

But the results convinced the family. He has since chiseled over 1,800 acres of rangeland consisting primarily of club moss, blue grama, and fringed sagewort and now manages, in their place, good stands of western wheatgrass and green needlegrass.

Part of the better production is due to better moisture retention on the renovated range. "Before we renovated the pastures, we'd fill two reservoirs every spring from runoff. Now we need an exceptional snow and rain to fill them. The renovation has cut our runoff to less than one-half of what it was before," Harold notes. The moisture goes to growing grass.

"Management is the key to range renovation," he cautions. "You've got to stay off it at least 1 year. If you grub it off the year of renovation, you'll have an awful mess." He deferred their renovated pastures for 3 years.

For spring grazing, they planted crested wheatgrass and alfalfa. "Our goal is to have 3 or 4 acres of tame grass for each cow," Harold says. The cattle run on tame grass from April to the middle of June usually. In wet years they stay on tame grass until July, giving the native grasses an even better start.

Each year one of the 19 pastures is deferred for a full growing season so "once every 18 years a pasture will get a year's rest." Each year a pasture is grazed at a different time during the rotation period.

Although Harold has planted Russian wildrye for fall use, he prefers using the stubble fields on the 2,800 acres of cropland. He had problems with the Russian wildrye going root-bound.

The increase in grass production on the ranch speaks for the Simmes's management. "We went from 380 pounds of production per acre on native range to 1,000 pounds per acre," Harold says.

The weaning weights also tell the success of grazing systems. In the early 1970's when the conservation plan started, they were lucky to get 420-pound steers and 370-pound heifers. Last fall they weaned 526-pound steers and 430-pound heifers.

"Culling and genetics have a lot to do with it also," Harold admits. "But we have to have the grass to support the cows and calves." His management goal now is 600-pound weaning weight.

To achieve this goal they plan to seed more tame grasses and to renovate another 900 acres. "We're not getting the response from deferment, so we're going to plow some of our good fields and make them more productive."

Simmes says the Great Plains Conservation Program has worked on his ranch. "It really helped us set priorities—water and fences—so we can control where the cattle graze." But besides the ideas, the program provided dollars. "Ideas are not enough," he says. "If the money is available, you can do the work much more quickly." ●

Sheep and Streams

William S. Platts

Recent trends toward protecting riparian-fisheries habitat have focused attention on grazing management in riparian zones. Although some of the effects of cattle grazing on streamside areas have been documented, information describing the effects of sheep grazing on streams is limited. Sheep have generally been assumed to exert little influence on riparian and stream environments as they usually are herded onto and graze slopes and upland areas. In the Pole Creek meadows, however, past heavy grazing, plus additional use by driveway sheep for forage and bedding while awaiting shipment, was probably harmful to the riparian and stream environment.

Area Description

The Salmon River drainage, which includes Pole Creek and the study meadows, supports the major chinook salmon and steelhead rainbow trout spawning runs entering Idaho from the ocean. Pole Creek, which flows through meadows (6,200 feet elevation) formed by glacier-transported sediment, receives water from a small tributary stream on which

the study site is situated. The tributary stream channel is composed of gravel with smaller amounts of rubble and fine sediments. The stream supports sculpin and brook trout.

The area has been heavily grazed since the late 19th century. Shortly after the settlement of the Snake River Plains by European man, the upper Salmon River drainage became increasingly important for sheep summer forage. Because the Pole Creek meadows were located on the Ketchum-Stanley sheep driveway, the meadows received unusually heavy use; 200,000 sheep used the area in 1910, according to a report by William Horton, District Ranger at the Pole Creek Station. Ketchum, Idaho, was the largest shipping center for sheep in the United States.

A 30-acre enclosure was fenced in the Pole Creek meadows in 1910 to encircle a Forest Service Guard Station. The enclosure was used to pasture 10 horses and mules from 1964 to 1974 for about 1 month each year. The adjacent unfenced meadow, immediately upstream from the enclosure, continued to receive heavy sheep and bedding use and, by 1934, 150 acres had to be reseeded because of overgrazing. The sheep driveway from Ketchum to Stanley was closed in 1964 by the USDA, Forest Service to spring travel, which resulted in reduced grazing pressure on the meadows.

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The fence separates the heavily grazed area (background) from the lightly grazed area (foreground). Note the wide, shallow stream in the heavily grazed area narrowing as it enters the fenced area.

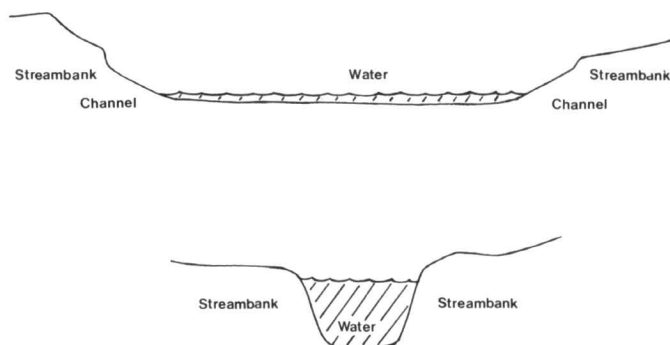
The many years of heavy sheep grazing on the unfenced meadows and the light or nonexistent grazing within the Guard Station enclosure provides an ideal case history for studying riparian and stream reactions to heavy sheep grazing.

