Rangelands

Society for Range Management

Volume 8, No. 4
August 1986

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1987 Annual Meeting of the Society for Range Management

Boise, Idaho
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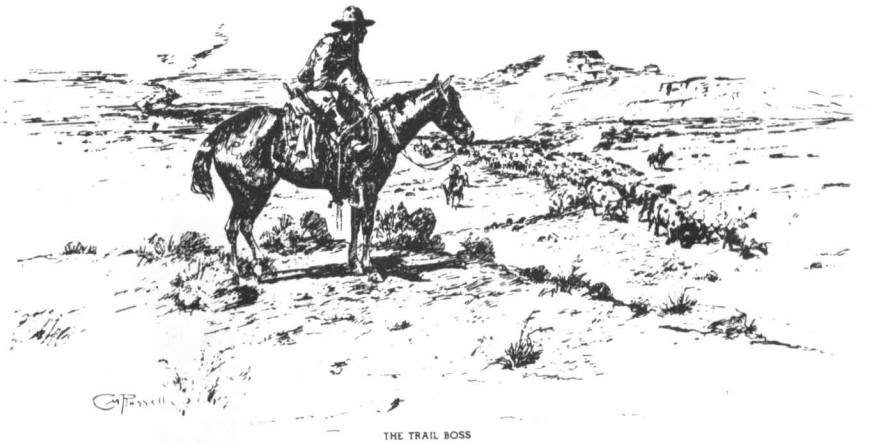
SOCIETY FOR RANGE MANAGEMENT



THE TRAIL BOSS

The **Society for Range Management**, founded in 1948 as the *American Society of Range Management*, is a nonprofit association incorporated under the laws of the State of Wyoming. It is recognized exempt from Federal income tax, as a scientific and educational organization, under the provisions of Section 501(c)(3) of the Internal Revenue Code, and also is classed as a public foundation as described in Section 509(a)(2) of the Code. The name of the Society was changed in 1971 by amendment of the Articles of Incorporation.

The objectives for which the corporation is established are:

—to develop an understanding of range ecosystems and of the principles applicable to and the management of range resources;

—to assist all who work with range resources to keep abreast of new findings and techniques in the science and art of range management;

—to improve the effectiveness of range management to obtain from range resources the products and values necessary for man's welfare;

—to create a public appreciation of the economic and social benefits to be obtained from the range environment;

—to promote professional development of its members.

Membership in the Society for Range Management is open to anyone engaged in or interested in any aspect of the study, management, or use of rangelands. Please contact the Executive Vice-President for details.

Contribution Policy

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Rangelands serves as a forum for the presentation and discussion of facts, ideas, and philosophies pertaining to the study, management, and use of rangelands and their several resources. Accordingly, all material published herein is signed and reflects the individual views of the authors and is not necessarily an official position of the Society. Manuscripts from any source—nonmembers as well as members—are welcome and will be given every consideration by the editors. **Rangelands** is the nontechnical counterpart of the **Journal of Range Management;** therefore, manuscripts and news items submitted for publication in **Rangelands** should be a nontechnical nature and germane to the broad field of range management. Editorial comment by an individual is also welcome and subject to acceptance by the editor, will be published as a "Viewpoint."

RANGELANDS

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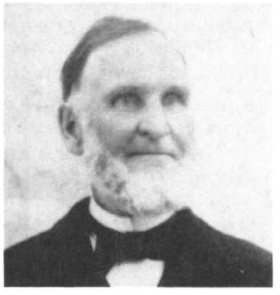
COVER: "Shipping Time" in the Osage. Cowboys on the Oklahoma Land and Cattle Co. Ranch near Foraker, Okla., move steers into pens and on to scales for weighing and shipping to market or feedlot. Dick Whetsell, in scale house, records weights on September 1, 1985. (Photo by Dick Bogard)

A Trail of Hardship to 'The Land of Gold and of Plenty', 1850

Marilyn Samuel, Noel L. Danner, and Ruth E. Danner

Editor's Note: In traveling across this land on a paved highway in a high-powered car we tend to forget that there were travelers in the past who did not have it so easy. Television shows a version of early day travel. This paper illustrates the true nature of the problems faced in crossing this country in the early days. These were truly hardy people crossing vast distances with little more than their own two hands and a strong determination. After reading this account, I am not sure I could have done it.

Costmor Harris Clark was born on the first of May, 1810, in Chester, Vermont. He descended from ancestors who, six generations earlier, had emigrated from England to America in about 1640. Clark was a stonemason by trade. He and his wife Mary Stockwell Clark lived in Oak Creek, Wisconsin, and had three sons, Leonard, Charles, and Frank. Mary Stockwell Clark died in 1845. Clark and his sons moved to Milwaukee and boarded with John Nelson Mount, his wife Eleanor Hulsart Mount, and their four children (Emary, Charlotte, Harvey, and Timothy). Mr Mount died in 1847. Eleanor Mount and Costmor Clark were married later and moved to the Clark family home in Oak Creek.



Costmor H. Clark, 1810-1905
This photograph was made from an old negative which was made from an old photograph.

Clark, at the age of 40, left the family at the farm in Wisconsin and joined the emigration to California in the spring of 1850. After he arrived in Hangtown (now Placerville), California, he spent some time in the mines where he became a partner in the Starr King Mine near the Tuolumne River. Then he moved to San Francisco and returned to his former trade of bricklayer and plasterer. In the winter of 1852, he returned to Wisconsin, took his family to New York where he booked passage for all to Nicaragua, crossed the Isthmus, boarded the S.S. Sierra Nevada, and arrived in San Francisco on June 16, 1853. Three children (Laura, Hattie, and George) were born after the Clark family arrived in San Francisco. The family moved to Napa, California, in 1856 where Costmor helped build the Napa County Court House. Costmor bought a ranch in the valley near Napa and remained there until 1884 when they had a home built in town. Costmor served one term as Justice of the Peace in Napa sometime after 1884. Eleanor Mount Clark died in November of 1887. Costmor died in early December, 1905, at the age of 95 years 7 months. Costmor Clark was a man of sterling worth, strong convictions, great energy and determination, and a staunch supporter of democratic principles.

