

Half-Century Changes on Northern Nevada Ranges

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THIS report is based upon surveys made in 1902 and in 1952 on the same livestock ranges in northern Eureka County and western Elko County, Nevada.

The purpose of the first survey by Dr. P. B. Kennedy, Botanist of the Nevada Agricultural Experiment Station, was to select a typical portion of northern Nevada and make a detailed study

"of the conditions, character of the plants, effects of grazing and amounts and kinds of valuable forage for sheep on the summer range."

The purpose of the recent survey was to determine changes in range condition after 50 years of grazing. Comparisons were drawn between the surveys of the same range area by referring to P. B. Kennedy's report, published by the Nevada Agricultural Experiment Station in Bulletin 55 (Kennedy, 1903), as a field guide, and searching out and studying the route of the earlier survey. The descriptions given by Kennedy, though not quantitative, were accurate enough to make re-location of trails, streams, springs,

ponds and ranches possible in nearly all instances. The area surveyed lies between 40°35' and 41°12' N. latitude and between 116°5' and 116°30' W. longitude. It is in Ranges 49-52E, Townships 31-38N.

Within this area, the Tuscarora Mountains rise about 2500 feet above Boulder Valley on the west

and Maggie Creek Valley on the east. The valley floors are roughly 5000 feet above sea level. The 6000 foot contour may be said roughly to divide the foothill spring ranges from the mountain summer ranges.

The soils of the foothills are formed from old alluvial material on benches, terraces and elevated fans. Slopes are mostly from 10 to 30 percent. The soils are brownish-grey, of medium texture and erosion resistant. They have suffered moderate sheet erosion and a few small gullies are present.

Low sagebrush (*Artemisia nova*) and grass, chiefly Sandberg bluegrass (*Poa secunda*), provide the general aspect.

The mountain soils have developed from fine-grained rocks. They are brownish, of medium texture and shallow. Slopes of 30-60 percent are common. Low sagebrush and grass form the main type here, also (Bennett, 1939).

The precipitation during the spring and summer of 1902 was nearly normal in amount at Beowawe. Precipitation for the period, January through August, 1902, was 4.10 inches compared with the normal of 4.26 inches. No comparable estimates from Beowawe are available for 1952, but at Elko, the U. S. Weather Bureau record shows 5.92 inches for the eight months, the normal being 6.65 inches. The wettest and driest months at Beowawe are May (.75 inch) and August (.24 inch). The average frost-free period is 117 days. Tem-

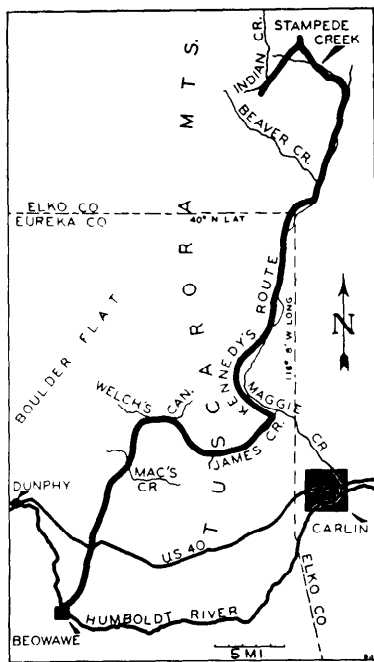


FIGURE 1. Route followed in 1902 and 1952 in study of livestock ranges in north-eastern Nevada.

¹ Deceased.