Methods

Methods evaluating the riparian and aquatic habitats consist of measurements taken at each of 121 channel cross sections that run from bank to bank, perpendicular to the main flow of the stream. These cross sections are situated at 10-foot intervals covering 600 feet of stream in the fenced area and 600 feet of stream in the unfenced area. The two sites are adjacent to each other. Aquatic habitat measurements were taken in July, August, and September of 1978, and riparian measurements were taken in October after the grazing season ended.

Aquatic habitat measurements include those documenting water column conditions (stream width, depth, depth of water at the bank, and water velocity); those documenting channel conditions (channel gradient and percent gravel, fines, and rubble); and those documenting streambank conditions (bank angle, bank undercut, and bank alteration). Stream width was the width of the channel covered by water at each cross section. Stream depth was the average of four water depths taken at equal intervals across each cross section. Water depth was also measured at the point where the streambank meets the edge of the water (called bank water

depth). Water velocities were taken at selected intervals across the transect. The percent of gravel (0.19 to 2.9 inches in diameter) and fine sediment (less than 0.19 inches in diameter) in the stream channel surface was obtained by using measuring tapes. Channel gradient was taken using an engineer's level and sighting rod. Channel cross sections were developed using an engineer's level, sag tape, measuring rod, and a sighting rod. Streambank angle was measured with a clinometer, which determined the downward slope of the streambank to the water. Streambank undercut was measured from the greatest protrusion of the bank that goes over or into the stream to the furthest undercut of the bank.



Typical stream channel cross section in the lightly and heavily grazed sites. Upper is the heavily grazed area, lower is the lightly grazed area.

Table 1. Comparison of variable averages between the lightly grazed and heavily grazed sites.

Variable	Lightly grazed	Heavily grazed
Stream width (feet)	1.8	7.8
Stream depth (inches)	6.2	1.3
Bank water depth (inches)	5.1	0.4
Water velocity (fps)	1.3	0.8
Gravel (percent)	69.3	98.2
Fine sediment (percent)	28.2	2.9
Channel gradient (percent)	0.7	1.2
Bank angle (degrees)	82.0	132.0
Bank undercut (inches)	1.7	0.6
Artificial streambank alteration (units)	5.7	86.1
Habitat type rating (units)	17.7	14.0
Vegetative use (percent)	2.3	37.3

Alteration of the streambank was rated visually using a defined rating system.

The riparian habitat measurements include rating the streambank habitat type. The rating is based on the dominant and subdominant plant or soil composing the streamside environment as it would affect the fishery. A streamside habitat of sand (dominant)/sand (subdominant) is considered to have the least value to salmonids and is rated 1. A brush (dominant)/sod (subdominant) habitat is considered to have the most value and is rated a 24. The other streambank habitat types range between these ratings. Use of streamside vegetation was a visual estimate of the percent of vegetation used or altered by animals within 5 feet of the streambank.

Results

The results in Table 1 and the channel profiles in the drawing show definite differences between the lightly grazed

and heavily grazed sites. The stream was over four times as wide in the heavily grazed area as in the lightly grazed area. Sheep use on the streambanks in the heavily grazed meadow caused the banks to erode away, resulting in over four times as much water surface being exposed to solar radiation as was the case in the stream research in the lightly grazed meadow. Average stream depth was almost five times as great in the lightly grazed area as in the heavily grazed area. The depth of the stream at the streambank stream channel interface was almost 13 times as great in the lightly grazed meadow.

Discussion

Sheep are often classified as animals who prefer slopes and upland areas for grazing. Therefore, under proper management, they would be expected to have little on-site effect on riparian-stream environments. This study shows, however, that when sheep were forced in the past to concentrate on a riparian-stream area, which is contrary to proper management, they adversely affected the stream environment. Heavy concentrated sheep grazing can make streams wider and shallower, outslope the streambanks, eliminate undercut banks, change riparian habitat type, expose the stream to more solar radiation, and decrease water depths at the stream surface-streambank interface. Fishery biologists generally agree that the documented changes tend to decrease fish populations. Therefore, to concentrate sheep on meadows for long periods of time is probably detrimental to the riparian-stream ecosystem.

Under a grazing strategy such as deferred use combined with good herding, there should be few if any detrimental effects on the fishery. The Forest Service has reduced sheep grazing and holding time on the study site. Under this new management, it is my judgment that the stream has been constantly improving. ●

Summer Grazing of Sagebrush-Grass Range by Sheep—a Photo Record

R.O. Harniss and H.A. Wright

At the U.S. Sheep Experiment Station in Dubois, Idaho, we examined the possibility of grazing traditional spring-fall sagebrush-grass sheep range in the summer as a maintenance ration for ewes weaned early of their lambs. Sheep grazed two sagebrush subtypes from July 7 to September 10 at about 80 sheep days per acre over a 10-year period. The grazing rate was very heavy to accelerate the vegetation change due to grazing. Photographic and plot

data were taken to document the effects of this grazing during a 3-week period in early summer and late summer. Records were kept on ewe weights during both early and late summer on similar sagebrush range grazed at a rate of about 40 sheep days per acre.

The plot and animal data are reported in more detail in a companion paper (Harniss and Wright, in press). Following the adage "that a picture is worth a thousand words," we present photographs here that depict the trends over the 10 years in the balsamroot subtype of sagebrush.

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