We do not know the details of Costmor's journey from Oak Creek, Wisconsin, to just west of South Pass, Wyoming (then unorganized territory). From the Journal, we know that he passed through St. Joesph, Missouri. The presence of the journal was not known to the Curtis L. Danner family until after the death of Mary Frances Taliaferro Danner (daughter of Laura California Clark Taliaferro and granddaughter of Costmor Clark) in 1966. The journal was on separate, unbound sheets which had been stored in a grocery bag.

The following is a transcript of the Journal of Costmor Harris Clark. We have interpreted his writing as best we could and have tried to retain the original format and spelling.

June 30, 1850. (12 miles) Left our last encampment upon the Sweetwater travelling for 6 miles over a comparatively level plain we reached the South Pass[1] & crossed the dividing ridge at 10 O.C. Six miles farther down a slightly inclining plain or valley brought us to the "Pacific Springs" which consist of a bog or marsh of several acres in extent. The sod covering the surface not being sufficient in some places to bear up the animals that were allowed to fall upon the grass that covered it, and in consequence many animals were mired and some of them died before they could be rescued. At this place was the last station of Estill's Mail Express and hundreds of emigrants were laying by for the purpose generally of improving the last opportunity this side of California of writing back to their friends. To improve this opportunity we encamped at 12 M.

Mon July 1st. (5 M.) Spent the day until 4 O.C. in bating[2] our horses and writing our letters. Estill's charge for conveying them to the states was 50 cts each. At 4 O.C. P.M. we resumed our journey—glad to leave a place made very offensive by the stench emitted from dead and putrid animals in every direction. After traveling 5 miles encamped upon the plain turning out our horses to feed upon the bunch grass growing amongst the sage, no water. Wait refusing to watch any part of the night.—An unpleasant and disagreeable fool.

Tues 2nd (24 miles.) At 3 A.M. awoke my companions, having been out with the horses all night and the extreme darkness making it very difficult to keep them from straying in search of better fare and water. Ten miles travel brought us to the junction of the Morman & Main Roads, here we held a consultation in reference to the road we should take. Herriman & Wait in favor of going by Salt Lake & I opposed. Of course the majority ruled & we turned off upon the Salt Lake road. Six miles from junction crossed the Dry Sandy and eight miles farther to the Big Sandy where we encamped. Grass abundant—no company.—

Wed. 3d July (24 M.) Nineteen mile travel brought to Little Sandy. From thence to Green River it was 10 miles. We crossed this river by ferry paying $8. for our waggon & 5 horses and encamped one mile and a half below ferry. Passed this morning Messers Chadwick Stanford. &c[3] Greenleaf & Furman encamp upon the other side of the river. Good wood & grass.

Authors are great-great granddaughter, great grandson, and great granddaughter-in-law of C.H. Clark. Samuel is a botanist, USDA, ARS, 8408 Hildreth Rd, Cheyenne, Wyo. 82009 and daughter of the Danners.

The authors wish to thank the Curtis L. Danner family for their help in the writing of this article (Curtis and Noel are brothers.)

[1]South Pass, El 7,550 ft, now about 42 mi. south of Lander on Wyoming state highway 28.
[2]Bating—from baiting: feed & water
[3]&c - etc.

Thursday July 4 (24 Miles) We were aroused from sleep early this morning by the firing of guns in all directions reminding us that the day of our country's glory had again arrived. We turned out. Prepared our breakfast—fired a few guns in comemeration of our nations birth—and then resumed our solitary journey making a late start. Sent Wait ahead to find grass for the Midday bating—Discovered him at noon upon a high bluff making signals for us to "come to grass". We turned out of the road and travelled over an almost impassible plain of deep sand and sage for two miles to the foot of the "bluffs"—where we unharnessed, and led our expectant animals up the mountain where we found Wait, waiting—but no grass "this was grass." Doct. Myself & the horses felt very indignant but said nothing—not wishing to stir up the bear. But we unanimously made up our minds that he would not fool us again this is not the first time by many. After a short stay and a hard pull we reached the road & resumed our journey. Towards night Wait volunteered to advance & select camping ground for the night upon Blacks Fork. We reached the fork about dusk and continued our course down the stream looking out for our hopeful companion until eleven O clock P.M. when Wait came storming up behind demanding in a furious tone if we were going to travel allnight. This time he got as good as he sent. The Doct. giving him a regular going over, being seconded by myself occasionally. We came to a mutal understanding upon one point at last that Mr. Wait would be relieved in future from the duty of finding camping ground & forage. After grouping[4] about an hour or more in the dark we found a patch of grass upon the river flat & turned out. (No supper).

Friday 5th July (30 M.) Two miles from encampment crossed a branch of Blacks Fork where resided a rich Mountaineer and a number of Snake Indians. The Mountaineer owning large droves of horses & kine many of which were bought by emigrants. At noon we halted upon the plain finding good bunch grass. Here I shot an antelope at 40 rods distant. I ran into the river where I gave it a second & deadly shot, and in order to get it waded nearly waist deep. This afforded the first "fresh" we have had (excepting one rabbit) on our journey. We were overtaken and joined today by Greenleaf & Com. Danl. Baxter & Co. & Putman & Capt Furman and Brother, and all encamped in company on Blacks Fork—finding good willow wood and fine grass.

Sat. 6th July. (30 M.) We were considerably puzzled today as the road over which we were travelling did not agree with the "Morman Guide" and were upon the point of encamping until we could learn where we were and where going. But finally concluded that we were travelling in the right direction we were safe in going ahead. This proved to be the case, and our road a new and more direct road to Fort. Bridger which we reached about dark and were escorted to our encampment a mile beyond the Fort by Mr. Jones who had preceded us for the purpose of selecting camping ground. It was a good one, furnishing good water, wood and grass.

