000 head. Hundred of thousands of other cattle were trailed on through to Oregon and Idaho.

Difficult winters of 1874, 1879 and 1889 prove disastrous when coupled with drought years and deteriorated land conditions. Assessment rolls of 1890 show large reductions of stock. Thus, the cattle industry developed in 1865 with its peak in 1879.

In Nevada
Sheep drives provided significant impact on both Home Camp and Tuledad Planning Units. Major Kimball brought 3,700 sheep in one band into the Duck Flat area as early as 1865.

When the overgrazing situation by the cattle began to appear significantly in the 1870's, sheep were already grazing the lush and much needed high pasture lands. Large sheep holdings, as many as 12,000 to a family occupied the greater area and trailed into the pasture lands of both Home Camp and Tuledad.

The Lyons Trail of the Northern branch of the "Great Trail" brought 350,000 head of sheep through the middle of both units between 1877 and 1880.

The 1890's saw even further impact by sheep when as many as 120,000 per year were high land pastured in the area. These years proved to be the peak years in terms of overgrazing on the California side of the border and it forced the creation of the Warner Mountain Forest Federal Reserve in 1904, thus shifted the grazing pattern to the public domain lands of which Home Camp and Tuledad Units are a part. The sheep numbers continued to grow through the 20's reaching as many as 200,000 sheep in the area in 1929. There were three major peak periods for the sheep industry: 1870's for the sheep drives; 1880's and 90's for the flock masters of the valleys; with overall high years from 1890 through 1930 for the entire sheep industry.

With the passage of the Taylor Grazing Act of 1934, sheep were greatly reduced, however, the lands had already been severely impacted by overgrazing by both cattle and sheep.

Horses also had an early impact in the Home Camp and Tuledad Planning Units as illustrated by the fact that many animals were released, lost or left to die along the Applegate Trail. They became the forerunner of the wild free-roaming unbranded horses of today in the area.

Also, Indians are known to have had horses in are area and the early settlers too had many horses for their personal use. It is shown to be the first domesticated animals in the area.

Horses numbered between 600-1000 on many ranches as they were raised for sale to chicken feeders, state companies and the Army. By 1890 there were enough wild horses roaming free in the area to warrant rounding them up for sale.

In 1889 the competition between horses, cattle and sheep for forage was so heavy that 1,000 horses were killed in Surprise Valley and in 1908-1909 another 600 were killed. The problem again surfaced in 1921-1925 and twelve hundred head were removed.

Nevada passed a law in 1900 to allow killing horses and 15,000 head were killed by 1910. Approximately 25,000 head roamed the northern part of Nevada, many in the northwestern corner.

Thus we see the horse also contributed heavily to overgrazing with peak herd sizes being reached in the area in 1910.

At present, the area within the Tulead/Home Camp Planning Units is allotted an equivalent of 3,791 livestock animal units on a yearlong basis plus 150 wild horse animal units which makes a total of 3,941 animal units. The estimated impact during the peak years, 1875 through 1880, was roughly 16 times that number or 60,000 to 65,000 animal units on a yearlong basis. Even after 1880, as indicated by available data, vast numbers of sheep and cattle continued to utilize the range. Operators tended to judge the condition of the land and vegetation by the condition of their animals, thus lacking knowledge of both climate and vegetation the overstocking and continuous grazing practices

8

continued bringing about progressive deterioration of the range resources. It wasn't until the 1930's that numbers were restricted and management attempted.

In conclusion the hypothesis is clearly upheld. Cattle, sheep and horses contributed significantly to the deterioration of the land in the Tuledad/Home Camp Planning Units between 1864 and 1930.

MAP provides the location of the three emigrant trails and the major sheep trails in relation to the study area.

The era unregulated exploitation of the open range terminated in 1934 with enactment of the Taylor Grazing Act. The period from 1929 to 1934 constituted the priority years which established the initial level of grazing privileges on the public lands for each ranch. Consequently, the Bureau possesses detailed records of the number of livestock grazed during that period.

An equivalent of yearlong animal units (AUs) of domestic grazing animals grazed the study area between 1929 and 1934 (Dimock, 1977).

Subsequently, the Bureau conducted two adjudications of the grazing privileges in the study area--one in the late forties and a second in the late sixties. Substantial reductions were made in grazing privileges during both those adjudications, and here again the Bureau possesses detailed records.

In , the grazing privileges were reduced down to an equivalent of yearlong AUs (Dimock, 1977).

In , the grazing privileges were further reduced down to an equivalent of yearlong AUs (Dimock, 1977).

Currently, the proposed action allocates an equivalent of 3,791 yearlong AUs.

According to the records, wild and free-roaming horse numbers fluctuated in the period between 1930 and 1977. They would rise to peaks of hundreds or a few thousand, and then periodic concentrated

campaigns would reduce the numbers to an undetermined few. Such a campaign removed 1,200 head from the North Warners in 1925 (Comacho, Kingston, 1977). Another similar campaign removed 4,500 head from the Surprise Valley Area between 1947 and 1951 (Dimock, 1951). Currently, the allocation for horses is 150 AUs. Based on this information, and for purposes of charting trends in the numbers of total AUs of cattle, sheep and horses that grazed the study area over time, 150 AUs of horses have been used for each of the points in time of 1930, 1951 and 196 .

The foregoing information is summarized on FIGURE .

For all of the foregoing data, including the figure, a common demoninator of yearlong AUs was used. This was the simplest since much of the grazing was yearlong in nature in the 1880's. The AUs consistently include cattle, sheep and horses. The "equivalent of a yearlong AU" means that if 500 cattle grazed the area for six months, the 500 were converted to the equivalent of 250 yearlong AUs.

What is the significant of this information?

The significance lies in the establishment of the level of forage production that the rangelands in the study area once produced--sixteen times the present allocation. Neither the records nor the historical data indicate a substantial change in the climatic regime in the last century. Therefore, given enough time for restoration of the deteriorated soil fertility, there is no reason not to expect the same land to still posses similar potential for productivity.

Still another significance lies in the consistent fact that mere reductions in numbers of grazing animals have never proven successful. Numbers were voluntarily reduced from 62,500 AUs in 1880 to AUs in 1930. The Bureau further reduced them from AUs in 1930 to 3,941 AUs in 1977. Thus, a reduction to a level of 1/16 that which once existed has been made, and the basic problem has not been corrected.

The data in this document will show that the current level of use has finally stopped deterioration and generated a gradual upward trend on the lands relatively remote and inaccessible to livestock. But, the data will also show that the deterioration has not been stopped on the particular lands favored by livestock. The tragic element is that the favored lands are those with the highest potential productivity such as meadows and stream bottoms--the life blood of the Great Basin, and particularly for wildlife.

Further reductions in livestock would not help these favored areas any more than the continual series of reductions which has occurred for the past century--from 62,500 down to 3,941.

FIGURE . TREND IN NUMBERS OF AUs WHICH HAVE GRAZED THE STUDY AREA.

Yearlong
Animal Units
(1,000's)

65

60

55

50

45

40

35

30

25

20

15

10

5

0

1825

1850

195

1900

1925

1950

1975

Source - Comacho, Kingston, 1977

Source - Dimock, 1977

Tohama Co

J. S. Cone 1859 1857-1869 rancher
1880 rock fences Chinese labor

Richard Owens 1859 - father of Ray Owens

Road Red Bluff, Mineral, Susanville
completed 1860

1861-62 Severest winter ever recorded

Snow in Lake Valley

Animals froze. 30,000

1873 Another like above

Burgess Spring John Burgess grandfather of Chauncey
Burgess summered 500 head cattle
Mineral.

Ike McKenzie started Paynes Crk 1869

History Settlement North American and Livestock use

Explorers

Leif Eriksson 1000

Baffin Island, Labrador, Newfoundland.

Christopher Columbus 1492-1502-03

West Indies

South America

John Cabot 1497-1498

North America (First)

Landed Newfoundland. ~~Explored~~ Sailed
Maine to Labrador

Landed June 24, 1497 (not mainland)

Giovanni da Verrazzano 1524-1528

Born France? Educated in Florence

In the name of France explored

The North American Continent

from Florida to Newfoundland

He envisioned this area as New France
Vision faded because The King and
country not interested.

Landed ship La Dauphine

Sailed January 17 1524 for New World

Land March 1 1524 at Cape Fear

southern most of North Carolina

Three Capes. Thence to Florida then
back north to Newfoundland.

History - Explorers

(2)

Jacques Cartier 1534-1542

Made three voyages to North America

Explored The St Lawrence River inland as present day Montreal
France's claim to Canada based on Cartier's Explorations

Sir Martin Frobisher 1576-1578

Three voyages in search of a North West Passage to The Far East
Unsuccessful

English Elizabethan navigator and explorer.

John Davis 1585-1586-1587

Arctic Voyages

Explored Davis Strait

Discovered Falkland Islands

Killed by Japanese Dec. 27 1605 while on an expedition to Sumatra

○ = age years

Marco Polo 1254 - 1324
Venetian

Travelled with his father Niccolo Polo
and uncle Matteo Polo

1253-60 (6) Trading expedition to
Constantinople (now Istanbul) Turkey

1266 On to Kaifeng China - Kublai Khan

1269 (15) Returned Venice

1271 (17) Left with father for China

1275 (21) Reached Cambuluc (modern Peking
China)

Employed by Khan on business China
and states of SE Asia including India

For three years ruled The Chinese City
of Yangchow

(38) 1292-1295 (41) Back in Venice 1295 (41)

Marco joined Venetian forces fighting
Genoa. Taken prisoner 1296 (42)

(44) During two year captivity wrote about
his travels in The far east -

The Travels of Marco Polo

His accounts largely verified by
other travelers in China later.

Accounts influenced Christopher Columbus

Clark, Jackson, 1912-56, American painter, b. Wyo. He studied (1929-31) in New York City, under Thomas Hart Benton, but he was more influenced by A. P. Ryder and by the Mexican muralists, especially Siqueiros. From 1938 to 1940 he worked on the Federal Art Project in New York City. Affected by surrealism and also by expressionism, he moved toward a highly abstract art to express, rather than illustrate, feeling. His "drip" technique, in which he energetically "dripped" complicated linear rhythms onto canvases. He sometimes applied paint directly from the tube, and he also used aluminum leaf. He achieved a glittery effect. His vigorous attack on the art establishment and his devotion to the very act of painting led to the term "action painting." Pollock was a symbol of the new artistic revolt, ABSTRACT EXPRESSIONISM, when he was killed in an automobile accident. His paintings are in many public collections, including museums in New York, San Francisco, Dallas, and Chicago. See *Clark* by H. Friedman (1972); studies by *Clark* (1969), Bryan Robertson (1966), and *Clark* (1967).

Clark, John, 1737-1823, American merchant, b. in New York. He came to America at the age of 23 and became a successful merchant. After moving to New York, he speculated advantageously in land and gained the confidence of the government. He contributed generously to the cause of the American Revolution, and he was one of the signers of the Declaration of Independence. He was the first American to be knighted by the British. He was repaid by the British government in 1795.

Clark, John (both: pōl'ānā-), 1737-1823, American merchant, b. in New York. He came to America at the age of 23 and became a successful merchant. After moving to New York, he speculated advantageously in land and gained the confidence of the government. He contributed generously to the cause of the American Revolution, and he was one of the signers of the Declaration of Independence. He was the first American to be knighted by the British. He was repaid by the British government in 1795.

Clark, John (both: pōl'ānā-), 1737-1823, American merchant, b. in New York. He came to America at the age of 23 and became a successful merchant. After moving to New York, he speculated advantageously in land and gained the confidence of the government. He contributed generously to the cause of the American Revolution, and he was one of the signers of the Declaration of Independence. He was the first American to be knighted by the British. He was repaid by the British government in 1795.

and assimilate man's wastes (see ECOLOGY). The biosphere is a closed ecological system with finite resources and is maintained in equilibrium by grand-scale recycling. Under natural conditions organic and certain inorganic materials in the biosphere are continually recycled by processes including PHOTOSYNTHESIS and RESPIRATION, nitrogen fixation and denitrification (see NITROGEN CYCLE), evaporation and precipitation, and diffusion by wind and water action. But the introduction of massive quantities of waste matter at any point in the biosystem may "overload" it, disrupting the natural recycling mechanisms. Early indications that the environment could not absorb limitless amounts of waste came with the Industrial Revolution. By the latter part of the 19th cent. many industrial areas were experiencing severe air pollution caused by the burning of coal to run mills and machinery. The quantities of fly ash, smoke, carbon and sulfur gases, and other wastes had become too great for local environments—like those of London and Pittsburgh—to disperse rapidly. Similarly, industrial effluents and sewage were polluting river systems. Not until after World War II, however, was pollution generally viewed as more than a nuisance that blackened buildings and sullied streams, i.e., as a pervasive threat to human health. By the 1960s the threat had become great enough, many believed, to challenge the integrity of the ecosystem and the survival of numerous organisms including man. Population explosion, industrial expansion, burgeoning truck and automobile use—these were producing wastes in such gigantic quantities that natural dispersing and recycling processes could not keep pace. Exacerbating the problem was the appearance of new substances that degraded with extreme slowness or not at all: plastics, synthetic fibers, detergents, synthetic fertilizers, synthetic organic pesticides such as DDT, synthetic industrial chemicals such as the polychlorinated biphenyls (PCB's), and the wastes from their manufacture. Thus waterways and dumps festered with disease-breeding garbage. Industrial wastes created corrosive smogs and, with municipal wastes, polluted inland and marine waters, including drinking supplies. Automobile emissions choked urban and suburban communities. Pesticides and PCB's poisoned fish and birds. These conditions, persisting into the 1970s as year by year waste output increased, evoked demand in many nations, and on the part of the United Nations, for worldwide pollution abatement. In the United States, under pressure from private citizens, environmental organizations, public officials, Congress passed legislation aimed at restricting automobile emissions. A Federal Council on Environmental Quality and an Environmental Protection Agency were created. A "Clean Water Act" and a "Clean Air Act" were adopted to clean up industrial and municipal pollution. All citizens were given the right to sue any individual, corporation, or governmental agency to achieve compliance with abatement laws. State and local governments adopted various abatement statutes and procedures. However, the cost of substantially reducing industrial pollution is high; how to balance the undue economic burden remains a puzzle. Some experts hold that since pollution automatically increases waste production, the only way to combat it is by reducing production. Others believe that worldwide pollution can be controlled by international agreements.

Pollux, Julius (pōl'aks), fl. 170, Egyptian Greek lexicographer, b. Naucratis. He compiled a Greek lexicon for Emperor Commodus.

Pollux, brightest star in the constellation GEMINI; Bayer designation Beta Geminorum; 1970 position R.A. 743.5°, Dec. +28°06'. An orange giant of SPECTRAL CLASS K0 III, it is the nearest giant star, lying at a distance of 35 light-years. Its apparent MAGNITUDE of 1.13 makes it one of the 20 brightest stars in the sky. Pollux is the brighter of the Twins, CASTOR being slightly dimmer.

Pollux, Marco (pōl'aks), 1254?-1324?, Venetian traveler in China. His father, Niccolò Polo, and his uncle, Maffeo Polo, had made (1253-60) a trading expedition to Constantinople. A war blocked their return, and they journeyed eastward to reach Kublai Khan's eastern capital at Kaifeng in 1266. They returned to Venice in 1269, and in 1271 they left with Marco and two Roman Catholic missionaries for Kublai's court. The missionaries soon abandoned the party, which reached Cambuluc (modern Peking) in 1275. Marco Polo became a favorite of the khan, who employed him on business in central and northern China and in the states of SE Asia, including India (Yangchow). In 1292 the travelers, acting as escort for a wife of the khan of Persia, left Kublai's realm and were back in Venice in 1295. Marco Polo soon joined the Venetian forces fighting Genoa and was taken prisoner (1296). During his two-year captivity he dictated an account of his travels. The prologue of the work tells of Polo's life. The remainder of the book describes places he had visited and heard of and recounts the customs of the inhabitants. Polo made reference to much of Asia, including the Arab world, Persia, Japan, Sumatra, and the Andaman Islands, and to E Africa as far south as Zanzibar. He told of paper currency, asbestos, coal, and other phenomena virtually unknown in Europe. Polo was wonder-struck at Oriental splendors and was sometimes credulous of exaggerated accounts, but the book seems to be factual and has been of great value to historians. During the Renaissance it was the chief—almost the sole—Western source of information on the East, and until the late 19th cent. there was no other European material on many parts of central Asia. Of the annotated translations of his book the most useful is that by Sir Henry Yule (3d ed. 1903). See studies by M. S. Collis (1960), H. H. Hart (1967), and C. A. Burland (1970).

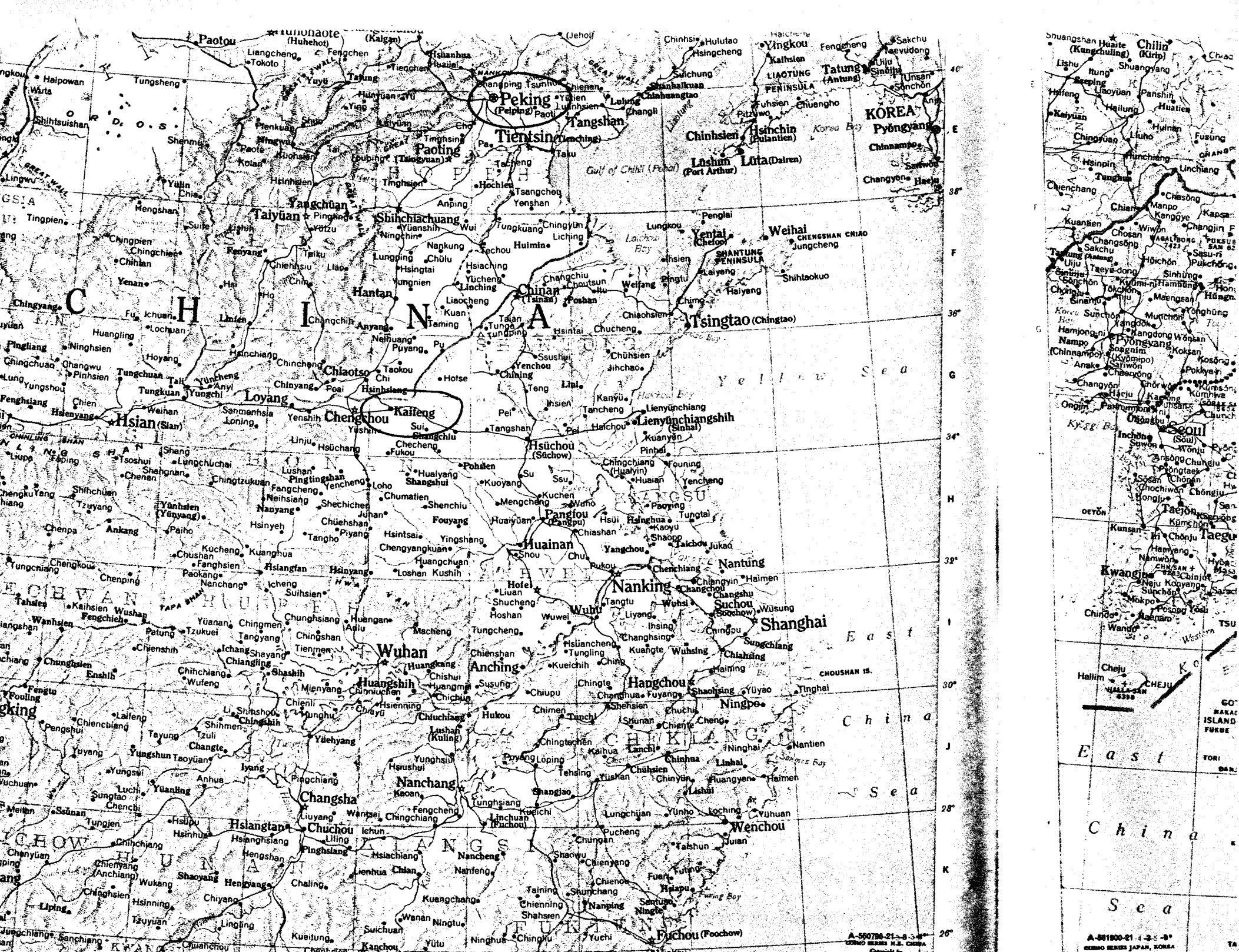
polo, indoor or outdoor ball and goal game played on horseback. Outdoor polo is played by two teams of four on a level grass field that measures 200 by 300 yd (182.88 by 274.32 m). Safety zones surround the playing field, and at either end goal posts stand 10 ft (3.05 m) high and 24 ft (7.32 m) apart. The outdoor ball, weighing about 4½ oz (1.3 kg) and measuring not more than 3¼ in. (8.26 cm) in diameter, is made of wood, often willow root. The indoor field, usually composed of a tanbark surface and surrounded by embankments, is not standardized in dimensions, and sometimes the goal posts—represented by stripes painted on the wall. Teams of three men play the indoor game, and the ball, measuring about 4½ in. (11.43 cm) in diameter and weighing about 6½ oz (1.8 kg), is made of inflated rubber. Whereas an outdoor match is made up of eight periods (called chukkers) of 7½ min each, the indoor match comprises four chukkers. Standard polo equipment includes a specially made helmet, a mallet, and a specially made polo shirt.