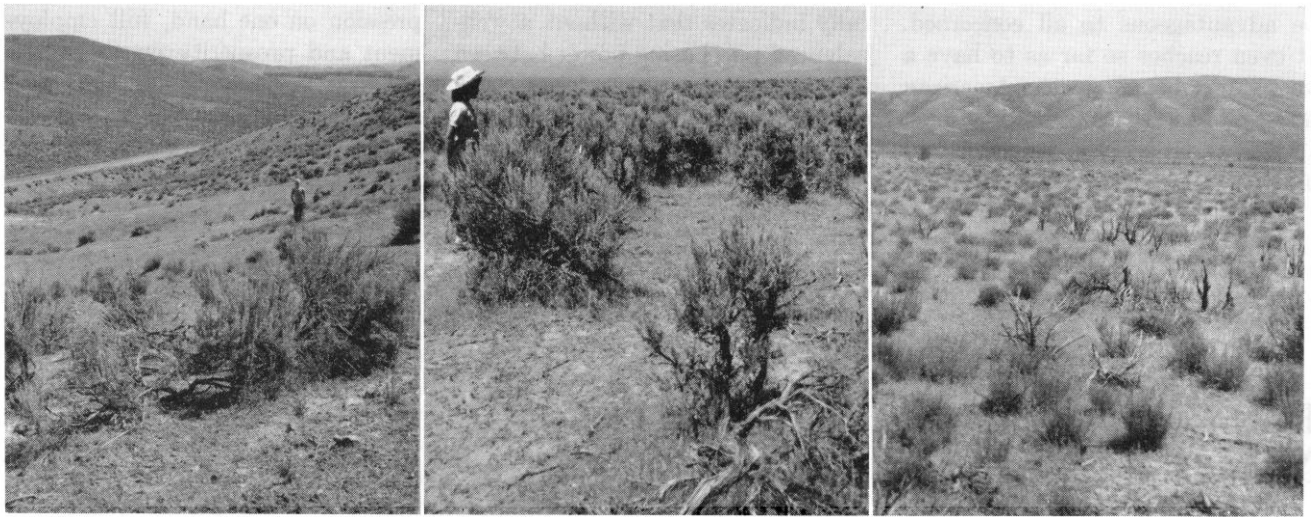


FIGURE 2. *Left.* Foothill slopes, north of Horseshoe Ranch at 5,200 ft. elevation. Since 1902, fourwing saltbrush has disappeared, while cheatgrass, peppergrass and halogeton have invaded. Relicts of winterfat, shadscale and budsage remain. *Center.* On this sagebrush-cheatgrass flat in the southeast corner of Boulder Valley, fourwing saltbrush was found in 1902. Elevation, 5,000 ft. *Right.* A burn in the sagebrush type two miles south of Coyote Camp on Maggie Creek. Ground cover density was twice as high on the burned as on the unburned area and the vegetation consists principally of cheatgrass and little rabbitbrush.

peratures vary between -42°F. and 107°F. , the July mean being 72°F.

In 1902, the Elko County ranges were used mostly by cattle. Kennedy noted that sheep had been on the study area for only three years. The upper Beaver and Stampede Creek summer ranges have been grazed by both cattle and sheep of the Jenkins outfit since 1913. These ranges are 6000 to 7500 feet in elevation.

In order to minimize possibilities of misinterpretation of the wholly qualitative descriptions of the 1903 bulletin, which has been out of print many years, it seems best to make free use of direct quotations.

"Leaving the ranch ... we pass through a mile of exceedingly tall sagebrush (*Artemisia tridentata*) some of it eight or more feet high, and then out into an open alkali stretch composed largely of greasewood (*Sarcobatus vermiculatus*)."

The big sagebrush has been cleared, the land cropped and abandoned to weeds, except for a small alfalfa field. The greasewood remains as before. The elevation at the Horseshoe ranch is about 5000 feet.

"Ascending the foothills on either side of the road may be seen shadscale (*Atriplex canescens*), budsage (*A. spinescens*), spiny saltbrush, (*Atriplex confertifolia*), hopsage (*Grayia spinosa*), little rabbit brush (*Chrysothamnus viscidiflorus*), small patches of whitesage (*Eurotia lanata*), and scrubby bushes of common black sage (*Artemisia tridentata*). All of these show signs of overgrazing and trampling."

Traces of whitesage (winterfat, *Eurotia lanata*), spiny saltbrush (shadscale, *A. confertifolia*) and budsage are still present, but barely alive. No shadscale (fourwing saltbrush, *A. canescens*) could be found. Of an estimated vegetal cover of $1\frac{1}{2}$ percent, half is big sagebrush, apparently an increase over the "scrubby bushes" at the end of Kennedy's list above. Apparently aided by fire, cheatgrass (*Bromus tectorum*) now makes up a third of the cover, while peppergrass (*Lepidium perfoliatum*) and halogeton (*Halogeton glomeratus*) have helped to clothe the denuded spaces (Figure 2, *left*). Despite a well-developed erosion pavement, rilling is moderately active. Although Kennedy

appears to have noted the soil movement, he did not mention any annuals at this location.