Sunday July 7th. Voted to remain in camp. A rumor was current today that a large body of Indians were concentrated in our neighborhood with the intention of attacking the emigrants and that runners had been sent ahead to all the Indians between us and Salt Lake to give them notice to collect for the same purpose. The reason for this hostility of the 'Snakes' was that a party of emigrants had fallen upon an encampment of Snakes in the night while they were asleep and murdered nineteen men women and children. (The whole party excepting two women, who made their escape to Ft. Bridger.) We could not doubt the story of the murder as the women were there and manifesting great distress and insisted upon the truth of their report. And towards night we saw a Delaware indian who had been to the scene of slaughter.

We expected bloody work and prepared for the worst—Guns pistols Knives were all put into working order and we intended to use them to the best advantage should the attack be made. Fort Bridger is a trading fort only and derives its name for its owner a Frenchman who has been an Indian trader & mountaineer for many years. The Fort seen from our encampment (I did not go to it) was a long low building perhaps 80 feet by 20. Situated in a beautiful valley plentifully supplied with good water and grass.

Monday July 8th (25 M.) Left the Fort at 6 1/2 o'clock travelling over a rough uneven country with timber mostly dwarf cedar growing upon the hills & mountains. Passed a soda spring—near which we stopped at noon—of which I tasted and found the water very agreeable to the taste—undistinguisable from soda water of the shops. This afternoon crossed Bear River where it divided into several streams forming small islands. The water running very swiftly by them & we had some difficulty in getting over in consequence. We found several broken waggons on the West side & their owners busily at work repairing them. Several miles travel brought us to the encampment selected by Greenleaf & Firman who went ahead for the purpose. It was a sly nook in the mountains affording us plenty of good dry poplar wood excellent spring water & an abundance of grass & wild onions. No Indian as yet. But we keep a good look out for them. Bear River is separating line between the Snake and Utah indians. So we are out the Snake country & I hope out of danger from the "Snakes".

Tuesday July 9th 25 Miles. Passed this morning the creek on which the Indian murder was committed. Near our crossing is a coal mine and a spring affording a substance resembling tar and used by the emigrants as a substitute for tar and grease. Roads rough. Hills almost impassable. Encamped upon the head of a branch of Weber R. Grass and water good and abundant.

Wed. July 10. (27 Miles) This forenoon passed through a deep valley under purpendicular ledges of rocks perhaps five thousand feet high. Towards night reached the Weber and the junction of the old and new roads to the city[5]. The old bearing to the right and the new (which is a toll road) turning to the left up the stream. This is recommended by a notice posted upon the guide board to be a nearer and better route—improved and subjected to toll by "authority" of the "State of Deseret" after five or six miles travel up stream came to a halt for the night finding good wood and grass upon the bank of the Weber a cold pure mountain stream some five rods wide and two feet deep. Herriman quite unwell this evening.

July 11th 22 miles. After sixteen miles travel up the Weber we turned right into a Kanyon and over a most tremendous hill and descended after dark into an extensive valley watered by a considerable stream cold and fresh from the mountains. We were guided to our encampment by the light of a fire kindled by a part of our company who had preceded us. Doct. Herriman quite sick of mountain fever.

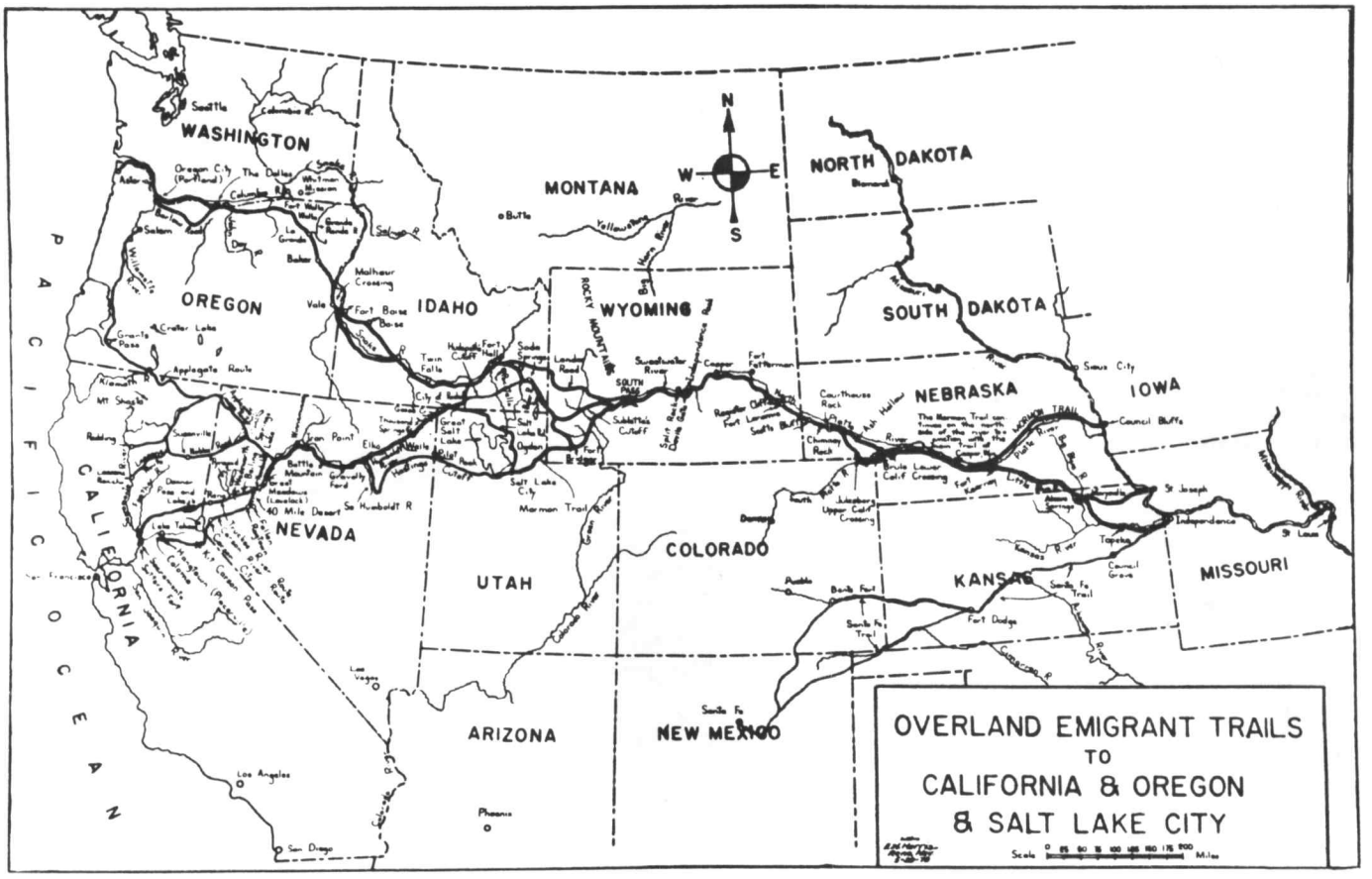
Fr. 12th 15 miles. A hard days travel through a Kanyon. The continual crossing of the creek where in many instances the wheels were over hubs in mud and water. The sideling roads and stumps and roots proved a smasher to many waggons and a hard pull to all the teams. We escaped however without a breakdown and emcamped about dark in a thicket of weeds and bushes but no grass. We finally concluded to lead our horses up into the mountains where we found a good supply of bunch grass, and turned them loose. Herriman no better. Myself quite unwell all day. Wait as usual lazy unaccommdating & impudent.