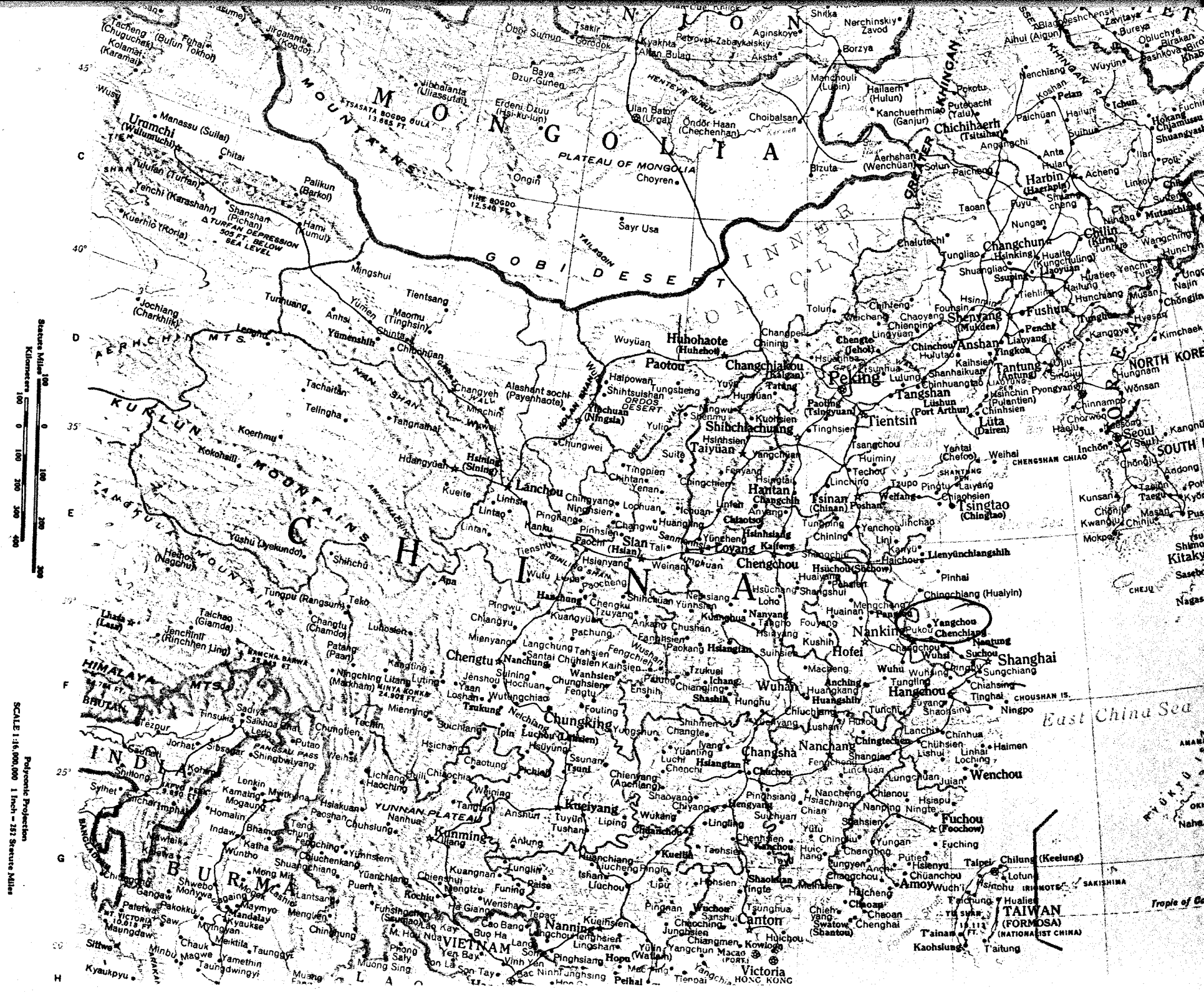
Polonaise (pōl'ānāz', pō'-), Polish national dance with some modifications, to China and Japan. According to this view, it was revived in India in the 19th cent., where it became popular with army officers stationed there, and spread to other countries. Others contend that polo was first introduced (1862) by the British officers themselves after seeing Manipur tribesmen stage a horse-ship exhibition, decided to imitate the latter's speed. Borrowing from their experience with polo, the officers soon decided to choose teams and their shots at a goal, thus creating a crude form of polo. At any rate, the sport was introduced into America. After 1886, tournaments for the International Polo Challenge Cups were played from time to time between English and American teams. Other international matches are played between Argentinian and American and between Mexican and American teams. Polo players are ranked according to their playing ability on a scale from 1 to 10, depending on how many goals they are expected to score in a regular game. See R. K. McMaster, *Polo* (1957).

polonium (pōl'ōnēəm, pō'-), Polish national element; symbol Po; at. no. 84; mass no. of most stable isotope 209; m.p. 254°C; b.p. 962°C; sp. gr. about 9.4. Polonium is an extremely rare element found in uranium ores (about 0.1 gram per ton). A product of radium decay, it is sometimes called radium F. In its physical and chemical properties it resembles tellurium (the element above it in group VIa of the PERIODIC TABLE) and bismuth. Polonium has 34 isotopes, more than any other element. All of these isotopes are radioactive. The most stable, polonium-209, has a half-life of about 103 years. Polonium-208 (half-life about 3 years) is the only other polonium isotope with a half-life over one year. Although these two isotopes can be prepared in small quantities in a particle accelerator, they are very expensive to produce. All other polonium isotopes are short-lived except polonium-210 (half-life about 138 days), which is the most commonly used isotope. It is prepared by bombarding bismuth with neutrons in a nuclear reactor. It is a highly radioactive material. A milligram of polonium-210 emits as much alpha radiation as about 5 grams of radium, and enough gamma radiation to cause a blue glow in the air around it. It can be used as a heat source, since most of the energy of the alpha radiation is absorbed as heat within the polonium and its container. Polonium has found use in small portable radiation sources and in the control of static electricity. However, it is an extremely toxic substance and must be handled with great care. Polonium was the first element to be discovered because of its radioactivity; it was discovered because of its radioactivity by Marie CURIE and named for her native country, Poland.

Polonnaruwa: see POLLONARRUA.

Polotsk (pō'latsk), city (1969 est. pop. 64,000), W European USSR, on the Western Dvina River at its confluence with the Polota. It is a large rail junction and agricultural trade center and has lumber mills and a paper mill.





Trampling Herd

Texas Cattle Drive

1842 Texas → New Orleans (East)

1846 Texas → Missouri, Ohio (North)

1855 Texas → Pennsylvania, New York City

From 1845 The year of The great cattle depression until opening of The Civil War ⁽¹⁸⁶¹⁾ trail driving increased

1849 Calif. gold rush great stimulus trail drives

1849 + → 1851-52 W H Snyder
Texas to San Francisco

Rio Grande southern Colorado corner Wyoming
Northern Utah → Cal. overland route westward
Nebraska SW to "Pomo" → San Francisco

Trail driving held up by Civil War

1866 Cattle drives north and west out of Texas started in mass
A disastrous year.

1866 Range cattle industry springing
up in Western Montana
Small ranches establishing
Cattle to stock these ranches from
Utah or Oregon

1871 Hightide of trail driving to Abilene

Founded Year	Can towns	RR	State
	Baxter Springs		Kansas
	Abilene		Kansas
1867-	Ellsworth	Kansas-Pacific	Kansas
	Newton		
	Wichita		
	Caldwell		
	Hays City		
	Dodge City - Kiowa		
	Ogallala		
	Cheyenne		
	Tulsa		
	Russell		
	Lincoln		
	Miles City		
	Denver		

Railroads

Date	Name and route
Completed 1869	Union Pacific - Central Pacific Missouri River Pacific Ocean <u>First trans continental</u> West from Nebraska and eastward from California The two met at Promontory Point Utah May 10, 1869

1867 Kansas Pacific was just pushing
across the plains To Kansas by
this date

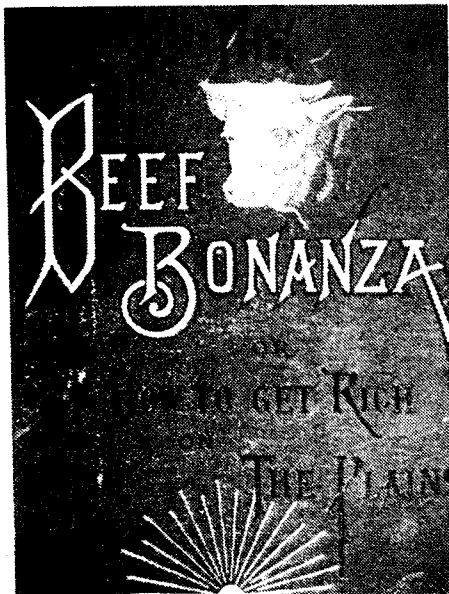
For them, "cow-boying" was an easy way to make a little money and escape from whatever problems drove them away from society and out onto the range.

Another class of stockmen could be termed *managing ranchers*. These included ranch foremen, managers, and working owners -- the professionals who kept ranches operating on a long-term basis. Some were former cow-boys, but many had roots in other professions in the East. Many of these men were well-known for intolerance, ruthlessness, and violence, especially towards ranching competitors, rustlers, Native Americans, insubordinate cow-boys, and the land.

Ranch owners who made it big became *cattle barons*, the self-proclaimed aristocrats of the range, and joined a third class. This class was also composed of wealthy financiers -- the influential investors who put up capital to finance the huge grazing fiefdoms that soon dominated most of the West. These acquisitive, opportunistic entrepreneurs were already rich and powerful bankers, lawyers, politicians, publishing magnates, mining tycoons, timber barons, railroad kings, industrialists, and so forth. They were mostly absentee owners who lived in Western cities, back East, or in Europe and occasionally visited or vacationed on the ranches they owned or financed. They relished their role as ranching nobility, and Westerners came to treat them as such, and even today many Americans envy and aspire to be wealthy ranching moguls.

As a rule, the men who came West and entered the ranching business displayed greed, ignorance, and bigotry. They had little respect for themselves or others, much less for the land itself, other than for what it might provide them. Denying to ourselves the true nature of these early colonists in order to preserve our nostalgic, heroic image of the Old West can only prevent us from understanding the real history of the West.

Although greatly outnumbered by other settlers, these stockmen seized the vast bulk of Western land and turned it to cattle grazing. At that time in history most of the West was of little use to most settlers, and the prevailing attitude toward the land was "If nothing else, you can always graze it."



Men of every rank were eager to get into the cow business. In a short time every acre of grass was stocked beyond its fullest capacity. Thousands of cattle and sheep were crowded on the ranges when half the number were too many. The grasses were entirely consumed; their very roots were trampled into dust and destroyed. In their eagerness to get something for nothing, speculators did not hesitate at the permanent injury, if not the total ruin, of the finest grazing country in America.

--H.L. Bentley in 1898

Columbus



Vikings carried livestock on their ships when they sailed to North America up to 500 years before Christopher Columbus (actual name Cristobal Colon), but the first livestock settled permanently in the "New World" were probably those brought by Columbus to the Caribbean island of Hispaniola on his second voyage, in 1493. Writer Kirkpatrick Sale relates in "The Columbian Legacy":

Within a year Columbus and a massive contingent of Spanish settlers had begun to change all that [the veritable "Garden of Eden" Columbus encountered on his first voyage] as the trees were cut down to make rancheros for imported cattle and sheep and soon plantations for sugar and coffee. Pigs, goats, and horses were allowed to roam freely, and as a result destroyed forage, trampled native farmlands, and made savannahs bare.

The first livestock introduced to the North American mainland are believed to have been cattle brought to Florida by Ponce de Leon in 1519. Cattle were imported into Mexico and the Eastern British colonies soon thereafter.

Grazers owned little or no land and their movements were known to few and questioned by none. The plentiful forage is evidenced now by words of early adventurers, as Fremont's "... tremendous areas of luxurious grass -- an inexhaustible supply;" Lewis and Clark's "These Western ranges have a luxuriant grass cover and will supply enough feed for all the cows in the world;" and Bradley's "... good, fine grasses grow evenly all over the country -- I believe that all the flocks and herds in the world could find ample pasturage (here)." Herdsmen rested secure knowing that over the next ridge was more free feed to the first comer.

--Laurence A. Stoddart, "Range Land of America and Some Research on Its Management" (Stoddart 1955)

Livestock grazing in the West began slowly. Hardy Spanish longhorn cattle, introduced from Mexico as early as the 1500s, were spread to California, Texas, and the Southwest. Shorthorn cattle from the Eastern colonies were gradually moved West over the years. By the 1800s both kinds, though in comparatively small numbers, had been moved into many parts of the West. Sheep, spread mainly from Mexico and California, generally followed not far behind. In 1850 there were less than a million cattle and perhaps a few million sheep (mostly in California) in the 17 Western states. With regional variations, numbers gradually increased during the 1850s and 1860s, with livestock relentlessly displacing native grazing animals and the peoples who depended on them.

Then in the 1870s and 1880s, with most Native Americans subdued and buffalo (bison) no longer in competition,

Kennedy 1897 Northeastern California (Fig -)

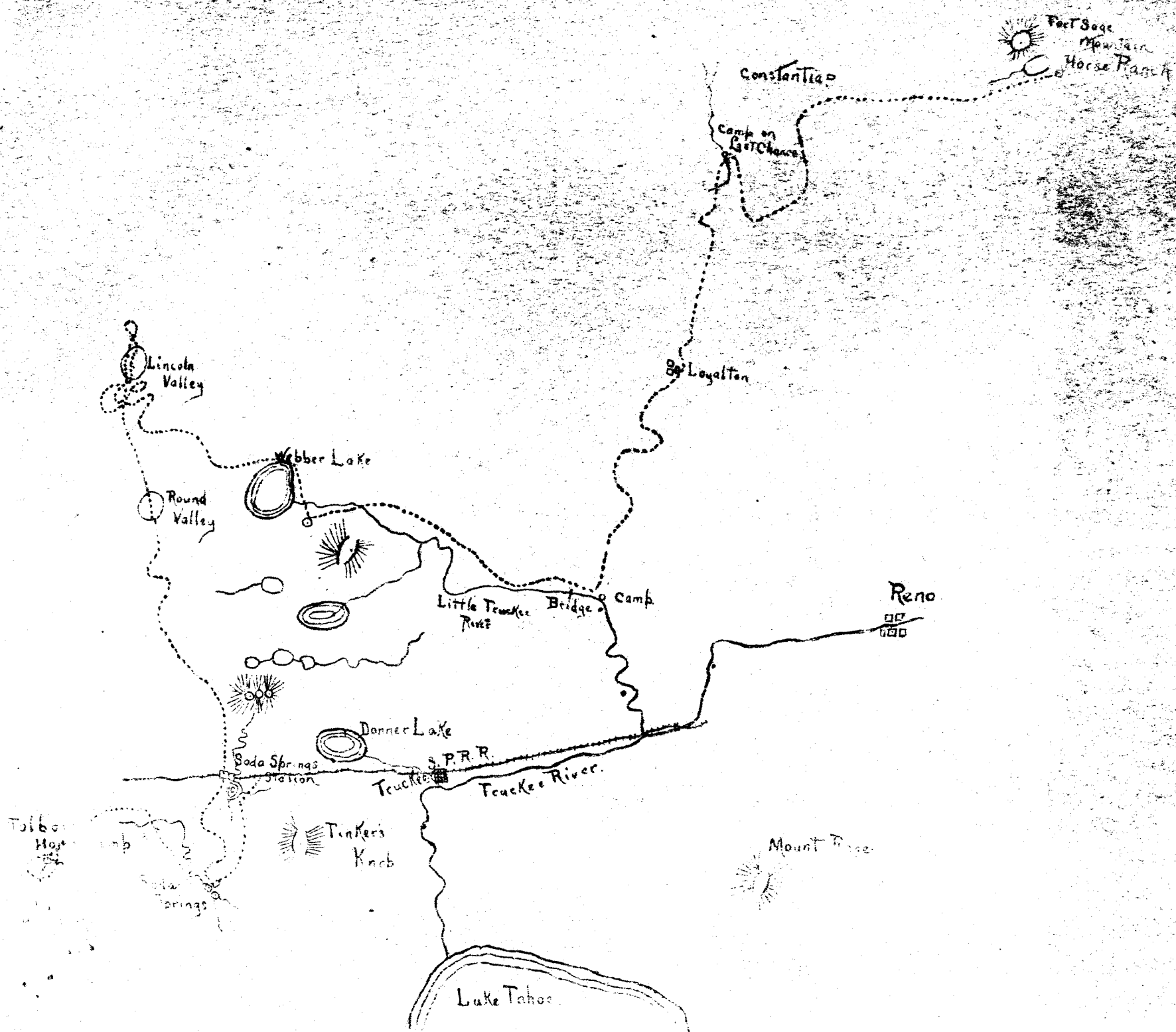
THE ROUTE AND THE OUTFIT.