"This condition (overgrazing and trampling) prevails until we reach the summit, a distance of about eight miles.... Descending the other side, we come to a long dry flat composed mostly of spiny saltbrush and the common black sage." (*Artemisia tridentata*). "Passing along the eastern border of the valley for some eight or nine miles, we came to a cut... into Welch's canyon."

The long dry flat (valley) mentioned is Boulder Valley. A search back and forth from the summit to Welch's Canyon revealed no spiny saltbush, nor could the rider at Mac's Creek recall any shadscale on the east side of the valley. The cover is about 57 percent cheatgrass and 40 percent big sagebrush (Figure 2, *center*). Recent reports (Tisdale and Zappettini, 1953) suggest that insects, rather than grazing, may have destroyed shadscale more than previously suspected. In 1952 and 1953, insect larvae attacked big sagebrush and are destroying it throughout north-

ern Nevada, a condition not mentioned by Kennedy.

The 1902 survey report concerning Welch's Canyon states:

"Here are always to be seen a number of range cattle... which come to a creek in the canyon to water. In the surrounding mountains, many hundreds of cattle and horses are seen feeding on a luxuriant growth of grasses..."

On the ridge south of Welch's Canyon, climax grasses make up 10 percent, cheatgrass 35 percent and common black or big sagebrush, 40 percent of the density. Desirable weeds comprise 1 to 2 percent.

Ninety-seven percent of the density consists of big sagebrush and cheatgrass on a low ridge north of Mac's Creek, with perennial grasses only 2 percent, and entirely under the brush. Still, thousands of cattle are grazed here.

"Reaching the summit... we descend into a flat with a deeply cut creek in it..." "The vegetation surrounding the creek, is, for the most part, rabbitbrush and saltgrass (*Distichlis stricta*). There are always several hundred cattle on this creek..."

In July 1952, the road to the head of Welch's Creek was washed out in several places. In the three miles traversed, however, what had once been several small wet meadows were observed taken over by big sagebrush aided by a block of salt, a few cattle and the deepening stream channels. Grazing and trampling have weakened the grass, and the lowered water table has encouraged brush invasion.

The deeply cut creek on the east side of the range is James Creek, now fenced as a summer cattle and horse pasture. A small ranch was established here before 1930, cutting 75-80 tons of alfalfa on the flat which is now covered with cheatgrass, big sagebrush and Great Basin wildrye (*Elymus cinereus*). Kennedy referred to this as giant

rye grass. The channel has deepened so that most of the old willows and aspen have died and toppled in, indicating continued widening, as well. No saltgrass or rabbitbrush (*Chrysothamnus nauseosus*) could be found on the flat.

Maggie Creek was next encountered near the Eureka-Elko County line. Going north, Kennedy noted that the entire valley was fenced for about a mile on either side, much as at present.

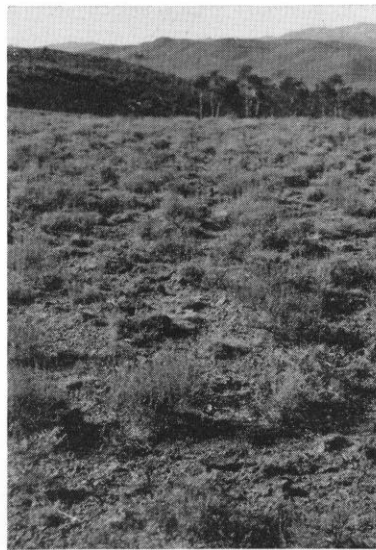


FIGURE 3. Browse-grass type at 7,000 ft. elevation. Little black sagebrush, bluebunch fescue and Sandberg bluegrass provide the aspect.