(July) 14 M) (Sat. 13th) This morning much concern was created in our camp by the absence of all our animals. A turnout of all the camp (that were able was made) after the horses and it was near noon before they were found. They had wandered many miles probably started into a stampede, either by Indians, or wolves. Towards noon continued our journey travelling through a deep kanyan for several miles we emerged into the Great Salt Lake Valley. The city, the cultivated fields and cottages were most welcome objects to our view. Everything before us even the cheering voice of the chanticleer reminded us of civilization and of home. Finding no publick house in the city, and no pasturage near we passed through and beyond, about eight miles to Willow Springs where we find very good grass and water and have pitched our tents for several days. Myself quite sick with mountain fever. Herriman better but quite morose and unsocial towards me. Wait a perfect bear or rather all but bristles a hog. Our company besides ourselves now consists of Messers Greenleaf Jones & Warren. Firman Putnam & A. Furman our former travelling companions still behind. A few days rest we hope will recruit ourselves and animals & prepare us for the journey still before us.

Monday 15th Just able to ride into Town. After considerable enquiry and a tiresome walk from street to street succeeded in finding Mrs.

[4]groping

[5]Salt Lake City



C.H. Clark followed the Mormon Trail from South Pass to Salt Lake City, the Hastings Cutoff west of Salt Lake, and the Carson River Route in western Nevada..
Map reprinted from: Everett W. Harris, The Overland Emigrant Trail to California. A Guide to Trail Markers Placed in Western Nevada and the Sierra Nevada Mountains in California by the Nevada Nevada Emigrant Trail Marking Committee, Inc., Reno, Nevada. *(1980)*

Mount and a seat in a chair with a back to it, (for the first time since leaving St. Jo.) was a most welcome luxury. Mrs. Mount received me in a very friendly manner. I remained with her overnight. Occupying for the first time in two month a bed which I had all to myself. How unlike a birth[6] in the waggon crowed up between two so extensive men as Doct Herriman, and Wait with his elbows and growls. Our long lost comrades came up today—All well.

Tues. 16 July. Remained in the city until near night when Doct. Herriman drove up and complained that he had been put to much trouble in finding me and seemed quite out of humour. In riding out to our encampment we got lost and drove above over the plain until near morning when we came to a halt and turned out our horses. The jolting of the waggon as I lay upon the bottom almost drove me distracted. My fever was very high and my head seemed ready to burst with pain. I made up my mind that I was not long for this world. Exceedingly glad was I when the waggon stood still. Lost our way in consequence of taking one of Herriman's cut offs.

Wed. July 17th Awoke this morning feeling much better than I expected after my distressing nocturnal journey. Daylight enabled us to find our camp which we reached after an hours drive. Remained in camp the remainder of the day. Commenced to prepare to pack-having made up our minds to go the "Morman Cut Off"[7]. Standfords came up and pitched their tents near us. Chadwick missing. Self quite sick. Herriman claimed the exclusive ownership of the two mares and Wait that of the pony. What next?

Th. 18th July - 3 Miles - Found my self quite ill this morning. Doct. Herriman refusing to prescribe for me and treating me in a rude manner—his reason was that I had expressed dissatisfaction at his treatment of the horses & I told him he never need fear another solicitation of the kind from me. Moved this afternoon from the plain up into the mountains encamping in a small Kanyan shaded by bushes and supplied with good water which flowed through it in a fine stream from the mountains. Our horses feeding upon the mountain grass above us. Doct. Herriman volunteered this afternoon professional advice, and prescribed physic. Seemed more friendly than it has been for many days. The manufacture of packs and pack saddles continued. Encamped with us are Gen. Hutchinson Doct. Green Messrs Steel, Preusen, Hugunin and several other gentlemen from Racine. Greenleaf Hoyt Jones Willard—Capt and A. Furman Putnam &c all going the "Cut-off". We have disposed of all our provisions excepting rations for 25 days, which we hope will last us through.