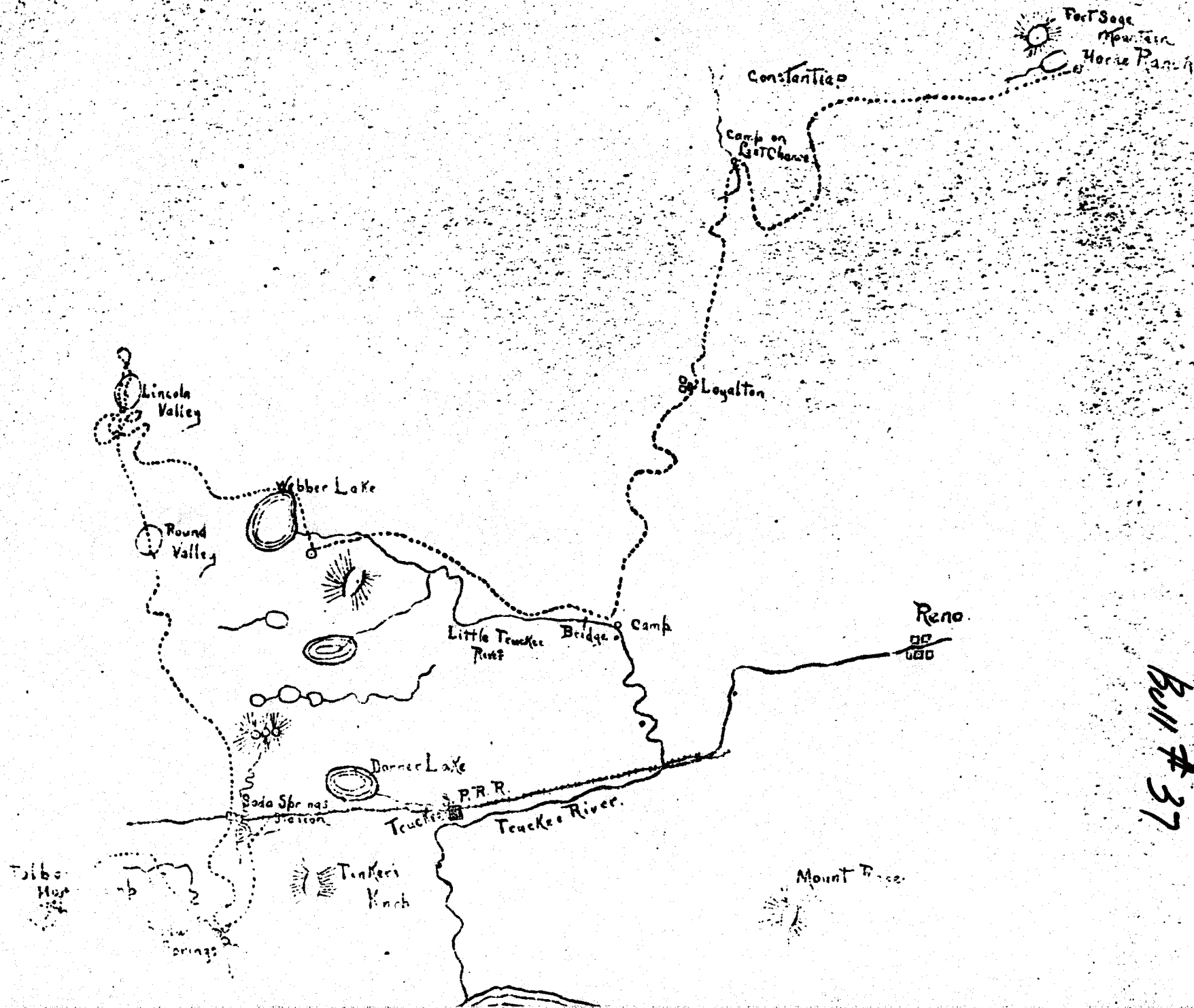
On June 3, 1901, Dr. P. B. Kennedy left Reno for the Constantia Ranch, in Plumas County, California, and proceeded thence to J. N. Evans' horse ranch near Fort Sage Mountain, where he was joined a few days later by Mr. Samuel B. Doten. After collecting many interesting plants and grasses in this region the party set out on foot to study the ranges lying between the horse ranch and Webber Lake. They went slowly through the dry and somewhat barren country lying east of the Constantia Ranch; then passed southward through Long Valley to Chat, California, where they turned to the west, and, passing over a low range of hills, entered Sierra Valley.

For several days they studied and collected the plants and grasses growing on the hills surrounding the lower end of Last Chance Creek, a region of especial interest, because in many parts of it the season's growth of plant life was as yet undisturbed by the sheep. After leaving the Last Chance country the party passed rapidly southward through the eastern end of Sierra Valley to Loyaltom, and thence by way of Lewis' mill to Sardine Valley, and through it to the Little Truckee River. Here they spent several days collecting forage plants and photographing them. They then traveled up the Little Truckee to Webber Lake, and on June 25th pitched camp at the head of the waterfall below.

In the region surrounding Webber Lake thousands of sheep owned by Messrs. Van Buren and Flanigan were grazing. The hills were covered with good forage plants, and all the sheepmen were glad to point out those they considered most valuable. In this interesting region the party spent three of the busiest and most profitable weeks of the summer's work. Leaving Webber Lake, they went next to Lincoln Valley by a roundabout way over the mountains. The herders whom they met on these fertile ranges gave them much information of the highest importance.

After a brief stay in Lincoln Valley the botanical outfit was guided by P. L. Flanigan's herders through the mountains to Soda Springs Station on the Southern Pacific Railroad. As Soda Springs Station is an important shipping point for sheep, the region surrounding it is almost barren of all forage plants. On this account the party left at once for Summit Soda Springs, on the American River. For several days they collected the more valuable plants of this region; then proceeded by way of the wagon road to Talbot's home camp, on the Middle Fork of the same river. Here, through the assistance of Mr. Talbot, they gained a great deal of useful information; then, after collecting and photographing the best plants and grasses, they proceeded back through the mountains to Reno, and so brought the summer's work to an end.





Kennedy 1897
Bull # 37

spend the summer of 1902 in Northeastern Nevada studying the forage conditions which confront sheep and cattle owners in that part of the State. Even when that region has been studied there will still remain for investigation the entirely different problems presented by the winter ranges.

The scientific study of our Nevada sheep and cattle ranges is certainly a subject of such importance that the Experiment Station is justified in asking for the heartiest co-operation on the part of the stockmen; for only through their active aid can results be reached which will be of lasting practical value.

THE ROUTE AND THE OUTFIT.

On June 3, 1901, Dr. P. B. Kennedy left Reno for the Constantia Ranch, in Plumas County, California, and proceeded thence to J. N. Evans' horse ranch near Fort Sage Mountain, where he was joined a few days later by Mr. Samuel B. Doten. After collecting many interesting plants and grasses in this region the party set out on foot to study the ranges lying between the horse ranch and Webber Lake. They went slowly through the dry and somewhat barren country lying east of the Constantia Ranch; then passed southward through Long Valley to Chat, California, where they turned to the west, and, passing over a low range of hills, entered Sierra Valley.

For several days they studied and collected the plants and grasses growing on the hills surrounding the lower end of Last Chance Creek, a region of especial interest, because in many parts of it the season's growth of plant life was as yet undisturbed by the sheep. After leaving the Last Chance country the party passed rapidly southward through the eastern end of Sierra Valley to Loyalton, and thence by way of Lewis' mill to Sardine Valley, and through it to the Little Truckee River. Here they spent several days collecting forage plants and photographing them. They then traveled up the Little Truckee to Webber Lake, and on June 25th pitched camp at the head of the waterfall below.

In the region surrounding Webber Lake thousands of sheep

owned by Messrs. Van Buren and Flanigan were grazing. The hills were covered with good forage plants, and all the sheepmen were glad to point out those they considered most valuable. In this interesting region the party spent three of the busiest and most profitable weeks of the summer's work. Leaving Webber Lake, they went next to Lincoln Valley by a roundabout way over the mountains. The herders whom they met on these fertile ranges gave them much information of the highest importance.

After a brief stay in Lincoln Valley the botanical outfit was guided by P. L. Flanigan's herders through the mountains to Soda Springs Station on the Southern Pacific Railroad. As Soda Springs Station is an important shipping point for sheep, the region surrounding it is almost barren of all forage plants. On this account the party left at once for Summit Soda Springs, on the American River. For several days they collected the more valuable plants of this region; then proceeded by way of the wagon road to Talbot's home camp, on the Middle Fork of the same river. Here, through the assistance of Mr. Talbot, they gained a great deal of useful information; then, after collecting and photographing the best plants and grasses, they proceeded back through the mountains to Reno, and so brought the summer's work to an end.

Now, it may be interesting to other botanists—perhaps even to the sheepmen—to know exactly how this work was done, what the outfit was like, and how the plants were collected and photographed. We therefore introduce at this point the following description of the outfit and apparatus:

The general camp equipment of horses, mules and pack bags was the usual shepherd's outfit, and was furnished by P. L. Flanigan. All the food—grub is a more descriptive term—was carried in little canvas sacks. The staple foods were flour, rice, macaroni, beans, potatoes, onions, canned tomatoes, bacon, lard, sugar, tea and coffee and syrup. By way of luxuries the greasy pack bags held a good supply of raisins and dried apricots and peaches, with some papers of mush and of corn starch, and a can of chocolate. The sheepmen kept the party supplied with young lamb, and a fly rod well handled kept the camp cook busy frying little trout—Eastern brook trout, some of them, the others natives

of the cold streams where we caught them. It would not be proper in a serious pamphlet like this one to tell how good they tasted. The party naturally expected to endure some hardships and privations. We walked several hundred miles, and slept with no tent for three months on the ground; but we didn't find any real hardships, unless it was one hungry afternoon when a meek, mild mule strolled innocently into camp, and ate everything in sight except the dishes and the yellow washing soap.

The photographic equipment included a 5x7 camera, the Pony Premo No. 6, with twelve holders in heavy sole leather boxes, a liberal supply of non-halation plates, and a ruby lamp, also backgrounds of cloth and paper. Since we developed many negatives in camp, and washed them in the nearest creek, some description of our methods may prove interesting. The developing was done at night, of course, and in an improvised tent formed by setting up the tripod on a bed canvas, and covering it with a blanket held in place at the corners by the pointed tripod legs and some stones. In this tent the photographer lay flat on his stomach, with half of him shivering in the dewy night, while his head and shoulders sweltered under the blankets. The method is better than it sounds, for with trays made of plate boxes soaked in paraffine and Seed's Eiko-Hydro powder dissolved in a tin cup, one may do good work if he doesn't mind small discomforts.

The background we intended to use consisted of two sheets of cloth sewed together, black on one side and white on the other. These were stretched on cords, and held in an upright position by strong stakes driven into the ground. This piece of apparatus had side wings and a top wing held in place by ropes and tent pins, and it was altogether too complicated for any practical use. Our really useful backgrounds were simply sheets of black velvet and of white cotton cloth. These we tacked to the bark of smooth pine trees and pinned the plants up against them; or one of us held up the cloth behind the living plant, which the other fellow photographed.

Our plant-collecting outfit consisted of an oblong tin box for fresh specimens and a pick to dig them with, also some simple presses with blotters and papers, between which the plants were

laid. The presses were merely pieces of planed pine board, covered on one side with transverse cleats one inch apart. A good heavy stone supplied the pressure, and the wind and sun dried out blotters and plants very rapidly. By this method we collected and pressed besides the forage plants a great many specimens of purely scientific interest. Each specimen was given a number when it was put into the press. The same number was given to an entry in a note book, which recorded all the facts that were given us by the sheepmen or that we observed for ourselves. When the pressed specimens became dry and brittle they were securely packed between heavy pasteboards, and shipped by stage or by train to Reno.

By this process we secured perfect specimens of all the important forage plants and grasses found at that time of the year in the part of the Sierra visited. These specimens are now at the University, and may be seen by anyone interested in them.

THE DEPLETION OF THE RANGES FOR SHEEP AND CATTLE, WITH SUGGESTIONS FOR RANGE IMPROVEMENT.

Altogether too many sheep and cattle per square mile have been grazed on most of the ranges of the Western States, and, naturally enough, these ranges are not so good as they used to be; many sections are permanently injured, others made wholly useless. These depleted ranges should be made if possible as productive as ever by reseeding with the best native forage plants and grasses, and with the best ones from foreign countries. This is a matter of importance to the whole nation. It is especially important in the States where stockraising is a leading industry.

On the public lands competition among the cattlemen and between sheepmen and cattlemen has been so severe that the ranges have become greatly depleted. In the Southwest this was not due to ignorance. The stockmen knew that the grass would not last forever. Each man planned to get all he could while it

Condition

Kennedy No 37
1897

1903

-7-

lasted. The demand for cattle was strong; each man bought all he could in order that he might sell twice as many a little later. The range was overstocked, and the grass was rapidly disappearing. The speculative boom continued until there came the inevitable reaction with its enormous losses. The depleted ranges of the Southwest will carry now only two-thirds as many cattle as they could have been made to carry. To a greater or a less degree this is true of the Government lands everywhere. The open ranges, like any range or any pasture, can provide forage for only a limited number of stock. Every stockman is trying to get all the grass he can while it lasts. There are too many cattle on the cattle ranges, too many sheep on the sheep ranges. The cattlemen vary this proposition by saying that there are apt to be too many sheep on the cattle ranges, and the sheepmen have the opposite complaint to make.

On sheep ranges rented from the railroad in the Eastern Sierra Nevada, depletion caused by overstocking is not so widespread. As the sheep increase, too many may be put on one section, but in the main the sheepman knows about how many sheep his range will carry without injury, and does not exceed this number greatly. The desire to get rich quickly may lead him to greatly overstock his rented range, and then sell out—a short-sighted policy whose tendency is to force him out of the business.

Even on lands actually owned by the stockman destructive overstocking is not uncommon. This arises partly from thoughtless ignorance, and in part from lack of prudent foresight.

On any range land the number of animals which can safely graze there without permanently injuring the forage is a limited number, much smaller in dry seasons than in those whose rainfall is more abundant. On a pasture too many animals will eat the grass too closely, and soon trample it out. Bitter and thorny weeds will produce seed abundantly, for they will be left untouched. The disappearance of the grass which occupied the ground and choked out the weeds, changes the pasture into a weed patch. On an overstocked range for sheep or for cattle the forage is permanently injured in much the same way. The good plants are killed out; the bad ones survive because they have more room in which to grow. There is always a sort of warfare, a struggle

grazing
capacity

Selective use

for existence, going on among all the plants which occupy the land. Remove the good plants, and you give the bitter and thorny kinds an excellent chance to grow and to spread. Thus a depleted range not only produces less good forage, but it is also likely to become overrun with useless weeds and brush, an injury which can scarcely be repaired.

There are two great classes of plants—the annuals and the perennials. The annuals come up every year from seed. The perennials come up every year from seed and from the previous year's roots. The nutritious annuals of good flavor on an overstocked range get little chance to produce seed. The perennials cannot go to seed either; but this does not matter so much, for their roots live through the winter, and, so long as the crown is uninjured and the roots are not torn up, the perennials reappear every summer. The annuals are likely to disappear first on an overstocked sheep range; then the perennials grow dwarfed and stunted, and slowly die out. All the while bitter and thorny weeds and brush which the sheep have avoided have had a good chance to produce seed, and to spread all over the country. When just about enough sheep, however, are grazing on the range the annuals produce seed enough to keep on growing, and the perennials send more strength into their roots, which grow stronger and deeper, and so can produce a good crop of leaves and stems the next year.

Besides being injured by the destruction of nutritious plants, and the consequent increase of the poorer sorts, overstocked ranges are injured by destructive changes in the character of the soil itself. Some soils are so loosened by the trampling hoofs of the stock that on the hillsides the finest part is washed away by the rains. Other soils are hammered down so hard that the rain and the melted snow run off from the surface in the spring floods, and are of little use to the thirsty plants.

There is no use in talking about these various ways in which overstocking injures the range unless we are ready to consider some means of bringing back the grass on the depleted ranges.

Can the forage on the public lands be improved?

Is there any doubt that the public lands do not support as many sheep and cattle now as they did twenty years ago?

Effect
selective
grazing

Condition
Soil
erosion

Range
Improvement

Are there not too many sheep and cattle on the government lands even now?

What will this lead to twenty years from now?

How can the past injury be repaired and how can further damage be prevented?

When the open range grows poorer every year, the stockmen are brought face to face with the situation. Perhaps they meet and agree to divide the range, each man to keep his cattle on his own land, the sheepmen to stay in their own division and the cattlemen in theirs. By this unlawful arrangement new men are to some extent kept out of the business; and just so long as the agreement is held to, there is not so much reason for great overstocking of the range. A sort of order thus grows out of chaos. A kind of government replaces anarchy; but it is a government by the strongest, and there is sure to be strife among the strong ones. Perhaps one group of men holding one portion of the public range by force of arms or by force of agreement may decide also not to overstock their range and to improve it by sowing the seed of valuable grasses and forage plants.

This is not likely to occur, because the reseeding of a large tract is a costly undertaking, and one still so largely an experiment whose results cannot clearly be foreseen that no stockman will be likely to undertake the reseeding of lands not his own. How, then, shall the open ranges of the public lands be made fully productive again?

A socialist has suggested that this should be undertaken by the general government as a public work to be paid for by taxation of the whole people; that seed should be collected, enormous grass farms planted, and that the seed raised on these farms should be sown far and wide on the ranges, and that the cost of all this enormous undertaking should be borne by the general government.

It has also been suggested that the government should reseed its lands and then rent them or lease them for enough to cover the cost of reseeding. This plan, like the Socialist's dream, is open to many and conclusive objections. In reseeding by the socialistic method, the cost would be so stupendous and the opposition on the part of taxpayers so strong and so well founded

Kennedy 1897
Bull #37

that this method is wholly unsound in principle and impossible in application. Again, if the government should reseed its lands and rent them, what guarantee could it exact that the reseeded lands should not once more be greatly overstocked?

By some means, however, the depleted public ranges should be made again highly productive. This is vastly important to the stockmen and the stockraising States. It is indeed of real importance to the entire nation. If the methods suggested are not practical, it remains to find a method which will be just and reasonable, and at the same time really workable. Granted that reseeding is wise and necessary, what class of men is so familiar with the ranges and so well qualified for the work, both by self interest and knowledge of conditions, as the stockmen themselves? Who can more justly be asked to pay for the reseeding? Now, of course, no man will scatter much seed over land which he does not own or lawfully control. If then the public ranges are to be made once more fully productive, they should be leased for long terms to the stockmen; for the stockmen should bear the cost of reseeding and they should reap the profits. The government should of course help them as much as possible in this difficult and important undertaking.

It certainly seems that this leasing method will be the quickest and surest way of bringing the depleted range lands back to their normal productiveness. Should the government lease its lands for long terms to the stockmen it might well spend the money received from leases in helping the stockmen reseed their ranges; this by founding grass farms in the stockraising States where the best native grasses and other forage plants might be tested and where small quantities of seed might be raised for the stockmen to sow at the right time and in the right place. These large grass farms would of course be a part of the Experiment Station system.

When the average man begins to think about restoring depleted ranges, he is apt to imagine that somewhere on earth, in Australia, or in South Africa, or even in Siberia, there must be a wonderful grass or a salt bush, or something else which can be made to grow on his ranges high up on the dry mountains and down in the wooded, shady valleys, furnishing abundant food for

Restoration
Native species

all his stock. This is just as possible as it is to find a patent medicine at one dollar per bottle which will really cure all diseases. It is almost always true that the plants best suited to any range are the ones which already grow there or which used to grow there. Of course there may be better ones growing in other parts of America, or in other countries in nearly the same kind of soil and climate; but it is usually true that any stock range will be benefited most quickly and most permanently by reseeding it with the best native plants and grasses. This is true because plants which have occupied the same territory for years, perhaps for centuries, have become perfectly adapted to the soil and the climate of the region where they grow.

The native plants may be restored in part by resting every year certain parts of the range, thus allowing the forage plants to produce seed. This method could be made far more successful, if on the rested lands seed of the right kind could be sown artificially. The seed, however, is hard to obtain and it is not always easy to decide which plants are really the best ones for this purpose.

For artificial sowing a good forage plant should have the following qualities: It should, above all, be hardy and nutritious. It should be deep-rooted. It should be well suited to the soil and climate in which it is to grow, and it should produce abundantly seed of such a character that it can be easily collected and sown. The leaves and stems should, of course, be full of those substances which go to make fat, muscle and bone in good sheep and cattle. Out of the hundreds of kinds of plants growing on the ranges, there are only a few which combine all these various qualities of hardiness and nutrition. The experiment stations may very profitably co-operate with the stockmen in hunting for these few good ones and in gathering their seed, testing it and sowing it.