The wet meadows, as at Simon Spring, consisted then as now, of native bluegrasses (*Poa* spp.), wild barley (*Hordeum nodosum*), giant rye grass (*Elymus condensatus*), sedges and rushes. Beardless wildrye (*E. triticoides*), which is so common on the Humboldt river flood-plain meadows, was not found up Maggie Creek.

"Outside the fences is a rolling foothill country covered with little black sage," (*A. nova*) "the common black sage and a short scattered growth of giant rye grass." "During the lambing season, there is an abundance of spring flowers and young bunch grass, which the sheep feed upon."

"Occasionally throughout these foothills are seen gulches with 10-15 acres of native bluegrass, not fenced. These... furnish considerable pasture in early summer..."

Of dwarf fescue-grass (*Festuca microstachys*) Kennedy says:

"This small annual fescue-grass covered the ground at lower elevation usually on the poorest soil. It comes up in the early spring and while green, furnishes some forage for sheep."

And of Sandberg bluegrass he noted:

"From the foothills to the tops of the mountains, this valuable species can be found. There are many areas in which the plants were beginning to show the effects of trampling and close feeding..."

However, that perennial grass is still the most abundant one present.

Upon examination of the range in the light of these observations, it is apparent that the original types still predominate, but with modified composition. Apparently burn-scars were absent or unimportant in 1902. In 1952, burned-off range bordered the route on the west about 40 percent of its distance for 17 miles north of Carlin. Some of these crossed the road and the valley bottom (Fig. 2, right).

Big sagebrush appears to have replaced the bluegrass meadows at lower elevations, while cheatgrass has replaced the annual fescue. Sandberg bluegrass comprises from 15 to 20 percent of the cover.

General statements are difficult to compare, but it seems well to consider Kennedy's remarks on other species before continuing on to the higher summer ranges.

Of bitterbrush (*Purshia tridentata*), Kennedy stated:

"It is a very valuable forage plant for sheep at all seasons and is found scattered throughout the rolling foothill country in dry situations."

A decrease in bitterbrush is suspected, inasmuch as in 1952 it was found in only one of 14 range areas where species composition was recorded along Kennedy's route.

In the earlier survey, bluebunch wheatgrass (*Agropyron spicatum*) was

"found abundantly on the hills where cattle feed on it extensively."

It is now generally absent at lower elevations, forming less than 5 percent of the density at mid-elevation but approaching 20 percent on south and on east slopes in the mountains.

Probably squirreltail (*Sitanion hystrix*) forms a higher proportion of the forage than 50 years ago. Kennedy does not report it, although it now occurs along his

route as 3 to 10 percent of the plant density and, after Sandberg bluegrass, the most abundant native grass.

Foothill ranges in good to excellent condition around the Tuscarora Mountains may be inferred from another quotation,

"As the plants growing on the lower ridges become dry very early in the season, they are usually fed off first. Notwithstanding this, however, there are miles of range country which, at this season, were not touched by the sheep. Ten times the number of sheep usually fed on these mountain ranges at this season of the year could find plenty to eat. The difficulty lies in finding sufficient forage for them later in the season when water becomes scarce."

Possibly this optimistic report and his reference to

"the great free range country of northern Nevada"

in 1903 hastened the advent of cheatgrass in the area. According to George Banks of Beowawe, who has been active in livestock production in Elko County for over 50 years, the influx of 20,000 sheep from Bakersfield, California in 1905, shortly preceded the appearance of the first cheatgrass on the ranges around Maggie Creek.