Fr. Sat. Sun. Mon. Our preparations are now complete and we are to resume our journey tomorrow. Herriman claims the two mares—packing one and riding the other. Wait claims the ownership of the pony and is going to ride him. Old Charley is to take a pack of provisions. Bill is assigned to me. But the poor animal is in no condition to travel, and I expect to ride but very little. Our horses have improved but very little if any by stopping here. I think they have failed since we left Willow Springs. Bill & Charley especially.

Tuesday 23d 14 M. Left our mountain encampment for the city, where we remained until 4 O. C.P.M. where we crossed the Jordan by swimming our horses and encamped upon its bank 3 or 4 miles below the crossing.—Feed indifferent—

July 24th. 28 M. At 7 A.M. in company with Hutchinson Steel Preusen

[6]birth—berth
[7]Hastings Cutoff on map.

Doct. Green Hugunin & several others (from Racine) Messrs. Putnam Furman & Furman of———[8]. Danl. Cameron & Follet, Cook Dewey and Shields from Milwaukee and vicinity—Greenleaf Hoyt Jones Warren-Willard and several others from different parts of the States. We struck out upon this long talked of "Cut off" travelling over the level plain towards the point of a mountain some 15 miles to the South West. After reaching it and travelling along its base some three miles we stopped for dinner at a salt spring. The water was cool and limpid but too salt to be palatable or to quench our thirst. Here we encountered quite a copius shower of rain.

In the afternoon we passed several other Salt Springs and a portion of Salt Lake the water of which is salt indeed and the shore slightly encrusted with salt. From this point our course lay nearly South over a soft salt marsh. Our path being crossed by several salt streams flowing from springs at the front of the mountains upon our left and producing a luxureant groth of wild cane which seemed quite palatable to our animals.—Encamped—turning our horses into the canes. Salt water to cook with on wood so impregnated with salt as to be almost incombustible. Our blankets spread upon the canes—our bed.

Th. July 25th 35 M. Over salt plains and marshes in many places so slightly encrusted as to be almost impassible—many places would not bear up a horse or even a man, and we were obliged to make circuits to void them. We travelled upon the plains to make a cut off. Most of the travel taking the surer but longer road at the foot of the mountains at our left. Towards night we left the "bogs" and joined the prudent travellers upon terra firma.—Reached our place of encampment sometime after dark—We can see nothing of the "lay of the land" but a very unpleasant smell reaches us from every direction said to be an emission of gass from the springs and bog in our neighborhood. The water that we are using is rather "bad to take". The grass is poor. I pity the horses—and prepare to make my bed in the open air expecting if I sleep to dream of salt—of swimming in salt and breathing sulphurretted hydrogen and every other stink on earth—

Fr. July 26, 32 M. Not feeling inclined to breakfast at our encampment we left at an early hour and travelled on five miles to another camping ground where we found better water and grass. We remained here until 1 O'C. after noon, for the purpose of feeding our animals and cutting some feed for their use upon the "90 m. desert"[9].

At 4 O'clock P.M. left encampment each with his bundle of feed consisting mostly of canes. Bills back having been badly chafed by the saddle I put him before Cameron & Co's waggon and rode one of their ponies—Continued to travel in a Southerly direction along the front of the mountains for about 16 miles where we made a short turn to the North-west striking for a range of mountains ten or twelve miles ahead—we were obliged to make this angle—the softness of the ground at our right preventing our taking a more direct course.

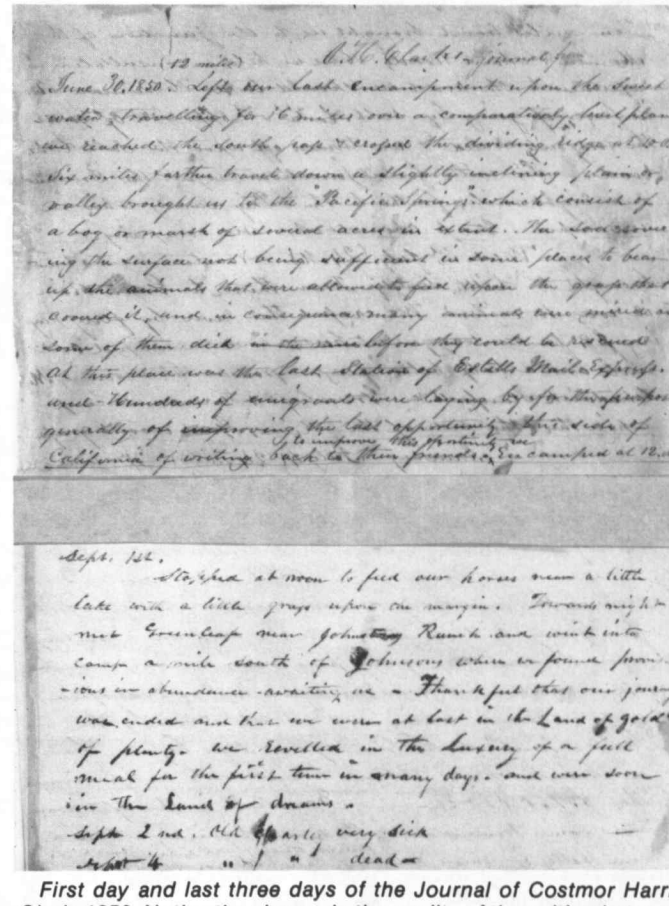
At this angle of the road we found a spring approximating more nearly to fresh water than any we have yet found West of the City. I was travelling alone—Some of our company ahead and others who had stopped to look for fresh water in the mountains behind. The night had set in with every indication of a severe thunder storm. I dismounted and hurried on the pony hoping to reach the mountains before the rain should soften our path and make it quite impassible—a result we had reason to fear from the nature of the soil. I succeeded in making 5 or 6 miles of the distance only when it commenced to rain violently—I turned out of the path, tied pony to a sage brush, wrapped myself in my blanket and waited the result—the continued flashes of lightning revealing to me distinctly the mountains which I feared I might not reach without great difficulty. Fortunatly the violence of the storm soon abated and I started on, travelling however with great difficulty over the softened marl (if it is marl) and reached the mountain encampment at daylight where I found all hands drying themselves before a blazing fire made of a kind of dwarf fir which covers the sides of the mountains and ravines.