Much useful work along these lines has already been done by the experiment stations in several of the western States. In investigations of this kind station men and stockmen can well co-operate under the direction of the Department of Agriculture at Washington.

In Nevada these co-operative experiments could best be con-

Kennedy 1897
Bull #37

Rest
land production

ducted in the following way: Small tracts of natural range land covered with natural plants and grasses should be put under fence. On these fenced areas seed could easily be gathered from the best ones growing there. Seed from other countries could be sown within the fence and tested. These little seed farms would soon yield very valuable information, and on them small quantities of seed could be raised for planting on other parts of the range. When it had been shown in this way that reseeding with some native or foreign forage plant is really practical and successful, the little experimental seed farm could be enlarged and cleared of brush, perhaps even irrigated if the location made this possible; and seed could be raised in larger quantities and scattered more widely.

Of course the reseeded tracts would then need a year's rest to give the new grass a start. Such experimental work as this could well be undertaken by any stockman who owns his range or leases it for a long term, but such investigations are more successful when they are carried on under the direction of the scientists employed by the Department of Agriculture. It may be that in time the Nevada Experiment Station will secure sections of range land here and there in the State, where with the help of the stockmen larger seed farms can be established.

If we had in Nevada such a system of experimental grass plats and farms as that described above, the stockmen of the State could make use of it in the following way: By fencing small tracts on the range, they would obtain good specimens of the more valuable forage plants and grasses together with their seed. Any stockman could then send specimens of these plants, cut at the right season, to the Experiment Station, where a chemical analysis would show their relative values as food for stock. The Station men would also test the seed in experimental grass plats and find out whether it could be sown artificially with profit. The Station would then send back to the stockmen a report saying that out of the plant samples and seeds sent in, several, perhaps, are nutritious and hardy and easy to sow on the range. The report would also include directions telling as far as possible the best and most practical methods of gathering the seed and spreading the good plants.

CONCLUSIONS.

From the facts observed and gathered and from the specimens collected in this preliminary survey of the summer range, we have reached the following conclusions:

(1) That on the sheep ranges in the part of the Sierra which we visited the forage has not been greatly injured by overstocking.

(2) That on these ranges there are many forage plants so common and so hardy and nutritious that they are very valuable.

(3) That the forage would, of course, be greatly improved if the best of these native grasses could be made more abundant, either by sowing their seed or by resting every year parts of the range, and in this way allowing natural reseeding.

(4) That in all probability there are foreign forage plants whose seed could be successfully sown with benefit to the ranges.

(5) That the best methods of causing the spread of these good native and foreign plants have yet to be discovered: this by experiments in obtaining the seed and sowing it, first in fenced enclosures and then on the open range.

(6) That in these experiments the Experiment Station men and the stockmen must work together if the results are to be thoroughly practical, and at the same time scientifically accurate.

Tribute
Honor
Bull

Emigrant Trails

Call #
UC Library

308 T D 714

2nd Floor

Robert Lois J

Historical Overview of a Portion
of Lassen and Modoc Counties, California
Report to BLM Susanville Dist.
by Robert, Lois J.

Pacific Palisades 1980

205 pages

Phil Lord

Harvey Abbey Diary 176 pages
1905-1935

Abbey, Robert Harvey

Early day experience in The
U S Forest Service
Forest Ranger Dist.

*Original
on file
at UC-Giannini Library*

A LAND USE STUDY

IN EASTERN MODOC COUNTY
CALIFORNIA

involving

RANCH AND RANGE RELATIONSHIPS

UNIV. OF
CALIFORNIA

March 15, 1941

George A. Fischer,
Junior Range Examiner,
Modoc National Forest.

SD 427
C85765

6174001

CONTENTS

	Page
Purpose of Study - - - - -	1
Acknowledgment - - - - -	1
Description of Area - - - - -	3
Location and Boundaries - - - - -	3
Topography - - - - -	3
Geology - - - - -	4
Drainage Systems - - - - -	4
Climate - - - - -	5
Industry and Resources - - - - -	5
Agriculture - - - - -	5
Lumbering - - - - -	6
Mining - - - - -	7
Recreation and Wildlife - - - - -	8
Population - - - - -	8
Agricultural Situation - - - - -	10
Historical Background - - - - -	10
Types of Agricultural Enterprises - - - - -	12
Factors Limiting Agriculture - - - - -	14
Climatic Conditions - - - - -	14
Soils - - - - -	18
Water - - - - -	20
Remoteness from Market - - - - -	22
Credit and Finance - - - - -	23
Tenancy - - - - -	25
Range Situation - - - - -	27
X Historical Background - - - - -	27
Area, Ownership and Jurisdiction - - - - -	30
Vegetation Types - - - - -	31
Present Range Use - - - - -	32
Utilization in Relation to Range Capacity - - - - -	34
Feed Requirements of Livestock Industry in Study Area - - - - -	35
Problems - - - - -	36
Lack of Balance between Livestock Capacity of Ranching Units and Ranges - - - - -	37
Lack of Seasonal Balance of Ranges - - - - -	38
Lack of Satisfactory Seasonal Balance in Yearlong Operation of Individual Ranching Units - - - - -	38
Climatic Fluctuations and Annual Forage Production - - - - -	39
Lack of Control of Deer Population - - - - -	39
Remedial Measures - - - - -	39
Revegetation - - - - -	40
Limiting Livestock Populations to Capacity of Range - - - - -	40
Deferred and Rotation Grazing - - - - -	41
Development of Self-contained Ranching Units - - - - -	41

— Begins

CONTENTS (Continued)

Ranch Management	- - - - -
Improving Quality and Yield of Hay	- - - - -
Additional Pasturage	- - - - -
Feeding Livestock	- - - - -
Adjustment of Livestock Numbers to Feed Supply	- - - - -
Handling Livestock	- - - - -
Breeding Livestock	- - - - -
Marketing Livestock	- - - - -
Investment and Income	- - - - -
Summary and Conclusions	- - - - -
Timber	- - - - -
Agriculture	- - - - -
Range	- - - - -
Ranch Management	- - - - -
Literature Cited	- - - - -

PURPOSE OF STUDY

42
43
44
45
46
47
48
51
51
51
52
55
56

In northeastern California the range livestock industry plays an extremely important role in the local economy. According to the 1935 U.S. census, Modoc County ranked among the ten leading beef-producing counties in the State, and the livestock industry accounted for almost two-thirds of the total value of agricultural crop production. The hay lands and the range lands in this region are vital to the livestock industry. Many of the ranges have been subjected to heavy grazing and periodic droughts. These factors, combined with financial demands, have created problems that may seriously affect the stability of the industry.

The Modoc National Forest, which includes most of the near-by summer range areas available to the livestock industry of the locality, was created in 1904, and range use has been under regulation for more than three decades. It was established, following petition by local stockmen, to provide for regulation of the heavy grazing use in order to safeguard the supply of summer range forage so vital to the local industry. During the World War the forest ranges were stocked to maximum capacity, and heavy use continued during the 1920's, which, combined with the declining trend of below-average precipitation to the all-time low of 1933, resulted in reduced forage production and decreased grazing capacity on many of the forest ranges. A detailed survey of these ranges completed in 1938 disclosed that the degree of current use allowed was not providing the required forage resource protection. Adjustments to correct this situation have affected to some extent the general welfare of the industry. It was realized, however, that national forest range use is but one of the basic factors involved in stable, economic operation of local livestock ranching units in this area. Accordingly, in 1938 it was considered desirable to undertake a study of the background, current status, and existing conditions of land use in the locality, with special emphasis on range lands and range livestock operations. Considerable factual information from various sources was available and has been used as a basis for the work. Additional field study was required to obtain material and data necessary to round out the project. The primary object is an endeavor to present a general, comprehensive picture for consideration by forest officers and by other individuals and agencies interested in land-use problems of the locality.

The report is divided into four sections, the first being a description of the physical and cultural conditions in the study area, followed by those dealing with the agricultural situation and the range situation, and concluding with a treatment of farm and livestock management possibilities.

ACKNOWLEDGMENT

As is fully recognized, the success of a work is heavily dependent upon the thoughts, writings, and efforts of others. For much of the data contained in this study, credit is due to the authors of numerous publi-

Historical Background

At the time of settlement and during the seventies and eighties, according to pioneers, the valleys within the study unit were apparently excellent range lands with meadow grasses growing up to three feet in height. Bordering the meadow areas was a rank growth of rye grass "high as a man's head on a horse." Away from the valley floors on the adjacent foothills and plateaus were found dense stands of perennial bunchgrasses producing a good volume of feed, with leafage a foot in height and seed stalks much higher. Sagebrush was sparse and in some areas was found only in isolated spots. There was no cheatgrass. This exotic was introduced later, through imported hay and by transient livestock. It has become abundant only in the last twenty years.

Range areas in the mountains produced excellent forage which consisted principally of bunchgrasses with a minimum of inferior forage plants. These ranges apparently remained in good condition until about 1890. Reports state that each fall fires were set in the forested areas and they burned until extinguished by winter snows.

Early settlers found an abundance of native forage on the public lands. They made no provision for hay production except a limited quantity to maintain dairy stock and farm horses. Range livestock was turned loose and large herds of cattle and horses and some sheep were maintained entirely on the range. The industry continued on this basis until severe winters fully established the fact that it was unsafe to attempt to run cattle without hay in winter, and the range cattleman eventually became a hay-raising farmer.

The severe winter of 1874-75, lasting from November to April, resulted in heavy losses of livestock. Many estimates agree that over half the livestock was lost. After this disaster hay production was somewhat increased. The dry summer of 1879 and the consequent inadequacy of the hay crop resulted in another livestock disaster during the following winter. Losses were not as heavy as in 1875, since the decimated herds had not yet built up to former numbers. Hay production was again increased but not sufficiently to weather the very severe winter of 1889-90. The drought of 1889 caused a dire shortage of hay and range feed, and as a result of the deep snow and severe cold during the following winter approximately 75% of the livestock population and nearly all of the deer and antelope herds perished. Many of the stockmen, particularly the larger operators, were practically wiped out.

After this series of disastrous winters, ranchers built up their hay acreage and tonnage to meet the needs of the livestock, and it has remained near the same level to the present time. The fact that most of the valley meadow areas which had been used for open range were taken up and fenced by homesteaders by 1880 was another reason for increased hay production. The remaining open ranges were closely grazed and little forage remained on which to winter livestock. The cattle were fed when necessary in winter and turned loose in the spring as early as March to drift almost at will. No effort was made to provide control on the range, and the livestock often wandered far from home, mixing with herds from other regions. Rodeos began in August and continued until the end of the year, and then not all live-

stock were brought in from the open range. The industry continued along these lines except where the requirements imposed by steadily depleting ranges forced operators to provide more winter feed as protection against severe weather, during which more or less of the livestock were driven to and fed at the home ranch. A minimum amount of feed for a maximum number of livestock was the rule.

Beginning with the late seventies, unnumbered thousands of cattle, horses, and sheep were attracted from Oregon and Nevada and from other parts of California by the rich vegetation. The heavy influx of transient sheep apparently began about 1885. The majority of these came from the valleys of Oregon and from the upper Sacramento. Band after band was driven across the Devil's Garden and along the Warner Range. Large numbers of outside sheep were run by local residents on a share basis. Others were purchased in Oregon and driven through to the railroad points. Livestock herds were driven to the shipping point, the lambs sent to market and the ewes returned over the same route in the fall. It has been estimated that by 1900, 100,000 or more transient sheep were annually trailed through the area. In addition, about 75,000 locally owned sheep used the area for summer range.

It probably can be safely stated that much of the overgrazing was due to the transient herds whose owners possessed no land and had no valid interest in the area beyond that of grazing it as long as the forage lasted.

Both local and transient livestock invaded the ranges as soon as the snow left the lower elevations, cropping the new growth to the ground and following the receding snow line to the tops of the mountains. This close grazing too early in the season, the subsequent trampling of wet ground, and the continued trailing of countless numbers inflicted heavy damage to the range. Interviews with old residents reveal that overgrazing was carried to such a point by 1903 that cattlemen were gathering their beef steers in June and placing them in fenced pastures because they were losing weight on the range.

The intrusion of tramp sheep caused local cattle to return to ranches early and compelled ranchers to open their fields and meadows for grazing use in late summer. It was claimed in some cases that nomadic stockmen grazed their flocks about the premises of farmers and even invaded enclosed pastures, making it almost impossible to keep livestock of any kind about the farm. Competition was especially keen for the mountain areas which were excellent lamb-finishing ranges for transient sheep but were needed during the summer season by local livestock.

For their own protection against nomadic livestock, local stockmen were instrumental in effecting the creation in 1904 of the Modoc Forest Reserve, now the Modoc National Forest. This included most of the desirable summer range areas of this unit. National forest administration resulted in regulation of the use of these ranges and the elimination of transient livestock. Transient livestock were forced to move to the uncontrolled public domain lands in Nevada and California, thereby adding an additional burden to these already heavily grazed ranges.

The appreciable increase in local livestock numbers between 1910 and particularly during the War period, and the subsequent increased use on domain lands and to a degree on national forest ranges caused overstocking far beyond the grazing capacity of many parts of the The result was further depletion of the forage resources of these ranges, which was accentuated by the severe drought of 1918-1934.

During the early 1930's considerable concern was evoked over the welfare of these public range lands. A range survey of the Warner completed in 1934 revealed overuse to an alarming degree on that of the national forest, and a reduction program to bring grazing to line with grazing capacity was inaugurated in 1935. Additional disclosed similar conditions on other national forest lands within the unit, and an adjustment program is now under way on these areas. The of obtaining satisfactory range use on national forest land is complicated by a large resident deer population and heavy winter con- tion in some areas.

The Taylor Grazing Act was passed in June 1934. This Act authorizes Secretary of the Interior to establish grazing districts of unreserved appropriated public domain lands outside the national forests and to t, administer, regulate, and improve such areas. In the study unit lands include most of the spring and fall range areas. Beginning in the Grazing Service was organized to administer grazing districts, grazing privileges were allocated on the basis of prior use and depend- and fees were charged for such use. This control curtailed promiscuous lo livestock and eliminated the troublesome nomadic stockmen to a degree or brought their range under regulation by the Grazing Service.

Statistical data and statements made by early settlers indicate that nge livestock industry reached its peak in Modoc County just prior to or within the third decade following initial occupancy and settlement area. From the information available, the livestock population of unty was then approximately twice the present number. The estimated ock population of the study unit at that time was reported to have he equivalent of 120,000 animal units $\%$. It has been said that rs were able to maintain larger herds than at present, due to the nce of free range forage tributary to the ranches. This free range t time, however, was available for use by livestock from outside the s well as by that owned locally. During the ensuing two decades, or O, competition from transient livestock increased until both the for- pply and the local industry were jeopardized. During the latter part s period, regulation of the summer range areas was secured following eation of the national forest in 1904. At present, regulation of the and fall ranges is being realized, following the passage of the Grazing Act.

$\%$ Animal unit - A.U. - means one cow, one horse, 5 sheep, or the equivalent thereof.

Surry, this is cut
off - can redo it
you want.

In the study unit the decline of the livestock industry from its all-time high in the nineties has been attributed to several factors:

1. Continuous overuse by both local and transient cattle and sheep seriously depleted public-land range resources and reduced forage production on these areas. Overuse apparently resulted in a great reduction of valuable bunchgrasses which were replaced by sagebrush and inferior species of grasses and weeds of lower grazing value.

2. Simultaneously, recurrent droughts and the general downward trend of precipitation from the nineties to 1933 prevented the range forage from making satisfactory recovery even under regulated use of the summer range areas during the latter half of this period. As a result former grazing capacity of the range has not been reestablished .

3. Regulation of use on the public range areas to a resource protection basis has resulted in a reduction in numbers of livestock grazed on these ranges. Some ranch operators, unable to secure public range permits, have been forced to reduce livestock numbers to the capacity of their owned or leased lands. The public range permits of others have been reduced, and this has forced a corresponding reduction in total livestock ownership for some of the ranching units involved.

4. The amount of conifer timber reproduction has increased because of fire protection during the past thirty years, resulting in a decrease of herbaceous and shrubby vegetation of value as forage. This has lowered the grazing capacity of many ranges in the timber types. On the other hand, such loss has been offset to some extent by extensive logging operations in the pine types, following which there is an increase of vegetation of value as forage, as a result of the removal of mature timber.

Area, Ownership and Jurisdiction

Within the study unit boundaries is a total area of approximately 2,019,400 acres. Excluding developed agricultural lands and waste areas leaves 1,641,000 acres classed as range lands, the location and ownership of which are as follows:

Table 8 - Ownership and jurisdiction of range lands in study area.

	<u>Modoc</u> <u>National Forest</u>	<u>Grazing District #2</u> <u>(California)</u>	<u>Total</u>	
Government land	787,800	357,500	1,145,300	Acres
Private or other ownership	131,400	364,300	495,700	Acres
Total	919,200	721,800	1,641,000	Acres

Over half of these range lands are within the Modoc National Forest and the remainder are in California Grazing District #2. About 70% of the total acreage is Federal land and the remainder is in other ownership. Approximately 210,000 acres of open range lands are owned by the operators of the 514 ranching units in the study area. Three lumber companies own about 72,000 acres within the unit. The remainder of the private land acreage or about 55% is in tracts of varying sizes owned mostly by non-farmers, many of whom reside outside the area. There is a limited acreage in State ownership consisting of tax-delinquent land and school sections. A number of Indian allotments are scattered throughout the unit, mostly outside the national forest. Eighty-five percent of the range lands inside the national forest is in Government ownership, while in the grazing district the open range area is about evenly divided between Government and private lands.

The national forests are under administration by the Forest Service, U. S. Department of Agriculture, while the grazing districts are under the jurisdiction of the Grazing Service, U. S. Department of Interior. Regulation of grazing use on such ranges involves Government land and intermingled unfenced lands in other ownership. Use of fenced range land in private ownership is not subject to regulation by Government agencies.

Vegetation Types

Map 5 ^o/ shows the location and extent of the 13 major vegetation types of the study area.

Climatic conditions and especially temperature and precipitation are important factors controlling the distribution of vegetation types. While soil is important, climate is perhaps the limiting factor for the three most extensive natural types of the study unit.

1. The timber types occur at the higher elevations which receive the greatest precipitation, including most of the snowfall.
2. The juniper-woodland types occupy the drier sites of the lower mountain slopes and the extensive lava tablelands.
3. The sagebrush types are found on the lower slopes of the tablelands and on terraces slightly above the valley bottomlands, and often include sparse stands of juniper.

Intermingled with the three major vegetation types are five others of limited extent.

- (1) Open grassland and (2) browse types are of very minor importance.
- (3) A few weed types occur in the Warner Mountains and on some of the intermittent lake areas of the Devil's Garden.

^o/ Map 5 not reproduced on small scale (Note: and original has been destroyed)

(4) The aspen type is scattered throughout the Warner Range and is of importance in the southern portion of that area.

(5) Stringer meadows occur in basin areas and along stream courses of the timber types and are important in the aggregate, although their location cannot be indicated on a small-scale map. Meadows of larger size occupy a portion of many of the open flats on the Devil's Garden.

Waste range types occur on alkali flats, in dense stands of timber or brush, and on barren rocky areas. All of the other types produce vegetation which is of value as forage and is utilized by range livestock and wildlife.

The areas above the valley floors are used almost entirely for grazing purposes.