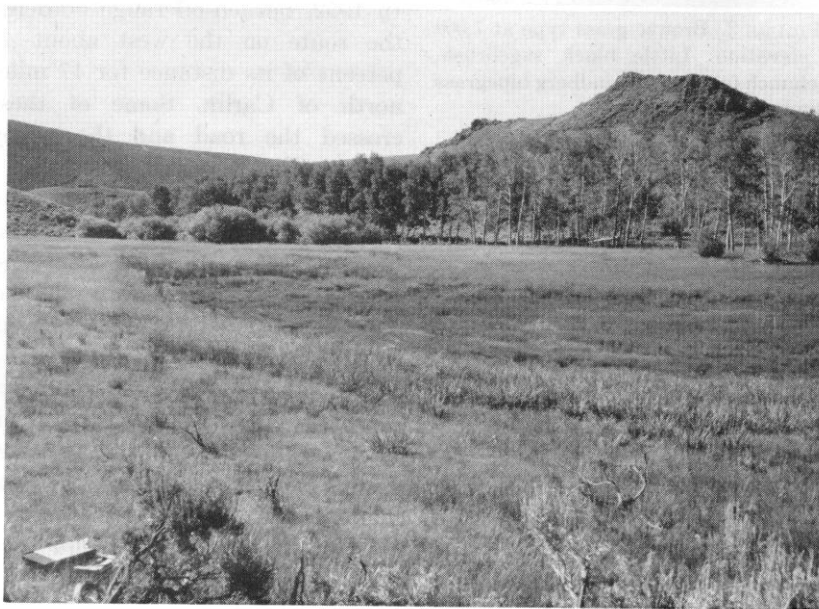
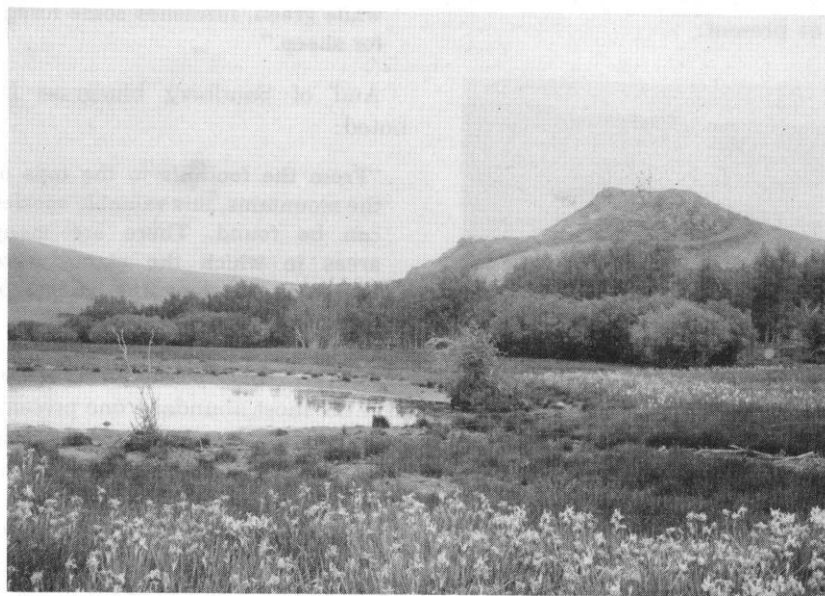


FIGURE 4. *Upper.* A pond near the head of Stampede Creek at about 6,300 ft. elevation, photographed in 1902 and described as "A mountain meadow and little lake in the month of June before being pastured by sheep". *Lower.* The same pond in July, 1952, with very little open water surrounded by eccentric zones of vegetation. It is drained by a small live stream.

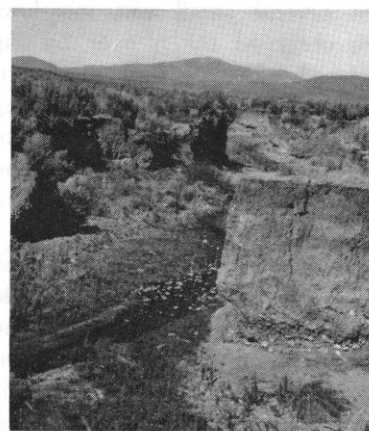


FIGURE 5. Recent accelerated bank-cutting by Maggie Creek six miles from its source attests to the runoff and erosion high on its tributaries.

Kennedy found:

"The common black sage and little black sage are quite abundant on the lower foothills, but become scarce as we ascend the mountains, their places being taken by large, dense patches of narrow-leaved sunflower (*Helianthella uniflora*), the smooth-leaved sunflower (*Wyethia amplexicaulus*), Great Basin lupine (*Lupinus holosericeus*) and sourweed (*Eriogonum*)."