Sat. 27th July Our encampment is upon the Eastern side of a chain of broken mountains—with lofty peaks and deep ravines. Some hundreds of emigrants are waiting here to recruit their animals and prepare for crossing the great "90 mile desert". The feed here is "bunch grass" which is found growing rather sparingly upon the sides of mountains and ravines.

Water is found by digging holes at the bottom of a ravine. It is of a very inferior quality, and flows so slowly as scarcely to supply the demand of immediate use & we shall have to economize in order to save what we wish to take with us for use upon the desert.

Sunday 28 July Remained in camp saving water and making preparations for crossing the desert until 4 P.M. when we left encampment, and the last place of grass and water East of "Pilot Peak"[10]. Twelve miles travel through the mountains brought us to the verge of the desert where we stopped for half an hour to take a hasty cup of coffee, and then lanched[11] out upon the broad expanse before us just as the sun was setting. For the first 15 miles we travelled through a bed, seemingly composed of sand ashes and salt mixed with cobble stones into which we sunk almost knee deep—continually stubbing our toes against the stones until those of us who were travelling in moccasins (as I was and for the first time on the journey) were almost crippled, and worse than all, the dust raised by the travel ahead and blown into our faces by a strong wind was almost beyond endurance. It was the greatest difficulty we could either see or breath. At 12 O'clock reached a high rocky ridge which was very steep on both sides and difficult to cross on the summit of which I rested my horse a few minutes—threw away my moccasins and resumed the stogies—my feet so much swoln that my no. 11's were a very tight fit—

July 29 At 3 O'clock A.M. reached another ridge of sand where we fed our horses their bundle of canes and rested while they were feeding. At 4 resumed our journey travelling over salt plains towards



First day and last three days of the Journal of Costmor Harris Clark, 1850. Notice the change in the quality of the writing between these two pages.

a ridge of mountains which bounded the horizon to the Westward—passing at short intervals the bones of animals, waggons and various other articals of property a small portion only remaining above the surface. This was property belonging a company of Mormans, who, while attempting to cross the desert were overtaken by a rain which

[8]unreadable
[9]Great Salt Lake Desert
[10]Pilot Peak, 10,704 ft., north of Wendover, Nev., just west of the Utah state line.
[11]Lanched—launched

so softened the crust which covers the surface of the plain that it would not bear up their teams, they were obliged to abandon them to their fate. At this time in many places the crust will scarcely bear up a waggon however no one has broken through as yet and we have found it very pleasant travelling ever since we crossed the rocky ridge before mentioned. With the exception of these "ridges" of stone and sand the whole plane is a perfect level, resembling a lake covered with ice—the salt on the surface white and glittering in the sun like snow.

At 4 P.M. reached the mountains for which we had been so long travelling with the expectation of finding feed and water at their base, but great was our disappointment to learn that we had still to travel 25 to reach "Pilot Peak".—All around us were animals dying of hunger thirst and fatigue and many men as well as women in nearly the same condition. After resting a few moments started again and it was with the greatest difficulty we could urge our animals to go at all and were obliged to stop again. We took off the packs from our horses and let them rest for nearly an hour under the shade of the mountain after which the poor things seemed willing to make another effort, and we continued our journey along the base of the mountains in a Northwest direction for about ten miles when we came to the point of the spur around which we turned to the left and saw for the first time (at a distance of 15 miles) the long looked for "Pilot Peak". Here we met a young man with two canteens of water and were invited to drink as much as we pleased, and informed us (Mr Millard from Whitewater and myself were together others of our company were travelling behind and some before according to the ability of their animals) that half mile ahead was a waggon load of water sent back by parties who had reached the mountains before us. We soon came up to the "water waggon" and received a supply for ourselves and animals. The "water man" informed us that he was hired to meet the emigrants with water at this point—the money being raised by subscription or contribution rather, among the emigrants as they arrived at the "Peak" and this humane arrangement will probably be kept up until all the emigration have passed.

The danger of famishing for want of water being over I determined upon staying where I was until morning as I was quite lame in the feet and felt as I never did before the necessity of sleep as I had not slept to exceed 3 hours in 84 or four days and three nights. Mr. Millard kindly voluntered to take my horse with his and if possible get them through to feed during the night. I crawled under a waggon to be out of danger of being run over by animals and men and soon forgot in sleep the fatigues of the "desert Pilot Peak", or the golden land. I slept until a late hour in the morning and arose quite refreshed and "put out" for the mountain and reached the encampment about noon. The place has quite the appearance of a town. Tents are pitched on every side and men and women are moving about in every direction. And the beautiful plain which is watered by the streams flowing from a range of snow crowned mountains, are covered by animals luxuriating in "plenty".

Wed. 31st July 3 miles— Moved this morning three miles down the valley to a more convenient and less crowded location.

Th. 1st Aug. 37 M. Left encampment at an early hour. Myself in poor trim for travelling on account of the lameness of my feet, and poor Bill in a worse condition still—the effect of hunger and fatigue in crossing the last desert. It is with greatest difficulty he can be induced to travel, and I have been obliged to take upon my own shoulders a part of his pack. This added to my rifle was a little more than I felt able to carry and I was obliged to lay down my arms, and surrender it to the desert over which we were travelling—hoping hovever that Cameron and Cook who were behind with the wagon would take it up—if they have not done so my poor old friend is lost, and I am defenseless. We have travelled today in nearly a Westerly direction—crossing in the morning through the range on which is "Pilot Peak"—We decended upon a salt plain some 18 miles in width—crossed a rocky ridge 25 miles from our morning encampment where we found two small springs of water and after waiting our turn for nearly an hour we succeeded in getting perhaps a quart of water each for our animals and perhaps a pint apiece for our selves. Ten miles farther travel over a soft sandy plain brought us to another range of mountains where we find water grass and a large encampment but cannot succeed in finding our company who were mostly ahead of us—so we have turned out our horses and must retire to rest, supperless. Wm Shields was my travelling companion today as far as the two Springs when he went ahead. Soon after which Mr. Follet overtook me and is now my "room mate". "The ground for our bed, they sky for our curtains". Water here is impregnated with sulphur.