The climatic change, with elevation as an influence on the extensive natural vegetation types, is well exemplified by a cross-section between Alturas at an elevation of 4,345 feet in the valley, and the summit of the Warner Mountains with an elevation of about 10,000 feet, an air-line distance of less than 20 miles. East of Alturas, when approaching the Warner Range, the tableland supports a sagebrush type with scattered juniper trees. This type gradually merges into woodland as the density of the stand of juniper increases toward the lower slopes of the mountains, where ponderosa pine is first encountered on the south and west slopes. At about 5,000 feet the timber type is nearly pure ponderosa pine. As the elevation increases, the timber stand includes varying proportions of white fir and incense cedar in addition to ponderosa and Jeffrey pine. The heaviest stands occur on the north and east slopes. Above 6,500 feet the timber type is nearly pure fir. Aspen and lodgepole pine also occur as fringes on the moist sites of open basin areas and along upper stream courses at this elevation. Above 7,500 feet elevation, the effect of exposure and altitude is again evident by the appearance of white-barked pine. Along the summit of the Warner Mountains the timber types occur as mixed stands, consisting often of abnormally formed trees of slight economic importance, alternated with open rocky areas on which there is a total absence of tree growth.

Present Range Use

In this area, due to elevation and climatic conditions, there is no winter range. The only exception is during mild winters following adequate fall precipitation and temperatures favorable to growth of vegetation on ranges of lower elevations. Of the three major vegetation types of the unit, the sagebrush and juniper areas are natural spring and fall ranges, while use of the timber types at higher elevations is possible only during the summer season.

At present most of the range within the grazing district may be used for the period April 1 to October 31. In some instances, these low-elevation ranges are used for this entire period by those livestock operators who have an insufficient amount of summer range elsewhere or no such summer range. In other instances, stockmen who have permits on the national forest use the grazing district as spring range before going to the forest range. In many instances the grazing district ranges serve as places to put livestock in order to get them off the ranches while hay

crops are
ranches as

Wit
vary from
To provide
use of nat
ing upon t
while an
for the n
come from
not becau
to a lack
for remov
tion of t
for lives
available

TH
ownership
the summe
forage is

R
authoriz
on the m

Governme
Unfenced

on a ba
acres i
authori
months,
Range u
private

crops are being grown and harvested, and the livestock are returned to the ranches as soon as hay aftermath is available for pasturage.

Within the national forest, the dates the forage is ready for grazing vary from May 1 to July 1, depending generally on elevation and type of range. To provide for annual climatic fluctuations, the opening dates for authorized use of national forest ranges can be advanced or deferred two weeks, depending upon the season. On the Devil's Garden the usual opening date is May 1, while an average date of June 1 is used for the Warner Mountains. The season for the north and east portions of the Warner Mountains, where livestock come from Surprise Valley and Goose Lake Valley localities, begins May 16, not because the forest ranges should be grazed so early but due principally to a lack of adequate spring range in those localities and the necessity for removing livestock from hay lands by that date. In the southwest portion of the Warner Mountains the season on the forest opens June 16 or July 1 for livestock from the South Fork Pit River Valley, for which spring range is available on the grazing districts.

There is no control of seasonal use on fenced range lands in private ownership. In the national forests, climatic conditions limit grazing to the summer season. Otherwise such fenced areas are used as needs arise and forage is available.

Regulated grazing use equivalent to 223,000 animal months $\frac{\circ}{\circ}$ is authorized on the public ranges of the unit. Less than 40% of such use is on the national forest and over 60% on the grazing district, as follows:

Table 9 - Authorized use of public ranges in study area.

	<u>Modoc</u> <u>National Forest</u>	<u>Grazing District #2</u> <u>(California)</u>	<u>Total</u>
Government land	81,000 A.M. $\frac{\circ}{\circ}$	105,000 A.M.	186,000 A.M.
Unfenced private land	<u>4,000 A.M.</u>	<u>33,000 A.M.</u>	<u>37,000 A.M.</u>
Total	85,000 A.M.	138,000 A.M.	223,000 A.M.

Regulation of the public areas allots usable range in the study unit on a basis which averages approximately $7\frac{1}{3}$ acres per animal month, 10.8 acres in the national forest, and 4.5 acres in the grazing district. Of the authorized use, all but 7,000 animal months, or a total of 216,000 animal months, is for livestock from local ranches located within the study unit. Range use by livestock from outside the study unit is accounted for by the private land in the unit which is owned or leased by outside stockmen.

$\frac{\circ}{\circ}$ A.M. - Animal month, or one month's feed requirement for one cow, one horse, 5 sheep, or the equivalent thereof.

Utilization in Relation to Range Capacity

The livestock grazing capacity of range lands depends largely upon the amount and kind of forage produced on such areas. As has been discussed previously, long-continued overuse of many ranges in this unit has resulted in replacement of valuable and preferred forage plants with inferior species of less value as forage. As a result these ranges now have lower grazing capacity values. The annual volume of range forage production varies with climatic conditions. The climatic history of this region is one of short-time alternating periods of drought and above-normal precipitation, with long-time swings over more extended intervals of decreasing or increasing precipitation. All these factors influence range capacities.

It is not practical to vary the rate of stocking ranges in this area on a basis of good and poor forage years. Most ranching outfits are not sufficiently flexible to provide the short-period adjustments in livestock numbers which would be required by such practice.

The present rate of stocking many ranges in this area represents an attempt to provide for use of the volume of forage which is produced during estimated average years. Such practice provides a needed margin of safety for extended subnormal periods which are characteristic of this region. The minimum requirement for regulation of public ranges must be a degree of use which will sustain grazing capacities over a period of years. The desirable goal would be a degree of use which will permit improvement in forage conditions and eventually result in increased range capacities.

Use of ranges within the grazing district portion of the study unit has been under regulation for only a brief period. The current degree of use is based primarily on the history of prior grazing use on the area and the extent of supplemental range use necessary to round out year-long operations of the ranching units involved. Further, these ranges have been subjected to an overburden of livestock resulting from a long period of regulation on the summer ranges of the national forest. A detailed survey of the range lands in the grazing district will be required before the effect of current use can be analyzed and the capacities established on a basis of sustained forage production.

The national forest range lands have been under regulation for a much longer period of time, more than thirty years. A detailed survey of existing conditions resulting from such use has been completed recently, and estimates of capacity have been revised where the necessity for such action was evident.

Some of the ranges in the Warner Mountains are overstocked, when judged by the present degree of vegetative use and the condition of the livestock when taken off the areas. With continued heavy use on these ranges their rehabilitation is difficult if not practically impossible. The necessity for additional adjustments in the rate of stocking on such ranges is indicated.

In general, current use by livestock on other national forest ranges in the study unit is conservative and not so badly out of line with sustained capacity. Overuse by deer, however, is a serious threat to sustained

range ca
a proble
be maint

appears
will be
local l
at its
must pr
uals, w
to soci

Feed Re

ing uni

Type

Cattle
Genera
Genera
Sheep
Crop S
Part-t
Hay
Grain
Livest
Self-s
Dairy
Truck

of app
ing th
from
feed
privat

range capacity on the Devil's Garden. On many ranges in that area this is a problem which must be solved if existing capacities for livestock are to be maintained.

The current and pressing problem on the public ranges of this unit appears to be one of regulating use so that sustained forage production will be possible. This objective must be realized if that portion of the local livestock industry dependent upon public ranges is to be maintained at its existing level of production. Plans for a solution of this problem must provide for action on the part of all interested agencies and individuals, with a minimum of disturbance to stable livestock-operating units and to social and economic values of the local community.

Feed Requirements of Livestock Industry in Study Unit

The following tabulation shows the total livestock ownership by ranching units within the study area which are supplemented by use of range lands.

Table 10 - Livestock ownership by range outfits in study area

Table 10 - Livestock									
Type of Farm	Livestock Owned						Total		
	:No.:	:Ranch:		:Beef:		:Animal:		:A. M.	
	:Units:	Cattle:	Dairy:	Sheep:	Horses:	Units:	Requirements		
Cattle (Beef)	: 135 :	50016:	272 :	2260 :	2967 :	53707:	644,484		
General (Diversified)	: 33 :	1886:	167 :	310 :	243 :	2358:	28,296		
General Livestock	: 15 :	2706:	46 :	9545 :	273 :	5034:	60,408		
Sheep	: 16 :	608:	38 :	20850 :	226 :	5042:	60,504		
Crop Specialty	: 4 :	449:	17 :	:	25 :	491:	5,892		
Part-time	: 4 :	40:	2 :	150 :	50 :	122:	1,464		
Hay	: 4 :	320:	:	:	420 :	740:	8,880		
Grain	: 4 :	251:	8 :	10 :	25 :	286:	3,432		
Livestock Specialty	: 2 :	360:	:	:	15 :	377:	4,524		
Self-sufficing	: 1 :	15:	2 :	:	6 :	21:	252		
Dairy	: 1 :	48:	19 :	:	7 :	74:	888		
Truck	: 1 :	54:	12 :	:	11 :	77:	924		
Total	: 220 :	56753:	583 :	33125 :	4368 :	68329:	819,948		

represent an animal feed requirement obtained by feed-

The 68,329 animal units owned represent an animal feed requirement of approximately 820,000 animal months. Part of this is obtained by feeding the crops, byproducts, and aftermath of developed agricultural lands and from improved pastures of the ranching units. The remainder of the required feed is provided by natural forage growth on range lands in Government and private ownership.

Animal Unit means one cow, one horse, 5 sheep, or the equivalent thereof.

Public ranges under regulated use within the study unit provide feed for these local livestock only to an extent equivalent to 216,000 animal months, as previously discussed. In addition, public ranges outside the study area provide the equivalent of 110,000 animal months' forage for livestock from ranches located in the study area, as is shown by the following:

Table 11 - Public range use outside the study area

	<u>Fremont</u> <u>National Forest</u> <u>(Oregon)</u>	<u>Grazing District #2</u> <u>(Nevada)</u>	<u>Total</u>
Government land	4,000 A.M.	86,000 A.M.	90,000 A.M.
Unfenced private land	-	20,000 A.M.	20,000 A.M.
Total	4,000 A.M.	106,000 A.M.	110,000 A.M.

Livestock from ranches in the study unit obtain the equivalent of 326,000 animal months' feed under regulated use on public and unfenced privately-owned ranges, two-thirds of the total within the area and one-third outside.

Fenced range lands in private ownership are scattered throughout the public range areas or are parts of ranching units. Some are used for specialized purposes such as beef or cow and calf pastures. Many are heavily grazed during periods when hay is exhausted and when use of improved land in the ranching unit is not possible or use of the public ranges is not authorized. It is estimated that use of these privately-owned fenced areas by livestock from ranches in the study unit is equivalent to 82,000 animal months.

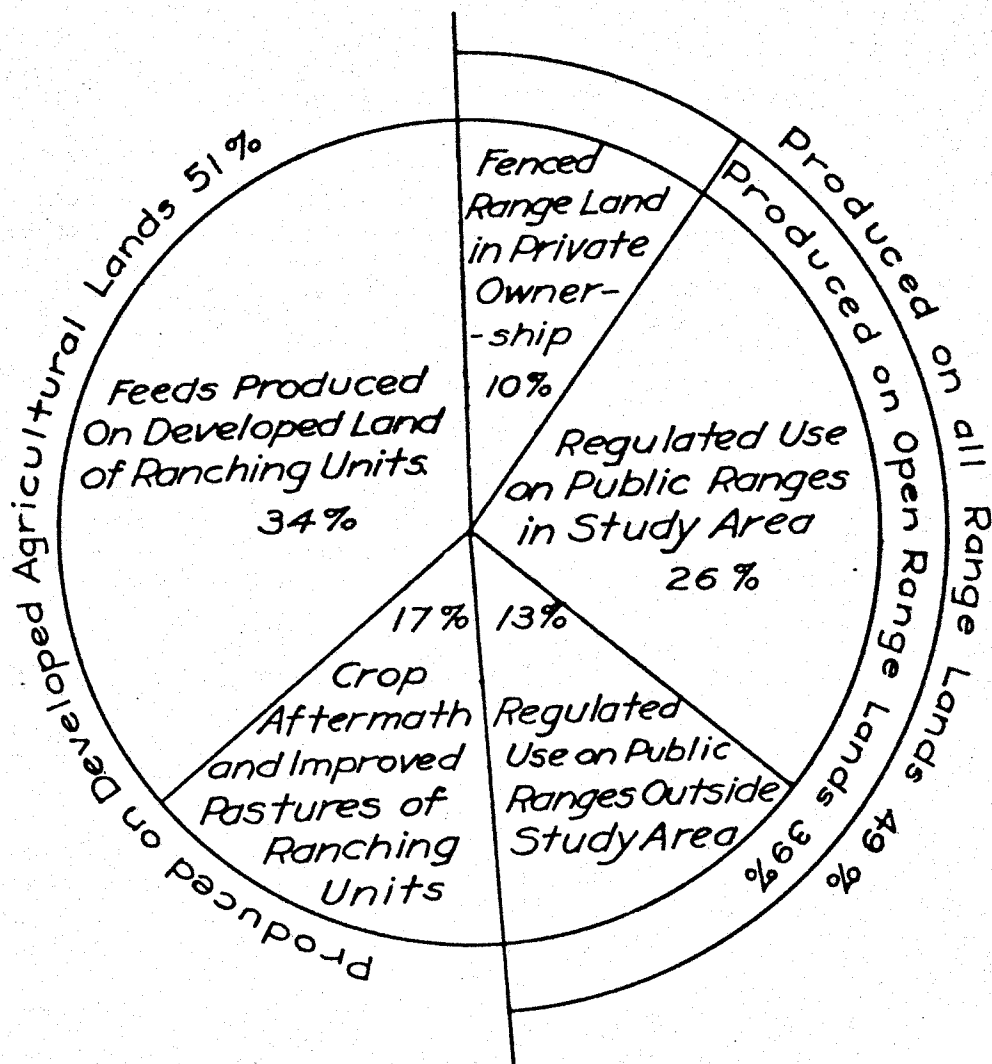
On the ranching units in the study area the winter feeding period averages four months, which represents an equivalent of 273,000 animal months. In addition, the aftermath of the hay crop and the improved pastures provide considerable feed on the ranching units. Most of the local beef animals are finished on such areas, the grazing value of which is estimated to be the equivalent of 139,000 animal months.

The known and estimated provision for annual feed requirements of the livestock in the study unit which are supplemented on public ranges is shown graphically by figure 3.

Problems

The following are some of the more important or basic problems of range use in the study area.

Figure 3. Known and Estimated Provision
For Annual Feed Requirements of Range Livestock
Owned by Ranching Units in Study Area.



Lack of balance between livestock capacity of ranching units and ranges

There is insufficient range in the study area for the livestock capacity of its ranching units and inadequate public range capacity to provide for the demands of the present level of livestock production.

The ranch and range relationships of all the ranching units within the area are shown on Map 6 ^{2/}. A large number of the units are shown on this map as having no outside range use. These for the most part are ranches devoid of livestock or are self-contained outfits. A few have only private range supplement. As a whole, the principal source of supplemental range use seems to be from national forests or grazing districts or both. The extent of the relationships between ranges and local ranches is emphasized and shows the dependence placed upon the use of public grazing lands to maintain successful, balanced, livestock enterprises.

Those operators who have control of private range and also have public range permits usually can cease feeding about March 15 and graze their private range until the season opens on the grazing district range on April 1. Their livestock use the grazing district range until the season on the national forest opens on or about June 1, at which time they are moved onto the forest.

In the case of operators having public range permits but no private range, feeding of hay or use of improved land of the ranching unit continues until about April 1 when the season opens on the grazing district. After that date the livestock make use of the grazing district range until the season on the national forest opens, when they are moved to that area.

Those operators with only national forest permits and insufficient private range or no private range, feed hay or use improved land of the ranching unit until about May 1 or such time as there is sufficient forage growth on national forest range. These are the operators who usually request permission to turn out livestock on national forest ranges from two weeks to a month before the established grazing season opens. They are usually out of hay, or the livestock refuse to eat hay, and there is no pasturage on their ranching units other than the hay meadows.

Operators without national forest permits use grazing district ranges until the hay crop is harvested, after which at least a portion of their livestock may be pastured on the aftermath.

The ideal situation would be one in which the operator had 7 months' use of public ranges, with the relative amount of spring, summer, and fall range balanced. Actually, at present, the total use of public range both inside and outside the study area averages only $4\frac{2}{3}$ months, which indicates a shortage of $33\frac{1}{3}$ percent.

This lack of open, public range is met by reduced seasons of range use and by keeping the livestock within privately-owned pastures for a longer period of time than desirable for well-balanced operations. Even

^{2/} Map 6 not reproduced on small scale. (Note: and original has been destroyed)

with such practices, there is still overuse of some of the near-by ranges. Present use of these areas is in excess of sustained grazing capacity, and further adjustments appear necessary. For the immediate future, it can be anticipated that total use of public ranges in the study area will be somewhat less than at present.

Lack of seasonal balance of ranges

There is an insufficient amount of summer range in the unit. Some natural summer-range meadows are now devoted to hay production. Lack of summer range results in longer periods of use on areas which would have higher livestock capacity values if used only during the spring and fall periods. Lack of adequate spring range adjacent to some valleys of the unit necessitates premature use of a portion of the summer range. This results in additional loss of total livestock capacity value of the limited summer range. Ownership or leasing of private lands in summer range areas by operators of ranching units outside this area further reduce the amount of this class of range available for use by local stock.

The lack of adequate spring range for Surprise Valley and Goose Lake Valley is a serious handicap. Livestock must be held on ranch hay lands for a longer period of time in the spring than is desirable practice.

The extensive sagebrush and juniper types of the Devil's Garden would provide for the greatest number of livestock if used only during late spring, early summer, and fall seasons. Lack of an adequate amount of late summer range in the timber types of the area prevents balanced use which would represent greatest range capacity of the area. Summer use on the area in the past was handicapped by a shortage of livestock water, but this has been remedied to a large extent by the water development projects which have been completed in recent years.

Lack of satisfactory seasonal balance in yearlong operation of individual ranching units.

The reduced capacity on public ranges in this unit has resulted in gradually shifting the overload of livestock to fenced range lands in private ownership and to developed lands of ranching units. This not only intensifies the problem of unbalanced ranching units but in some instances threatens to upset existing balanced outfits. Adjustments in agricultural land use and animal husbandry practices appear necessary in order to maintain the economic security of the ranching units involved.

A few operators control insufficient private range and have no public range privileges. They are forced to secure high-priced pasturage, of which only a limited amount is available, or their livestock must be shunted from one field to another on the ranching unit while the hay crop is being grown and harvested. The result is either high feeding costs or overstocking of hay-producing lands which reduces the total livestock feeding capacity of the ranching unit. Such operations must be most efficient to constitute economic livestock production in this area.

Operators possessing improved pastures or meadows not used for hay production on their ranching units begin to remove their livestock from the public ranges in August. Others wait until the aftermath on hay-producing lands has made sufficient growth to provide pasturage. The grazing of hay lands immediately following the harvest of the crops retards regrowth and limits aftermath production so that full forage production possibilities are not realized. Animals intended for sale as beef are brought off the range first. The other animals are brought in later, as more pasturage on the ranching units becomes available for use. In the case of operators with inadequate fall pasturage on their ranching units, the livestock are left on the public ranges until the close of the grazing season or until shortage of range forage or climatic conditions forces their removal. Such livestock, including the younger animals, frequently lose considerable weight before being removed from the range, and go into the winter feeding period in poor condition and remain so until the following grazing season.