The most obvious differences now are in the scarcity of narrow-leaved sunflower and the abundance of little black sagebrush. Of three areas on which condition surveys were made, one, on Beaver Creek, had vegetation in good condition, little black sagebrush making 23 percent of the density, perennial grasses 28 percent and perennial weeds 20 percent. No cheatgrass was found and bluebunch wheatgrass comprised 17 percent of the density.

The terms "desirable species" and "poor", "fair", "good" and "excellent" condition are as designated on "Range Condition Class Field Sheet" prepared by Soil Conservation Service, Pacific Region (R7-128) and "Range Condition Guide for Northeastern Nevada", SCD, mimeo, April 1952.

On south and west slopes above the Lakes on Stampede Creek, little black sagebrush amounted to 55 percent, desirable weeds to 2 percent with cheatgrass present and bluebunch wheatgrass about 1 percent. Another fair condition area was surveyed on the pass between Maggie Creek and Indian Creek. Little black sagebrush was over 60 percent but weeds only 4 percent of the density. In all three cases, erosion was moderately active. This and the cover type are evident in Figure 3.

Narrow-leaf sunflower was found only in small protected pockets of deep soil interspersed on islands of lush vegetation in the little black sagebrush type.

The small scattered ponds, now known locally as the Lakes, were described and photographed by Kennedy. Some of them are fed by springs, others by melting snow. Evidence exists that their succession through wet meadow to dry meadow and sagebrush-grass has been hastened since Kennedy's visit. For example, the open pond photographed in 1902 (Fig. 4, upper) and the same spot in 1952 (Fig. 4, lower) are in distinctly different stages of succession.

This pond is fed by a spring a quarter of a mile above, as well as by melting snow. Its level is regulated by a well-defined outlet through the meadow. The meadow itself consists of eccentric, incomplete zones around the pond (Fig. 4, lower). The vegetal composition of each zone appears to be determined by depth to the soil saturation level. Successive zones surrounding open water are characterized by rush (*Juncus*), sedge (*Carex*) and Nevada bluegrass (*Poa nevadensis*), blue flag (*Iris missouriensis*), wild barley and Nevada bluegrass, Great Basin wild-rye and common black sagebrush, bluebunch fescue (*Festuca idahoensis*) Sandberg bluegrass and hillside sedge, aspen (*Populus tremuloides*) and last, the common black sagebrush-grass-weed type with species of needlegrass (*Stipa*), wheatgrass, beardtongue (*Pentstemon*), aster, and povertyweed (*Iva axillaris*).

Other meadows in the vicinity represent both earlier and later stages of development. The ponds act as settling basins for spring runoff from the eroding slopes above (Fig. 3). This doubtless robs the stream below of some of its cutting power. At a rate dependent upon the surface erosion, the pond fills until shallow enough for meadow vegetation to close over. This vegetation catches more sediment and the flood stream, robbed of its settling pond, cuts a channel through the young meadow, draining it. Then mesic communities soon replace the hydric

to be in turn over-run by more xeric ones. The creek channels on the Maggie Creek side of the mountains have eroded more, in recent years, than those on the Boulder Valley side. Maggie Creek itself affords an example (Fig. 5).

Summary

To summarize, the changes which have occurred during the 50 years since the survey by P. B. Kennedy are evidently as follows.

On the foothills:

1. Desirable browses have decreased. Four-wing saltbrush, bitterbrush, budsage, whitesage and shadscale are examples.
2. Annuals have increased to an extreme degree. Cheatgrass, peppergrass and halogeton are examples.
3. Big sagebrush has occupied many dry meadows and has been replaced on numerous burns by little rabbitbrush.
4. Stream channels have eroded deeper and wider.

In the mountains:

1. Forbs are far less abundant.
2. Sagebrush has increased.
3. Sandberg bluegrass and squirreltail have increased.
4. Erosion and deposition are filling the ponds, hastening their conversion to wet meadows.
5. Gully erosion is beginning to drain some of the wet meadows.
6. Cheatgrass and fires are not important yet. The condition of the range vegetation is much better than in the foothills.

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