Fr. Augt. 2nd 18 miles Found this morning my partners and others of our company and was extremely glad of a breakfast after fasting for 24 hours—Greenleaf & Co have started ahead and have agreed to wait for us at the first convenient stopping place. Herriman and Wait very anxious to keep up with Greenleaf so much that Wait was in favor of going on and leaving me and poor old Bill to our fate—but this the Doctor refused to do until he had seen me.

The Doct proposed (as old Bill was not likely to be able to keep up Greenleaf) to remain with Cameron Cook & Co who were determined to travel more leisurely, and alow them to go on. I told him if old Bill could not travel, I could and it was my determination to travel in the front rank. So I left poor Bill with Millard took old Charley in tow and started on crossing the range of mountains under which we had encamped. Travelling Westward towards another range of hills or mountains which we reached a little after noon and just as Greenleaf & Company were leaving. We determined upon staying here over night as it was evident that we were overtravelling our horses.

We find tolerable grass and springs of warm sulphur—water quite agreeable to the taste—We estimate having travelled today 18 miles.

Sat. 3d Augt. 31 miles On the road by 5 O clock in the morning—through the hills and over a sand plain to another range of hills where we found sulphur springs and grass. The water was quite warm but pleasant. We stopped here for dinner having travelled about 15 miles. After dinner crossed the hills—still keeping a Westward course over a soft plain of sand & reached at sundown the foot of a ridge of snow mountains where we found Springs and Brooks of cool fresh water and plenty of good grass—Travelling after noon 20 miles.

Sunday Aug. 4th 15 So anxious were my partners to overtake Greenleaf that they determined to leave our delightful encampment although it was Sunday and, although it was actually necessary to give our horses a day of rest. Five miles travel over the mountains and ten over a sand plain brought us to the foot of another range of snow mountains where we found Greenleaf &c up to the eyes in green and fresh water in abundance. Reached the encampment at 11 1/2 O'clock A.M.

Mon Augt. 5th 35 M. At 7 A.M. resumed our journey—travelling all day a little West of South along the base of the mountains[12] from which flow at short intervals small streams of clear cold snow water into an extensive valley covered with abundance of grass and wild clover which our animals eat with great avidity—We are undoubtedly travelling too much South—but expect soon to find the road to make a turn through the mountains. We have just supped upon "Penola"[13] and water and are ready to give ourselves up to "morpeus"[14] & dreams.

Tuesday 6th Aug. 35 M. Continued our course along the base of the mountains for about 20 miles when we left the valley by turning to our right through a gap in the mountains travelling in a N. Westerly direction over a rough hilly country until 9 at night when we encamped in a valley upon a small stream running North. Crossed today several indian fences (if it is proper to call them so) they consist of sage bushes with the roots turned upwards and placed two or three feet apart and extending in a line over hill and valley as far as the prospect extends. What is the use of them is to me a mistery. Some suppose they mark the boundary of different tribes or families and some that they have something to do with the capture of game. It proves to me that we are in the vicinity of Indians and that is no peculiar comfort to me seeing that I am minus my rifle. We are somewhat apprehensive of their stealing our horses if not our scalps—Made a fire of "greese weeds" cooked our supper and turned in.

Wed. 7th Aug. 25 Miles. Continued North down the valley 17 miles—when it was proposed by Herriman and Greenleaf to attempt to make

[12]The Hastings Cutoff went around the south end of the Ruby Mountains and joined the main road of the Overland Emigrant Trail near Elko, Nev.

[13]Penola—a type of bread

[14]morpeus—morpheus

a cut off by changing our course to a North-Westerly course in hopes of striking St Marys River[15] by a nearer rout than to follow the creek around (which was supposed to be a branch of the St. Mary's).

The proposition was adopted and we struck off from the valley travelling over an awfully rough country of steep hills and deep ravines for about eight miles, when we reached a valley of good grass but no water. We concluded to stop here for the night uncertain of finding another so good a place. After looking up and down the valley for water we concluded to dig a well and succeeded in finding plenty of water by digging about two feet below the surface of the bottom of the ravine—Thus supplied we lay down in contentment—Company—Greenleaf, Jones, Warren, Hoyt, Willard, Herriman, Wait & Myself. Shields & Dewey Keeping the road.

Th. 8th Aug. 25 Miles. Keeping our course over high hills, and deep ravines, in which we found some grass but no water until 11 O'clock A.M. we came to a halt for consultation and decided (as there was no prospect of water ahead), to turn off towards the valley—We accordingly turned N.E. down a valley hoping it would lead us back to the road and of course to water. Wait proposed to transfer all the packages from "His" poney to old Charley—and so ride the poney by turns—the rider to lead the pack horse. While I was arranging the pack Wait mounted the Poney and started on. As soon the pack was arranged I started, driving Charley before me with the expectation of soon overtaking Wait. Charley followed the other horses until, as they turning the point of bluff, he lost sight of them. When he wheeled about and came rushing back towards me. In attempting to stop him I turned him off into a ravine leading into the mountains, and after chasing him for 4 or 5 miles over hill & valley succeeded in capturing him and getting back to the track, which I took, and followed until I lost all trace of my company—and concluded they must have left the valley. After looking in vain for their trail, I determined to mark out a course for myself—and turning to the East and climbing to the top of the mountain. Saw in the distance before me the mountains, topped with snow, a sure indication of "water" and with courage revived pressed forward hoping to be able to reach it before dark—unless indeed I might fall in with Indians which I aprehended, as I was constantly crossing their tracks and passing their camping places. The mountains and ravines are covered with a kind of dwarf fir, so thick in many places that it was difficult to pass. I succeeded however in reaching, just as the sun was setting the valley, which proved (as I expected) to be the valley & stream we had left the day before—Charley and I were both glad to get back to the green fields and limpid water of which we drank our fill and, then continued our course down the valley in hopes of finding our company for two or three miles, but not finding them I turned out old Charley—borrowed a frying pan of a neighbor—baked and ate a penola pancake and retired thankfully to rest in the "tall grass".