Climatic fluctuations and annual forage production

Single drought years, as well as longer periods of less than average amounts of precipitation, are characteristics of the climate of this region, and local livestock husbandry and range use must be adjusted accordingly. Unnormal precipitation results in reduced supplies of irrigation water and therefore lowered hay production as well as lowered range forage production. In the absence of a "carried-over" supply of hay for emergency use, there is a demand for too early and too heavy use of the limited range resources. The favorable portions of the climatic cycles encourage building-up livestock numbers and increasing the acreage of forage crops, while reduction of the livestock population invariably lags behind the down-swing rate of reduced range and agricultural crop production.

Lack of control of deer population

Satisfactory forage conditions will not be obtained on some of the ranges of this unit, especially on areas where large herds of deer concentrate during the winter period, until there is adequate provision for adjusting wildlife populations to the capacity of the range forage available for their use. Game management must not allow an increase in wildlife populations beyond the ability of the habitat to support them.

In this area, bitterbrush, a valuable browse for both deer and range livestock, is subjected to overuse under existing conditions. Heavy use by deer of the early growth of perennial grasses during the period when livestock are not permitted on the range, is not favorable to recovery and thrifty growth of the valuable forage plants. Juniper, one of the important deer foods of the Devil's Garden, is overused.

Remedial Measures

The problems are interrelated and involve use of all lands, agricultural as well as range, and involve all owners, operators and agencies, public and private, with land use responsibility. Solution of these problems will be less difficult with adequate cooperative effort on the part of

LITERATURE CITED

1. Calif. State Dept. Pub. Works. Div. Water Resources.
1933. Pit River investigations. Bul. 41, 152 pp.
2. Russell, R. J.
1928. Basin range structure and stratigraphy of the Warner Range, northeastern California. Calif. Univ., Pubs., Geol. Sci. 17 (11): 387-496.
3. Russell, R. J.
1927. Landslide lakes of the northwestern Great Basin. Calif. Univ., Pubs., Geog. 2 (7): 231-254.
4. Russell, R. J.
1927. The land forms of Surprise Valley, northwestern Great Basin. Calif. Univ., Pubs., Geog. 2 (11): 323-358.
5. Averill, C. V.
1938. Mineral resources of Modoc County. Calif. Jour. Mines and Geology 32 (4): 445-457.
6. Calif. State Dept. Nat. Resources. Div. Mines.
California mineral production and directory of mineral producers, 1935, 1936, 1937, 1938. Bul. 112, 114, 116, 117.
7. U. S. Weather Bur.
Climatological data, California section. Year summaries, 1931-1938.
8. U. S. Weather Bur.
1934. Climatic summary of the United States, section 16, northeastern California.
9. Antevs, Ernest.
1938. Rainfall and tree growth in the Great Basin. Carnegie Inst. Wash. Pub. 469, 97 pp.
10. Keen, F. P.
1937. Climatic cycles in eastern Oregon as indicated by tree rings. U. S. Monthly Weather Rev. 65 (5): 175-188.
11. Carpenter, E. J., and Storie, R. E.
1936. Soil survey of the Alturas area, California. U. S. Bur. Chem. and Soils, Soil Survey Rpt., Series 1931, no. 23, 54 pp.
12. Weir, W. W., and Storie, R. E.
1936. A rating of California soils. Calif. Agr. Expt. Sta. Bul. 599, 157 pp.

13. Fluharty, L. W., and Hays, J. C.
1939. Hay production management study, Modoc County, California, fourth annual report for year of 1938. Calif. Col. Agr. Ext. Serv., 11 pp. (Mimeographed)
14. Guilbert, H. R., and Rochford, L. H.
1940. Beef production in California. Calif. Col. Agr. Ext. Serv., Cir. 115, 125 pp.
15. Morrison, F. G.
1938. Feeds and feeding. 1050 pp. Ithaca, N. Y.
16. Fluharty, L. W., Brown, T. S., and Hays, J. C.
1939. Modoc-Lassen beef management study, fourth annual report for year of 1938. Calif. Col. Agr. Ext. Serv., 27 pp. (Mimeographed)
17. Fluharty, L. W.
1937. Beef cattle enterprise efficiency and cost studies in California, a summary of the 1935 and 1936 records. Calif. Col. Agr. Ext. Serv., 22 pp. (Mimeographed)

Kennedy (1903) Eastern, Nevada
CONDITION OF THE RANGE

"A great difference exists between eastern Nevada sheep ranges and those of the Sierras. In the former, only about one-quarter the number of sheep are grazed on the same area of range. This is due to some extent to the greater scarcity of water and to the fewer number of sheepmen occupying the territory. They have also access to the great free range country in northern Nevada in the region of Gold creek and the Bruneau river, so that a number of bands can be kept there during the summer months, and then brought down to the home range to be topped off and shipped. As most eastern Nevada sheepmen have from one to ten bands of sheep on this free range, and about sixty or seventy thousand sheep from Idaho also summer in northern Nevada, it stands to reason that there must be a continuous struggle for the best camping and feeding grounds. Probably more feed is wasted by trampling than is eaten. This, however, is not so injurious to the range as if it were eaten off close and the forage plants destroyed permanently. In no place on the home ranges had the grasses suffered from trampling and overstocking to such extent as shown by Dr. Griffiths in his investigation in the Steins mountains in Oregon. This may be accounted by the facts that usually the sheep only feed over the ground once except in the vicinity of the shepherd's camp. Sometimes a lazy or incompetent herder will bring his sheep back to his cooking camp every evening so that they may be more easily watched and he may not have so far to go for his meals. A few instances of this kind were noticed which showed that the soil was ground up into a fine powder and the plants eaten and trampled upon excessively. Cattle had done considerable damage along the creeks where they went daily for water for many months in the year by trampling many paths in their journey to and fro. The soil is not merely loosened in these cases but innumerable paths, from one to three inches deep, are cut into the ground making it impossible for any vegetation to grow in them.

"The plants which appear to have suffered most in this region are those of a shrubby nature, such as the Indian currant or snowberry, wild currants, rosebushes, service-berry and chokecherry. The sheep are responsible for the most part for the total destruction of numerous Indian currant, wild currant and rose bushes. They eat them extensively during the fall months, feeding on the leaves and tender young shoots until finally the main stems die and a bunch of dry sticks remains. Cattle, however, are exceedingly destructive to the service berry and chokecherry. While lazily enjoying the shade of the willows along the creeks during the heat of the day before ascending the higher mountains to feed on the bunch grasses, they seem to enjoy nibbling at the young twigs of these bushes until, as in the case with the currant and rose bushes, the main stems refuse to send forth any new shoots and gradually die back. Many thousands of dry sticks from four to seven feet high were seen, being remnants of once healthy service berry and chokecherry bushes. Several plants, such as the poverty weed (*Iva axillaris*) and the nettle-leaved mint (*Lophanthus urticifolius*), which are of no value for forage and are not eaten to any extent by sheep or cattle, occupy considerable areas, the former growing on poor soil and the latter on the very best soil the region affords. Owing to their being

left undisturbed and allowed to seed abundantly, they seem to be increasing out of proportion to the more valuable forage plants.

SUGGESTIONS

"Attention should be given by all sheepmen to the more valuable plants on their range and a particular effort should be made, not only to preserve these, but also to increase them. Plants of no value, like the nettle-leaved mint and the poverty weed, should be replaced by either native or introduced forage plants of value.

"Every possible means should be used in this region to retain the layer of soil on the hillsides, which at best is not over abundant, in order that the water, falling in the form of rains, may soak up into the soil and gradually give up its moisture as underground water for months after the rains have ceased. We well know that, if the soil is removed, a hard impervious surface is the result, and the rains falling on this run off rapidly, cutting gullies everywhere.

CONCLUSIONS

"There is plenty of forage for sheep at the present time on the eastern Nevada ranges...many of the ranges are better adapted for the raising of sheep than for cattle. This can be accounted for by the fact that the grasses which were once so abundant have been grazed on to an injurious extent by the cattle and have not been allowed to produce seed, while the "weeds" have been left untouched and have increased.

"The fact that water is frequently scarce in the late summer months has prevented the ranges from being overstocked by sheep.

"As the public range belongs to the people and not to any individual, it should be so used as not to become depleted. This can only be done by some system of leasing or control which will enable the stockman to take interest in the condition of the range and preserve it for himself and further generations. The settler with a small amount of capital would then have an opportunity of buying a small farm, large enough to grow his winter feed, and be able to lease a portion of the adjacent public range for summer use without being crowded out by stock companies or large individual owners.

"The use of the public range by traveling bands of sheep or cattle should be absolutely prohibited by a nation law."

SHEEP HUSBANDRY

CALIFORNIA :

A PAPER PRESENTED BEFORE THE CALIFORNIA
STATE AGRICULTURAL SOCIETY.

By JAMES E. PERKINS,
Secretary California Wool Growers' Association.

SAN FRANCISCO:

PRINTED BY TOWNE & BACON, BOOK AND JOB PRINTERS,
No. 536 Clay Street, opposite Leidesdorff.

1863.

LIBRARY
OF THE
U. S. Department of Agriculture.

Classified
5
3411

SHEEP HUSBANDRY IN CALIFORNIA.

Among the many industrial pursuits that have attracted the capital and occupied the attention of agriculturists in this State, none have shown a more rapid expansion, or held a better prospective position than that of Sheep Raising and Wool Growing. Already its results figure largely in the list of our export values, and it bids fair to become at no very distant day a leading source of our agricultural wealth.

Of all the animals given by a Wise and Provident Creator for the use and service of mankind, perhaps no other has contributed so largely to his comfort and to his wealth as the sheep. Certainly none figure more prominently in history as constantly accompanying the human race in its successive migrations. This prominence might justly be accorded to it from the readiness with which it is domesticated, its rapid increase, and the supply afforded by it both to satisfy the cravings of hunger and to furnish needed raiment.

The object of this paper is to call attention to the progress of wool growing on this coast, to point out some of the inducements for expanding the business, and the chief disadvantages which must be overcome before our wool product can command a first class position in the great markets of the world.

With the origin of the various breeds of sheep of the present day we do not propose to spend any time, as such researches, however interesting to the curious in such matters, will have but an incidental bearing on our subject.

The writer also desires to state in the beginning that his views are submitted as the results of his own observation, and with the hope of promoting those inquiries and that comparison of views by which alone the experience of each may be made to subserve the interest of all.

In passing to the special subject of this paper it may be well to look for a moment at the value of the sheep as a food-providing animal. Animal chemistry assigns to the flesh of the sheep the highest place, as compared with the amount of nutritive matter contained in the flesh of various animals. It contains twenty-nine parts in the one hundred, beef twenty-six, and pork twenty-four, and is therefore better than beef as twenty-nine is to twenty-six, and better than pork, as twenty-nine is to twenty-four—and certainly no animal food is more easy of digestion or better adapted to the wants of all classes. With this preponderance in favor of mutton as an article of food the question arises, why does it not occupy a more prominent position as compared with the flesh of other animals.

FEB 13 1903

An eminent writer on sheep says on this subject: "Notwithstanding all that has been said and written of the 'roast beef' of Old England, mutton is more eaten there by people of every rank. On the other hand, it is evidently not a favorite meat in the United States, though its proportionable consumption is evidently increasing. Whence the difference? Circumstances have led to habit, and habit in a great measure regulates appetite."

However it may be in other parts of the United States, we are confident that the consumption of mutton in our own State, at least in the more populous cities is steadily increasing, not only absolutely, but relatively to the increasing consumption of other meats, and that our farmers can at all times raise mutton quite as cheaply as they can raise beef, indeed that a price that would barely cover the cost of the latter would yield a good profit to the former.

But however serviceable to man as a food-producing animal, the chief value of the sheep is in its capacity to produce material for clothing, and in this field no other animal can take its place. It is true that the goat, the Alpaca, the Llama, and some other animals contribute to a limited extent material for the covering of man; but none of them afford a fibre so admirably adapted for clothing purposes by its softness, pliability, strength, and peculiar felting property, nor in such abundance.

The design of the Creator in giving this animal to our uses seems further and more strikingly indicated by the capacity with which he has endowed it, to adapt itself to every climate, and to appropriate to itself a wider range of grasses than any other domesticated animal—with perhaps the single exception of the goat—thus enabling it to thrive on soils that would be otherwise almost useless, and to accompany the human race to almost every portion of the earth.

For several years after the settlement of this State, the opinion prevailed very generally that sheep could not be raised here to any profit, for their wool. It was argued that the extreme heat of the summer, and the dry feed on which they must subsist for a large part of the year would tend to produce a fleece so thin and light as scarcely to pay for shearing. Under this impression, those who owned or purchased sheep looked only to the market for mutton for their outlet and profit.

Scarcely anything but the native or New Mexican sheep could be found, and these, worthless as they were, were still further debased by crossing with some Chinese rams which were imported about the year 1852 or 1853. The only recommendation either of these classes of sheep possessed was their prodigious fecundity, the ewes often bearing triplets, almost invariably twins, and sometimes five, and even seven lambs at a birth. In size, form, constitutional vigor, and disposition they presented the perfection of all that is undesirable, while their fleeces rarely exceeded two or two and a half pounds of coarse, uneven, kempy wool, suited only to the lowest class of fabrics and scarcely worth the cost of sacking and transporting to market. Yet it is from this basis that our stocks of the present day have mainly sprang, and we owe to it the demonstration of the suitability of our climate and grasses for the raising and keeping of the superior classes to which we are now approaching.

During the years 1852, 1853, and 1854, quite a number of Missouri and a few Ohio sheep were driven across the plains, and toward the latter of those years some fine importations of Australian sheep were received, all of which found ready sale at remunerative prices. Most sheep raisers who have been long in the business, can well remember when the possession of a very ordinary American ram was considered a most fortunate thing, and half-breeds (*i. e.* crosses of American rams on the Mexican ewes) were eagerly sought for.

The immense increase of sheep raised in the State, and the continual introduction of immense droves from New Mexico very shortly brought the stock of mutton sheep fully up to the demand from the butchers, and threatened at no distant time to be so largely in excess as to reduce prices far below the cost of production. As early as the year 1854, some of our most enterprising sheep raisers anticipated this result, and believing that a climate and range on which the poorer breeds seemed to thrive so well, must answer equally as well for the higher classes of wool-producing sheep, and that sheep could be raised here for the fleece alone, set about the importation of the thoroughbred merino rams of Vermont and New York. To Messrs. Curtis & McConnell of Sacramento County belongs the credit of the first importation of the Vermont, or generally designated Spanish Merino. Both these gentlemen are now dead, but they lived to see and reap the fruits of their foresight. Other importations of both French and Spanish merino stocks rapidly followed, as also of Cotswold, Leicester, and Southdowns. Large numbers of Australian rams and ewes were brought in, and all found ready sale at extreme prices. Before the year 1860, there was scarcely a flock in the State that had not some infusion of improved blood from these importations, and the character of California wools began to exhibit a percentage of improvement scarcely less than the increase in quantity, until at the present time an unmixed flock of native sheep is by far more rarely met than were improved flocks in the year 1856. A glance at our estimated wool clip for the past nine years will show the rapid increase, and the important position already attained, viz: (See p. 6.)

In 1855, the census reported our wool product at about five thousand pounds, but it was not until 1854 that it attained sufficient magnitude to obtain notice in the list of exports. That year we shipped 1,127 bales. The following table shows the extent in bales of our exports for each year since, viz: (See p. 6.)

Of the entire export up to the year 1856, probably nine-tenths was of the native breed, originally poor enough, and sent abroad in such abominable condition as still further to depress it in the estimation of dealers and manufacturers; and prejudices were then formed against California wools from which they have not yet recovered.

The rapid increase of our exports of wool is beginning to attract the notice of Eastern manufacturers, and already California is looked to for a respectable portion of the yearly supply.

Is any increase of our product of wool that we may reasonably anticipate, likely to increase the product of the United States beyond the amount required for our domestic manufactures? A correct knowledge of the annual product of the United States is essential to any satisfactory conclusion on this point. It

Estimated Product in POUNDS.

	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.
In Pounds.	175,000	360,000	600,000	1,100,000	1,498,351	2,378,250	3,260,000	4,600,000	5,530,000

For the year 1863

6,857,109 lbs.

Export Wool in BALES

	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.
In Bales.....	2,487	3,924	5,664	6,496	10,570	12,082	15,984	22,113.

For the year 1863

18,146 Bales

A considerable portion of the wools shipped this year have been in pressed bales weighing from 500 to 800 lbs each, the ordinary bales used heretofore averaging from 250 and 300 lbs. each.

California, sooner or later, the entire wool crop must pass through San Francisco either for shipment abroad or for use in our own factories, hence it is comparatively easy to arrive at the exact annual product of the State; but there is scarcely another State in the Union so situated, and one main dependence for the desired information is upon the census returns. The statistics of agriculture are always difficult to arrive at with precision, and it would be strange if there were no discrepancies in details. The statistics of manufactures are, however, readily attainable, and the importations of foreign wools being all invoiced at the Custom houses can be arrived at with certainty; together they give so close an approximation to the census returns that we may safely accept the latter as the basis of our calculations.

In the year 1860, which may be taken as about an average year, as there were then no causes at work to interfere with the regular course of manufactures, the United States worked up over eighty million pounds of wools, besides using over sixteen million pounds of cotton in fabrics designated as woollens. The total product of wool in the United States for that year was only sixty-two million pounds. Since that year, heavy tariffs have been laid on all goods of foreign manufacture imported into the United States, and increased duties have also been laid on all foreign wools, both measures calculated to benefit the wool grower of the United States by limiting the imports both of foreign goods and of foreign wools. Yet it must be confessed that the greater part of this protection to our domestic interests is extended to the manufacturer, inasmuch as the duties on manufactured goods are largely disproportioned to the duties on the raw material, and it is to be noted that our legislators seem always to have forgotten that American farmers, burdened with all the responsibilities of social and public duties pertaining to their position as free men and enlightened citizens, supporting churches, schools, and societies for mutual improvement and progress in all that goes to make the sterling, intelligent man, can no more compete with the convict shepherds of Australia, or the "Gauchos" of Buenos Ayres, or the ignorant and ill-paid peasantry of England and Germany, than our manufacturers can compete with the pauper labor of the great manufacturing centers of England.

During the year 1861, the immense demand for goods suited to army purposes and demanding immediate supplies, created an unusual call for low and medium wools far beyond the capacity of our home production, and the crop of that year derived a material benefit from this demand and the consequent advance in prices. During 1862, prices nominally advanced still further, but when reduced to the standard of gold and silver currency were really no higher than the average for a term of five years preceding. Contrary to all expectation, the price of wool seemed to be but little if at all affected by the changes in currency or the almost complete withdrawal of the cotton of the South from the channels of commerce and manufacture.

The nominally high prices freely quoted in all our journals and business circulars had the effect to attract shipments on a greatly increased scale from almost every wool-producing country, and the imports for 1862 exceeded fifty-six million pounds. Despite the fluctuations of gold and the operations of the

tariff, these importations continued in increased volume through the first half of the present year; the receipts of foreign wools for that period exceeding forty million pounds.

To this cause we may attribute the present condition of our markets and the general depression that seems to have overtaken them. That it will be permanent we do not believe; that it is but a natural reaction from which we shall soon recover seems more reasonable by far, and though wools may not again reach the nominal prices of last January and February in our Eastern markets, we expect to see them, relatively to the price of gold, even higher.

In regard to the large importations of foreign wools, it is to be remarked that the increased manufactures would naturally permit much larger importations than at any previous time, and beyond that the defection of the Southern States reduced the product of wool, directly, by the amount of nearly sixteen million pounds, and indirectly, by the amount of cotton, formerly used in goods denominated woolen, fully sixteen million pounds more; so that an importation of thirty million pounds would be required to offset the deficiency of our domestic product, even allowing a large margin for the increased production of the Northern States during the past two years.

We know that the supply of woolen goods for ordinary wear is by no means equal to the requirements of the country, and unless we are to be supplied to a much greater extent than ever before by foreign manufacturers, it is clear that wool must again be in active demand in our own markets. One fact is here worthy of mention, viz.: that our domestic growth of wool has never equaled much more than one-half of the supply for our home manufactures, and the entire amount of these has scarcely equaled one-fifth of our consumption of woolen goods. From all the sources of information available to us we draw the following conclusions, to wit: That at the commencement of the present rebellion both our own and the English markets were supplied with cotton and cotton goods for fully three years in advance, hence the fact that wool has as yet received so little enhancement from the withdrawal of the bulk of that staple. That ultimately the small accessible supplies and high prices of cotton will produce their effect on the value of wool, besides increasing its use largely and permanently.

That this result will be felt proportionably in all the wool markets of the world, and that the average prices for the next ten years at least must be highly remunerative to the grower.

That the utmost expansion that could be attained by the whole Pacific Coast would not under any circumstances make up the deficiency of our domestic growth, and even if we could attain a surplus of production over manufacture, that surplus would have abundant outlet to foreign markets.

Hence, our policy and interest is to increase the product as largely and as rapidly as possible.

The facts that sheep of all the principal breeds adapt themselves readily to all the variations of climate and range on the Pacific Coast, that they are remarkably free from all diseases, that they are here possessed of unusual fecundity, and that they suffer no deterioration in weight of carcass, or in the quantity and fineness of their wool, are now beyond question and require no argument.

Heretofore, it has been the universal practice to depend wholly on the natural grasses for the subsistence of the many flocks throughout the State, and but a few years ago these were everywhere abundantly sufficient to keep the sheep in thriving condition throughout the year. In the remoter localities, where there is scarcely any limit to the extent of range this is still the case; but in localities where the land has been fully stocked with sheep and neat cattle for a term of years, and where year by year the plow has run its furrows wider and wider, gradually circumscribing the original range, it is wholly different.

The native grasses of California are with rare exceptions annuals, propagated each year from the seeds scattered the preceding year. Where the lands have been so persistently overstocked the herbage has necessarily become thinner and thinner as the seeds have been gradually destroyed. This process of depasturage, though not confined to any one species of herbage, is most strikingly exhibited in the great oat ranges, where, 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 a stunted growth of six to ten inches, with wide reaches of utterly barren land, marking the extinction of the native growth. The progress of this killing out of the native ranges has been very gradual, but has now reached a point when the question of "range" has become the most formidable one the sheep raiser has to encounter.

This system of stocking the grazing lands must ultimately result in their entire depasturage and compel the sheep-raisers to either a system of annual removal of their stock to the mountains for summer pasture with provisions for fall and winter feeding on the plains, the purchase and inclosure of tracts of land of sufficient extent to permit such alternate feeding over different portions, as the land could sustain without exhaustion, or the breaking up of many of the large flocks and their distribution among the regular farmers.

It is probable that for many years to come, open and unoccupied land can be found, so situated that it cannot be used profitably for other agricultural purposes, enough for the existing stock and a considerable increase, but year by year these opportunities will become more rare until the result indicated has been attained. Through the southern counties of this State large tracts of land can now be purchased under Mexican titles, at nominal prices. Through the northern coast counties, and on into Oregon and Washington Territory immense tracts of unoccupied Government lands are still open to whoever chooses to occupy them, but through the central part of the State the ranges are very scarce and largely overstocked.

The great chain of mountains forming the eastern wall of the State, it is thought by many, will be found most desirable for sheep walks; but owing to the great fall of snow to which they are subject it is doubtful if they will answer for anything more than summer pasturage, and for this they will serve a most useful purpose.

The advantages presented to wool growers in California may be briefly summed up as follows: a mild, equable climate eminently favorable to the growth and healthy development of sheep, cheap lands on which to make permanent settlements, or for the present a sufficient amount of unoccupied public lands, with little expense attending the keeping of the flocks.

Let us now look at the character of California wools, and the effect upon them of the existing system of herding. The classifying of wool for purposes of manufacture is based mainly on the relative coarseness or fineness of the fibre, the distinctions in this respect determining what is generally called its "quality," but it should be understood that there are other peculiarities affecting its value even more than the relative size of its fibre; among the most important of these are length of staple, uniform strength of the fibre throughout its entire length, softness, lustre, and freedom from grease and dirt.

In all these respects which generally determine the value of any given parcel of wool, our California product is very low in the scale and must continue so until the whole system is greatly modified or radically changed.

The pernicious practice of fall-shearing effectually prevents the production of a staple of desirable length, and were it not for another defect, to which we shall soon allude, would be utterly objectionable.

The general character of the fall clip is bad; the wool is almost always extremely short, generally very tender, and always dry and harsh. It possesses none of the peculiar oil on which the "life" of the wool depends, and is usually so light as to blow away from before the cards, and can only be worked by mixing in small proportion with spring wool. A small proportion of the fall clip of lambs' wool is less open to objection, but even this carries a harshness of fibre that makes it quite undesirable.

Intrinsically, the fall wool is worth about thirty-three per cent. less than the spring clip, and beyond this, it gives dealers a ground for objection against all California wool, thus indirectly prejudicing the entire product.

But even were the fleece kept entire through the year, though it might meet the requirement as to length of staple, it would generally fail in respect to strength, and measurably in respect to all other requisites. It is well known that wool is composed of the same elements that go to make up the bone, and blood, and fibre of the sheep. Hence the fact of common observation that sheep kept in good condition always give the heaviest fleeces. We quote the remarks of a writer on this subject whose name is unknown to us, but whose views are well expressed and directly to the point we wish to develop:

"Wool, nature's provision for protecting the body of the animal in winter, makes a large draft upon the food of the sheep; and as sheep have not the skill or power to elaborate good wool from empty racks, unsuitable feed, or the East wind, the necessity of good feed and of sufficient quantity thereof will be readily acknowledged. In order to make healthful muscle and good wool, the constituents must be provided for the flock at all seasons of the year. The wool is supposed to contain the chief constituents of the body. It consists of phosphates, sulphates, and chlorides, salts forming the skeleton of the body, and presents upon analysis a great similarity to the composition of bone; it also combines a fatty matter corresponding to other animal fats, also a composition identical with flesh or muscle.

These facts, revealed by chemistry, seem to enforce the importance of understanding the art of feeding sheep whether wool or mutton, or both be the end in view, as both require the presence of the same elements in the feed.

"Hence, as liberal feeding promotes the growth and fattening of the body, so also it is favorable to the growth of the wool. The quality of the wool may always be taken as a sure indication of the condition of the animal producing it. Its softness indicates a thriving condition of the sheep bearing it, and to this is attributed the presence of the yolk, an oily substance having a powerful influence upon both the growth and softness of the wool. Where the yolk is deficient, wool is always more or less harsh and crisp. A deficiency of this in wool after it is grown impairs its quality, and whether attributable to inadequate feed or disease, causes the animal to lose its wool and is indubitable evidence of an ill-conditioned sheep."

It is also well known that an insufficient supply of food by restraining the secretions, checks, or for the time suspends the growth of the fibre.

In California, where all the herbage is of annual growth, springing from the seed and passing through a rapid growth, to stand under our rainless summer skies for months a dry feed, but almost as nutritious as well-cured hay until the early winter rains wash out its nutritive elements, though sheep may live upon the native ranges throughout the year, they cannot be kept in uniform thriving condition; and whenever an extraordinary season occurs, when either by excessive rains, or by unusual dryness the growth of herbage is retarded, great suffering and loss are sure to follow. With the exception of a few localities, where the feed is abundant at all seasons and the sheep always in good order, we find the flocks thriving through the spring and early part of the summer, gradually falling off through the autumn months, generally very poor through the early months of winter—the very period when they most need to be kept up in condition—and after the new grasses begin to grow, gaining very rapidly until again fat. The result of these alternations is most remarkably indicated in the fibre of the wool. During the summer months, though the sheep maintain a fair degree of flesh, the dry feed and frequent short supply of water are not favorable to the growth of wool, and the fibre pushed out under these unfavorable conditions is lacking in yolk, except on the lambs, with which the supply of milk drawn from the mothers replaces to some extent the green and succulent grasses and permits a somewhat more favorable growth. Through the fall and winter months, as the feed becomes more scanty and of poorer quality, the wool ceases to grow, and becomes very dry, harsh, and wiry; when the improved feed begins to make its mark on the condition of the sheep, the wool starts out with great vigor and rapid growth, often presenting in the fleece a top and bottom growth of entirely different character, and always presenting a point of demarkation at which a very gentle tension will break the fibre as evenly as if divided by a pair of shears.

Many samples of wool from the lower portion of the State, and some from the coast and upper counties last spring showed this defect in a most marked degree, and though having a fair amount of yolk were so tender throughout the entire length of the staple as greatly to impair their value.

From this cause it will be impossible to grow in California, under the present system, a staple that will be classed with strong wools, or to cultivate with any success those much desired and highly marketable styles called combing wools.

for which the chief requisites are, sufficient length, perfect uniformity, and even strength.

In this alternation of feeding, from a good and abundant supply to a poor and scanty allowance is also involved the production of those qualities of softness and lustre so greatly desired.

We have remarked that our climate is finely adapted to sheep and that as a general thing they show no deterioration in size of carcass or in weight and quality of the fleece, indeed we have evidence in many instances of a marked increase in the size of the sheep and weight of fleece, yet there is a wide difference in the character and value of wools of equal fineness from different parts of the State, arising probably from some unexplained climatic influence, or from the character of the soil over which the sheep range. For example, the wool from the upper Sacramento valley possesses the softness and life which adapt it to purposes of manufacture in a much greater degree than that from the San Joaquin or the southern coast counties. From the latter section the wool is generally dry, brittle, harsh, and wiry. The difference may be better appreciated from the fact that parcels of wool of extra softness will work up in the factory from one to two grades above its absolute fineness, while these wiry wools commonly work as far below their grades. In the former localities the range is gravelly and free from dust, the grasses light but sweet and highly nutritious; in the latter the soil more or less alkaline and the grasses coarser and rougher. Indeed in some localities so much alkaline dust adheres to the wool that manufacturers inform us they can scour it thoroughly without the use of soda ash or soap, the wool really cleansing itself sufficiently.

In the preparation of wool for market our wool-growers have made great improvement within the past few years, yet there are annually many and well founded complaints on this ground. Care in the processes of shearing, tying, and sacking is all that is required to present wools favorably, and policy as well as common honesty requires the removal of all foreign matter, such as tag-locks, corral dirt, sticks, sand, and stones.

The grease or natural oil of the wool cannot so well be avoided, because there are few places where the sheep could be properly washed before shearing; but it is here worthy of note that the tendency of our wools is to dryness and light supply of oil, so that with the exception of the high-bred merinos and merino crosses the average shrinkage of California unwashed wool, in the process of scouring for the factory, is from five to ten per cent. less than the shrinkage of Eastern washed wools. In our high-bred merino flocks this shrinkage runs very high, from fifty to seventy-five per cent. and reduces their comparative value very materially.

Upon the views here expressed arises the question, Can these disadvantages be so overcome as to enable California wools to compete with those of the Western States—Michigan and Ohio for example? We reply with confidence that they can just so soon as our flock masters come to exercise the same discrimination in the choice of rams, the same careful attention to their business, the same abundant provision of food for their flocks, and bring themselves to a complete discontinuance of the practice of fall shearing. This course will give

to their wools all those desirable characteristics in which they are now deficient, and with proper care in putting up the fleeces, they will show to almost as good advantage as the wools from the States mentioned, with which they cannot now be compared as all.

Where the native grasses are now the entire dependence, some further provision should be made for the fall months and especially for the period intervening between the killing out of the old grass and the springing up of the new. This provision will vary with the character of the range, but should be sufficient to keep the flock in fair condition and in good strength throughout the year. In our own experience, an expenditure of about twenty-five cents per head carried our own flock safely through the severe winter of 1861 and 1862, on an extremely light range and with very little shelter from the storms.

Where the ranges are thinned out by overstocking and the grasses—as in many localities is now the case—are supplanted with weeds the stock should be removed to more remote localities, and in doing this but little objection should be made to the increased cost of getting the wool to market, as any such increased expense would prove to be but an insignificant item, and it should be borne in mind that relatively to its value there is no article of produce so cheaply transported as wool.

This course of alternate feeding out the range and removal to new pasture will answer partially for years to come; but as before remarked, the owners of large tracts of land, and the regular farmers must ultimately control the wool product of this coast. To the latter the possession of such numbers of sheep as can be kept well on the refuse of these farms will prove an immense advantage, directly by the yearly return of wool, and by the cheap and convenient supply for the table, and indirectly by the benefit to the soil.

A fine illustration of this indirect benefit has recently occurred to our notice on the farm belonging to Mr. Robert Blacon in Alameda County. On this farm a lot that had been used for a year as a pasture for about sixty head of sheep, was this year put into grain, the yield was a hundred per cent. greater than from other portions of his farm, or than that from any of the farms adjacent; this increase could only be attributed to the sheep and alone paid much more than the cost of their keeping.

As to the most profitable breeds of sheep we can present but a few casual remarks. Of the distinctively wool-producing breeds, the French and Spanish, or Vermont Merinos are unquestionably the only profitable ones; both have their earnest advocates, but between the best selections of the two breeds there appears to be but little difference. Both thrive well, are equally healthy, and produce fleeces of nearly equal market value. The French merinos are larger boned, heavier carcass, and heavier fleece than the Spanish; the latter have a more uniform and somewhat finer fleece. Our opinion is, that a judicious interbreeding of these varieties will produce the best and most profitable sheep for our California wool growers.

Of the mutton-producing varieties the South Downs, Leicester, and Cotswold stand at the head of the list. The first of these produces a medium wool quite marketable but generally light and dry; it is an easy keeper, maintaining its

condition on very light range, and certainly affords a very fine supply for the table. The others are larger and heavier sheep, and under favorable circumstances produce the valuable combing wools, but to do so require a large supply of green, succulent food, and a pasture entirely free from burrs or seeds, either of which destroy its special value.

Parties owning land adjacent to the reclaimed tules, and convenient to market, could use these varieties with great profit, as the fleece would attain in such localities a favorable growth, and the portion of the flock designed for the butcher would always keep in good order and command high prices. Apart from the few so situated as to derive a profit from these classes of sheep, the merinos of the class named above must become the prevailing style; and wool of the grade of half or three-quarter blood—if the original stock is even passably good—will be found the most profitable to raise, as it is sufficiently fine for the ordinary market, and while carrying oil enough to give it desirable working qualities, is not subject to so great waste as the higher grades.

Of the localities best adapted to the growth of wools, we note a gradual improvement as you go northward. For example, the wools from the lower counties in this State, apart from the almost universal presence of burrs, are greatly deficient in strength, pliability, and softness.

From a careful observation of the product of the State, under very favorable conditions for attaining correct estimates, we should place the wool from various counties in the following order, going from the lower to the higher:

San Diego, Los Angeles, and Santa Barbara—wools almost all dry and tender, and always burry. San Bernardino, Tulare, Fresno, Monterey, and San Luis Obispo—wools generally in better condition but still harsh and often tender, a large part burry; a great deal of finely improved stock in the last two counties, and much of the wool is of fine quality. Merced, Stanislaus, San Joaquin, Santa Clara, Alameda, and Contra Costa counties show a regular though gradual improvement. Mariposa, Tuolumne, and Calaveras generally produce very pretty and clean wools. Solano, Yolo, Colusa, Sacramento, Amador, El Dorado, Placer, Sutter, Yuba, Butte, Mendocino, Lake, Sonoma, and Tehama rank in about the order stated, the wool from some of them being only second to that from Oregon and Washington Territory. Marin and Napa counties also produce quite good wools, but have some clover burr which injures their sale materially. Of all the wools grown on the Pacific Coast those from Oregon and Washington Territory are by far the best; they are always of good length, very strong, bright, soft, and entirely free from dust or burrs. These facts indicate that the Northern portion of our coast is best adapted to wool growing; their climate is somewhat cooler, the lands are well watered, the grasses are green and growing through the greater portion of the year, and they are not so fully stocked nor so liable to periodical failures of feed as the Southern portions of this State.

We have indicated what in our opinion will be found the most profitable style of sheep to raise for a term of years, viz.: those yielding a large fleece of medium and fine medium wool, but in closing this paper we desire to refer briefly to the subject of fine wools. Our attention is more strongly called to

this subject by noticing in our English wool circulars repeated remarks on the falling off in the character of Australian wools.

For many years, the German flock masters almost monopolized the production of the finest wools; the greatest care was given to their flocks—breeding, feeding, and rearing them with but the one object, every other point was made secondary to the fineness of the fleece. This course pursued steadily through generations gave at length the perfect Saxon and Silesian merino. Originally springing from the hardy Spanish merino, the same parent stock from which has sprung the well developed, heavy fleeced, and hardy French and Vermont merinos, it was bred down to a weak, bad-formed, and light-fleeced animal, but the point in view was attained, namely, a wool of almost gossamer fineness. After all the care and labor attending the rearing of these flocks, the twelve to twenty ounces of wool they gave could not be raised with profit except it could find a market willing to pay a price corresponding to the cost of production. These sheep were introduced into Australia where, with a mild climate, immense ranges, and convict labor, they soon began to supply the markets with wool almost equaling the German in fineness and at greatly reduced prices, in fact bringing them within a few cents per pound of the medium wools.

This condition of things compelled the German farmers to change their system and breed for heavier fleeces, a process that has been going on for years. Australia has continued to import from these flocks until the effect begins to be made apparent in the diminished supply of these extremely fine wools, and it is not improbable that within ten years fine wools may again command such extreme prices as would justify our wool growers in making material changes, for which, the style of sheep we have recommended will prove an admirable basis.

SAN FRANCISCO, Sept. 26th, 1863.

Tule Lake Home Camp

In the Long Valley area of northwestern Nevada, W. B. Todhunter is said to have first wintered 10,000-12,000 head of cattle on nothing but ryegrass in 1871. This was done for quite a few years in the 70's and 80's. Now the valley shows only scattered ryegrass plants and is predominantly greasewood, rabbitbrush, shadscale, and big sagebrush.

Charles Demick, of Alturas, California, who started buckarooing for Miller and Lux in 1895, in northern Washoe County, stated that these dry ryegrass areas formerly looked like grain fields in the fall of the year. There was also large amounts of rice grass, other bunch grasses, and only scattered areas of big sagebrush.

Invasions: Sagebrush invasions have been very noticeable during the last 50 years. Demick goes on to say that these areas were carefully protected from any summer use by livestock, being used only as winter range for the Miller-Lux herds.

The development of stockwater and the subsequent conversion to summer use on these ranges is what has caused *The sagebrush to invade?* according to Demick.

Other interviews with old time stock men have found concurrence with Demick's opinion. They also agreed with the thought that wildrye grass was the most important plant to be found in the sagebrush-grass type, particularly on the saline-alkali soils. Bluebunch wheatgrass and Indian rice-grass are two grasses that have suffered almost completed extinction in large areas of this type.

Juniper: Along with the noticeable sagebrush encroachment on this type, there are also strong invasions of juniper. This is particularly true in Washoe and Humboldt Counties of northwestern Nevada where old time stockmen vividly describe the type where only scattered juniper formerly was present.

The Ward Bros. established large herds in the Granite mountain country of Washoe County. They sold in 1885 to Fisk and Gerlach and the sale involved the transfer of some 24 recorded brands.

Neighboring California and Oregon cattlemen prominent at this time included Todhunter¹ and Devine who ran some 30,000 head of cattle in Humboldt and Washoe counties, Nevada, and Harney County, Oregon. Pete French of the French-Glenn combine, another Harney County operator, ran some 30,000 head in the same areas of Nevada at about the same time under 25 recorded brands.

¹Todhunter - started the Bare Ranch.

From the Surprise Valley area of California and running under 17 different irons was the Cummins and Murdock whose range was in Washoe and Humboldt counties. One of their brands, the "U" iron, is still used today on the same range by H. J. Powers, former Lt. Governor of California, and the grandson of Hans Murdock.

Sheep Walk. By 1880, that portion of Washoe County in western Nevada south of the 41st parallel was considered one vast sheep walk, with a far greater density of occupation than any other part of the state. The sparsely watered white sage valley areas strongly favored the roving sheepman and his flocks.

Duck
Flat

During the 1880's three prominent sheepmen got their start in western Nevada. They were Patrick Flannigan, Henry Anderson and John G. Taylor.

Flannigan started in 1877 with a small band purchased with money borrowed in Reno. By 1886 he owned lands in the Truckee Meadows and around Pyramid Lake. At the peak of his operation, he owned over 5,000 square miles of range and had 20,000 acres under fence. On these lands located in Washoe County, Nevada, and Modoc and Lassen Counties in California, Flannigan grazed 40,000 head of sheep, 5,000 cattle, and 1,500 head of horses. Flannigan's Smoke Creek Ranch in northern Washoe County was later sold to John and Pete Poco who ran some 30,000 sheep until 1915. The ranch later became a part of the vast Holland Livestock Ranch, one of the few large combination sheep and cattle ranches still

?

Trails. Many thousands of sheep were trailed from California through Nevada to Wyoming, Nebraska, and Montana in the period 1865-1900. The most important trail was the northern trail which went from Red Bluss to Termo, California, then to Duck Lake, Quinn River, Paradise and Goose Creek in Nevada.

In 1884, cattle numbers in the state were estimated by Stockmen at 700,000 head, and sheep numbers at 374,000. It is obvious that only severe damage to the rangelands could occur, as the arid ranges of the state could not possibly sustain themselves under such use.

L. J. Fee of Ft. Bidwell, California, whose family has run livestock on the ranges of northern Washoe County for nearly 100 years feels that the increase in the big sagebrush, the Juniper, and the disappearance of the wildrye may have resulted from this extreme stocking that took place prior to the turn of the century.

Cattle

Settlement of Nevada began shortly after discovery of gold in California. This resulted as the main land route to the gold fields lay down the Humboldt and up the Truckee Rivers, and needed stations and settlements sprang up at convenient points on the Humboldt, and in the valleys near the Sierras. The transcontinental traffic of the time brought with it the first animals that started the State's range livestock industry.

Early cattle in northwestern Nevada

In 1850, a party of Mormons started from Salt Lake City for California. They arrived in Carson Valley too early to cross the Sierra Nevadas, and while staying there, prospected for, and found gold. They founded Mormon Station (later Genoa) in June of 1850, and that fall, sold beef to the hungry emigrants in the area for 75¢ lb.

In 1858, Dorsey, Notlinger, and Drexel brought 1,500 head of beef cattle to Carson Valley and Truckee Meadows from California. They wintered them there, and then crossed the Sierra back to California with fattened animals that were quickly snapped up at the California mining camps. By 1859 the opening of the Comstock mines at nearby Virginia City created a stronger demand for the beef, and soon cattle were coming in from all surrounding states for sale at high prices to the Comstock miners.

Cattle

At the same time, cattle from California were first wintered on the ranges along the Humboldt River and also at Pyramid Lake in western Nevada.

During the drouth of 1864 in California many herds were driven into Nevada to crop the scattered bunchgrasses. Jack Sutherland, for example, whose ranch was in Tulare County, California, drove in 20,000 head and safely summered them in the northern part of the state. Since western Nevada was already occupied, many of these newcomers pushed on to the east, invading Churchill County, portions of the Humboldt Valley, Reese River, and Big Smoky Valleys in central Nevada.

By 1869, Nevada's cattle industry had begun in earnest with the arrival of thousands of longhorns trailed up from Texas. These Texas cattle were bought in Texas for \$5-7 per head, and sold for \$18-20 straight off the trail, when they reached Nevada.

Livestock kept increasing until by 1874 the ranges were quite crowded, and in many sections were already deteriorating from overstocking.

Carson Valley. In the severe winter of 1879-80, one third of the cattle population was lost.

Losses: The ranges at the beginning of this winter were more heavily stocked than ever before with 225,000 cattle and 216,000 sheep and the grasses and browse had been injured by the summer drought. Cattle losses actually ranged from 25% in Humboldt County to as high as 50% in the Reese River county in central Nevada. The winter of 1889-90 was among the worst the state has ever seen and this almost put the state completely out of the cattle business.

They Came For Range . . .

And Left A Heritage

By BEN HAZELTINE
CHARLES SAULISBERRY
HARRY TAYLOR

Sheep

The beginning of Nevada's sheep industry is just as indefinite as the early cattle industry. Probably the first sheep to come into Nevada were the ones brought for food by Captain Sitgreaves when he surveyed the 35th parallel in 1851.

Soon after, many sheep were trailed across the state from the midwest and southwest to take advantage of the markets created by the gold strikes in California. "Uncle Dick" Wooton, and Kit Carson, the scout and Indian fighter were among the first to trail sheep from New Mexico through Nevada to California. In 1852, Wooton purchased 9,000 head of sheep in Taos, N. M. He trailed these sheep to Sacramento, Calif. by way of the Humboldt and Carson Rivers. After wintering near Elk Grove, Calif., he sold 8,900 head for \$50,000. This is considered a record cross country survival.

Kit Carson: In 1853, Kit Carson trailed 6,500 sheep from Santa Fe, New Mexico through Nevada to Sacramento. After the Mexican War, he trailed 13,000 which he sold in San Francisco for \$5.50 per head.

First permanent flock of breeding sheep was brought to Genoa in Carson Valley from California in 1851 by C. D. Jones. Sheep from California entered Smith and Mason Valleys in Western Nevada to winter in 1859.

The first sizeable breeding herd of 3,200 head came into the Carson Valley and Truckee Meadows in 1862 from Illinois. The following year, 3,000 head of Mexican Chihuahua sheep came in from California.

From the early 60's to 70's most of the sheep brought into Nevada were wethers which came from California, Oregon and Utah for fattening. These were sold as 3 and 4 year old wethers at the many mining communities in Nevada and California.

Early sheepman. Dan Wheeler of Reno was one of the first prominent sheepman in western Nevada. He drove bull teams to Virginia City in the early 60's, but then switched to the sheep business. According to Mack Wheeler, son of Dan Wheeler, his father would stop and fish in the stream that came down Gieger Canyon on his trips to Virginia City. In those days this area supported a fine yellow pine forest. This forest was completely cut for use in the mines, and in building Virginia City and now this creek is hardly noticeable today. Wheeler would walk to Lakeview, Ore., and buy wethers. These he would trail east to the Steens Mountains then south

ABOUT THE AUTHORS

Ben Hazeltine, Charles Saulisberry, and Harry Taylor; Superintendent, Sheldon-Hart Mountain Antelope Refuges, U. S. Fish & Wildlife Service, Lakeview, Ore.; Work Unit Conservationist, SCS, Cedarville, Calif.; and District Ranger, USFS, Cedarville, Calif., respectively.

to Virginia City, selling the fat wethers to the miners.

In 1867, Wheeler entered the sheep raising business in earnest by importing Shropshire and French Merinos, and some Cotswold. A very good cross for the Wheelers was Cotswold with Merino Bucks. His range was the Limbo Mountain area of Washoe County, Humboldt House area and the Jackson Mountains country of Humboldt County. Dan Wheeler was also instrumental in constructing the Wheeler Ditch from the Truckee River and developing the south Truckee Meadows near Reno in western Nevada.

Mack Wheeler states that range conditions have changed considerably since the days of his father. The biggest change has been in the decrease of white sage. There has also been an increase in sagebrush. Meadows which formerly supported lush growth of grasses have no grass at all.

Over Grazing. These conditions according to Wheeler, have resulted from too much grazing and from the drier conditions. In the early days they felt there had to be at least 20 ft. of snow on Donner Summit to insure a good growing year. Apparently this situation has not occurred for some time. Also, spring and fall rains do not occur as they formerly did.

Other prominent sheepmen in western Nevada in the 70's were George W. Mapes, David Ridenour, and the Ward Bros. In 1870 M. E. and A. M. Ward first drove 4,000 sheep to Churchill and Lander counties and three years later sold 10,000 head for \$4.00 per head. Their Granite Ranch in Washoe County was later purchased by Fisk and Gerlach. Wards then bought the Bar Ranch in Lassen County of California and the Todhunter interests in northwestern Nevada. They are reported to have paid \$150,000 for the ranch and 6,000 cattle. They also continued in the sheep business and are reported to have sold some 15,000 head of sheep in 1903.

The Mapes family is represented in Nevada today by a prominent Reno hotel that bears the family name.

California Sheep. In the seventies, many sheep came from the Sacramento and San Joaquin Valleys of California and from southern Oregon to Washoe and Humboldt counties for summer grazing, and for later sale in the mining areas of California and Nevada. As the central valleys became settled, sheep trailing became restricted, and then stopped completely in 1905 when the Forest Service denied sheepmen permission to cross their lands.

The first sheepman of central Nevada also became active in the 70's. S. O. Wells drove his flocks into Lander and Eureka counties where he became prominent in the sheep and cattle business for many years.

The sheep business also began to develop in the eastern part of the state in the 70's. In White Pine County, settlers running both cattle and horses were reported to have caused extreme depletion to the ranges. However, sheepmen could still make a living. James Sampson, the Bew Brothers, Yelland, Keegan and the Doutre Bros. were among the first to run small sheep bands in this area. There were several large cattle ranches around Ely at this time, among them the Halstead ranch near Hamilton and Cleveland ranch near Ely. In 1882, A. L. Parker trailed the first large drive of sheep amounting to several thousand head from Utah and purchased the Halstead ranch as a pasture for his flocks. Since he had entered cattle country, Parker expected trouble with Cleveland, however, the latter presented no problem. The Cleveland ranch was later purchased by Adams-McGill Co. of White Pine County who used it in their 40,000 head sheep and 5,000 head cattle operation in 1900's.

Sheep Walk. By 1880, that portion of Washoe County in western Nevada south of the 41st parallel was considered one vast sheep walk, with a far greater density of occupation than any other part of the state. The sparsely watered white sage valley areas strongly favored the roving sheepman and his flocks.

During the 1880's three prominent sheepmen got their start in western Nevada. They were Patrick Flannigan, Henry Anderson and John G. Taylor.

Flannigan started in 1877 with a small band purchased with money borrowed in Reno. By 1886 he owned lands in the Truckee Meadows and around Pyramid Lake. At the peak of his operation, he owned over 5,000 square miles of range and had 20,000 acres under fence. On these lands located in Washoe County, Nev., and Modoc and Lassen Counties in

Salt Desert Shrub type

Within this type, the native grasses and winter brows feed was comparatively luxuriant when the valleys were settled up in the 1860's and 1870's, and the type was considered fine winter range for all classes of livestock. However, when the sheepman found out that sheep could subsist with only snow for moisture, this type became much more heavily used in winter by sheep.

Thousands of sheep wintered on these ranges year after year until depletion became so extreme in some areas that they were forced to move away. By 1880, with stock crowding these ranges, the winter-fat, budsage, rice-grass, and ryegrasses gradually failed. In many localities, where the grazing was so heavy as to prevent the grasses from maturing, these better grasses became wholly extinct.

Cahill, Flannigan, Graham, and others. Flannigan's Smoke Creek Ranch in northern Washoe County was later sold to John and Pete Poco who ran some 30,000 sheep until 1915. The ranch later became a part of the vast Holland Livestock Ranch, one of the few large combination sheep and cattle ranches still remaining in the state.

Herders. Henry Anderson was a Dane who started in the sheep business in 1886. Before many years, he was running thousands of sheep in the Sierras north of Truckee in California, as well as in Washoe, Lander, Elko, and Eureka counties of Nevada, and in Oregon, Idaho and Montana. He imported Swedes and Danes as herders, and was noted for his courage as an operator, taking his losses in as perfect stride as his profits.

John G. Taylor, one time called "King of the Sheepmen" was a Scotch sheep shearer who walked into Nevada from California in the early 1880's. After shearing and herding sheep for several flockmasters, Taylor became an operator himself with a helping hand from Dan Wheeler.

As a herder, he braved the rigors of an entire winter as the lonely herder of 10,000 sheep. He suffered severe losses in the winter of '89-'90 when temperatures dropped to 60° below zero. Yet he carried on, and at the peak of his operations after World War I, owned some 60,000 head of sheep and 10,000 head of cattle. His grazing lands stretched from Lovelock to Elko, and on into Idaho. It has been said that Taylor loved mules and Basques, but hated fat dogs and buckeroos. In spite of this fact, his cow boss built Taylor's cow herd from 800 to 10,000 head.

Until 1891 sheep were not too prominent in the northern part of the state. Apparently cattlemen were making full use of this area until the bad winter of 89-90. Sheep first entered the Quinn River country of Humboldt County in 1871 and by 1880 two of the largest flocks in the state numbering 21,000 head were grazed by two owners in this area.

Herders Origin. Most of the early sheepherders were Irish and "Red Bluff" Missourians. Portuguese herders from California were the next in any appreciable number, and were followed by Frenchmen, then French and Spanish Basque.

As mentioned previously Henry Anderson employed Swedes and Danes, but probably the most unusual were the Chinese herders employed by Thomas Nelson to herd his 9,000 sheep near Stone House in Humboldt County in 1882.

Shortly after 1890, the Basques began to spread from southern California into Arizona, Nevada, and Oregon. The drouth of 1896 caused many of them to scatter through the Reno and Carson Sink area, out to the Steens Mountains, and as far east as Elko. Here they found some pioneer Basque families already established. Among these were the Garats of Whiterock and Tuscarora, and the Al-

area. The Altubes were said to have started mowing their hay in June with 80 mowers, and never stopped till frost. The Garat brand, the "YP", recorded in Nevada in 1872 is believed to be the third oldest iron in active and continuous use in the United States.

Early Basques. One of these early Basques who ran sheep in Elko County in 1891 was Frank Yparraguirre of Reno. Yparraguirre's home place was located at Sweetwater on the East Walker River in Lyon County, Nev. In addition to running sheep around Bodie and north of Sonora Pass in California, his sheep traveled into Elko County, and ranged through Jarbidge, Deeth Marys River, the Bruneau Basin, and on into the Snake River country of Idaho. The 3 and 4-year-old wethers were trailed to San Francisco by way of Sonora Pass, Yosemite, and down the San Joaquin River. He also trailed through Mono County to Fresno. His flocks totaled about 22,000 sheep. An interview with this 96 year-old sheepman in 1960 revealed the opinion "that the sheep business in the old days was a good business but it got too crowded. Everybody tried to make money with sheep and that's what hurt it."

Healy and Patterson were large operators from Idaho and Wyoming who ran between 30-40,000 ewes in the Mountain City Area of Elko County in 1896.

W. T. Jenkins started running sheep in the Battle Mt. area of Humboldt County in the 80's and by 1891 he was known as being among the most extensive wool and sheep growers in Nevada, with flocks numbering some 25,000 head. His ranges extended over Humboldt, Lander and Elko counties. This company is still one of the most prominent sheep outfits in the state today.

Moffatt Operation. William Moffatt's Union Land and Cattle Co. also ran some 40,000 sheep in the early part of this century. Moffatt is more noted for his cattle operations, but it was his extensive dealings in the sheep and wool business that brought about the collapse of his Union Land and Cattle Co. in 1923.

The Dangberg family of Carson Valley in Douglas County also went into the early sheep business and are still active in it today along with their cattle operations.

Tom Dufferena and Bill Scott of Denio, Nev. ran extensive flocks in Humboldt and Washoe County areas shortly after World War I. They were probably the last of the big sheep operators in northwestern Nevada.

The Colconda Cattle Co. of Humboldt County was active about 1900 and ran sheep numbering over 20,000 along with 8,000 head of cattle.

Trails. Many thousands of sheep were trailed from California through Nevada to Wyoming, Nebraska, and Montana in the period 1865-1900. The most important trail was the northern trail which went from Red Bluff to Terro, Calif. then to Duck Lake, Quinn River, Paradise and Goose Creek in Nevada. John and Thomas Keough, prominent trail-

from California to Wyoming by the route in 1882. The southern trail started at Bakersfield, Calif. then up Owens Valley to Lida, Tonapah, Tybo, up the Ruby Valley to Wells.

It has been estimated that 2-3 million sheep were trailed across Nevada to the east in this great trail period. Extreme damage was done to the winter ranges of Elko County by these trailing bands, particularly during the 1878-80 period.

In 1884, cattle numbers in the state were estimated by the Stockmen at 700,000 head, and sheep numbers at 374,000. It is obvious that only severe damage to the rangelands could occur, as the arid ranges of the state could not possibly sustain themselves under such use.

L. J. Fee of Ft. Bidwell, Calif. whose family has run livestock on the ranges of northern Washoe County for nearly 100 years feels that the increase in the big sagebrush, the Juniper, and the disappearance of the wildrye may have resulted from this extreme stocking that took place prior to the turn of the century.

Severe Winter. A moderately severe winter in 1885 followed by the drouth years of '87-89 reduced cattle numbers down to about 400,000 but sheep were up to some 402,000 head prior to the 1889-90 disaster. Cattle numbers were back up to 281,000 by 1891 and sheep to 414,000. Sheep numbers topped a million head by 1907, with cattle being only up to 387,000. Sheep then remained constant, but cattle numbers increased steadily until the 1931 crash when both dropped sharply. Cattle then continued to increase but sheep numbers have declined steadily, until by 1959 there were reported but 311,000 sheep and some 522,000 cattle in the state. This, of course, is a far cry from the peak numbers reported by the stockmen in the '70's and '80's. It must be recognized, of course, that other factors aside from poor condition ranges have contributed to this reduction in stock numbers.

Within the last 50 years steps have been taken by Federal, State, and private interests to get the rangelands back into top production. At the request of the people, the first National Forest was established in central Nevada in 1908 to control the activities of the "tramp" sheep outfits from neighboring states.

Under Forest Service administration, these forests, the Humboldt, and Toiyabe, now cover some five million acres of high elevation grazing lands in the state. On range improvement alone, the USFS has spent a little over \$1½ million during the 52 years that they have been in Nevada.

The Taylor Grazing Act of 1934 created the Grazing Service, which later was incorporated into the Bureau of Land Management, which administers some 56,000,000 acres of public domain lands in the state. Within the six grazing Districts of the state, about \$3½ million has been spent on range improvements during the last 26 years.

The day of the open range still exists in Nevada, only the meaning has changed.

Horses

RANGE HISTORY NEVADA HAZELTINE ETC

THE HORSE is considered to be the first domesticated grazing animal in Nevada. These were descendants of animals brought to Mexico and the southwest by the Spaniards in the 16th and 17th centuries. Few animals, wild or tame, have proved so well adapted to the ranges of the state as the horse. As the years passed, however, the wild horse came to be held in quite low regard by the state's stockmen.

In 1900, Nevada passed a law allowing unbranded horses to be killed and 15,000 head were killed in the following two years. In 1910, an estimated 100,000 horses still ranged throughout the state. In 1950, 12,000 head still roamed the range after 4,000 had been killed in the previous two years. Today, the wild mustang has all but disappeared.

Griffiths ?