Fr. 9 Aug. 10 miles. Moved down stream 2 miles. I halted to await the coming up of the company which (from information received from an emigrant) I supposed to be behind me.

At ten o'clock the company came up and seemed surprised to find me ahead of them. Wait had a great story to tell about waiting and looking for me which nobody believed. The Doct. had kept up a fire until late at night and discharged several guns in hopes to direct me to their encampment, but I did not see or hear their signals.

Near this point the river passes through a narrow gap in the mountains and for about 8 miles the rocks rise nearly perpendicularly on each side to a great height—We crossed the stream 24 times in passing through—Waggons were obliged to keep the channel of the stream most of the way. At 6 P.M. we emerged into a spacious valley which proved to be the valley of Humbolt's or St Mary's river. Plenty of grass, clover, and wild flax. Encampments of emigrants in all directions. Among the animals we see Dewey's & Shield's "Creams"—Willow wood for fires—Quite a number of animals have been stolen by the indians the first day or two, and some men have had narrow escapes from them. Some Indians have been shot.

Sat. Aug. 10th 25 M. Travelled down the river 3 or 4 miles—turned off to the right upon a cut off over the mountains. After a most horid series of climbing up and climbing down for 7 or 8 miles we reached the river road and kept it for 9 miles, when we took another cut off to please the Doctor (who is perfectly mad on Cut-off's.) and after five miles farther travel encampeded upon the side of the mountain near a ravine with a small spring of water in it. The sides of the mountains covered with sage bushes—Bunch grass growing sparingly among it.

Common headstone for Costmor and Eleanor Clark, Tulocay Cemetery, Napa, California.

Sunday Aug. 11th 26 miles Awoke this morning and found our animals all safe and our scalps on. Left early travelling over a hilly, rocky road for 12 miles. We descended again to the river, which we kept for 14 miles and turned out. Provisions growing scarce.

Mon. 12th Augt. 30 Miles At 7 O'clock commenced our march. The river at our right upon the other side of the valley. Most of the day travelled along the foot of the hills and over sand ridges. The River being several miles from us upon the other side of the valley. At 3 P.M. found a well containing a supply of inferior water—Here we succeeded in buying 30 lbs of bacon from a wagon at 50 cts pr. pound. Left the road and bore diagonally towards river which we reached after about 6 miles further travel—where we found extra good grass and dry willow wood—Herriman and Warren falling behind and not coming in.

Tues 13th Augt. 27 M. Travelled over sand plains at a distance of several miles from the river. The larger portion of the travel being upon the other side of the stream—at 1 P.M. finding no water, we turned toward the river and found grass and water from our horses upon a slue several miles from the river—The valley at this point is probably 30 or 40 miles wide. Agreed to keep all together.

Wed. 14th Aug. 25 Miles Travelled N.W. about 15 miles most of the way over sand plains—and struck the river at noon—where Herriman and Warren overtook us. After noon left the river upon our right travelling in a Westerly direction for ten miles over a mountainous county—Struck the river again and encamped, Grass poor feed for horses. Passed today several shallow well of water salt as "lots wife". We have decided to go upon short allowance of flour (1/4 lb each twice a day) to be weighed accuratly Greenleaf's scales. I am both cook and steward.

The 15th 25 M. Travelling at a distance from the river, touching it at noon for bating & at night for encampment—Herriman & Warren falling behind and coming late into camp.

Fr. 16 August 25 Miles Herriman this morning insisted upon shifting a part of the load from "his" pack "mare" on to old Charley to which I objected—claiming that as he had both the mares and one of them exclusively devoted to his own use, I claimed the right of authority over Charley & intended to ride him occasionally as soon as his load was sufficiently reduced—for which I had been waiting a long time—He reiterated his exclusive right to the mares and joint ownership of Charley and swore and threatened to do just as he please in the matter.

[15]The Humboldt River

I proposed to have out the difficulty to the company to which he would not consent. Being just on the point of starting from camp and not wishing to delay the company, I took all the provisions from his pack—with the determination that if he got any of them for dinner or supper he would have to travel for them.

The company participated in feelings and we were soon under way and Doct. Herriman was soon out of sight behind us, and did not overtake us until late at night in camp upon the river.

Sat 17 Aug. 28 miles. Traveling still over a desert of sand—nothing growing upon it but sage. Many miles of our travel today had been over a plain of salt over the sand on which not even a sage bush grew. We reached the river at noon and after noon travelled over a hilly road and turned down to the river again at night. Greenleaf as usual looking out the camping ground. Herriman would not have found us to night had not Wait watched for him upon a neighboring hill. This was remarkable generosity for Wait.

And I am happy to record at least one generous act in him during the journey. Not another man in the company would have taken the pains.

Sun. 18 Augt. 25 M. Travelled away from Herriman and Warren as usual. Herriman probably fearing he should not be able to keep up with us, had the geneoristy to relieve Charley of a part of his load taking nothing but provisions. The river today has run our side of the valley and we have travelled most of the day near its bank. The valley is much narrower here than where we have travelled for several days past, and feed much more scarce. The water in the river very filthy—full of dead animals and swarming with toads and all manner of creeping things. And the air filled with flies and mosquitoes, and the whole valley made up of "slues" and bogs.

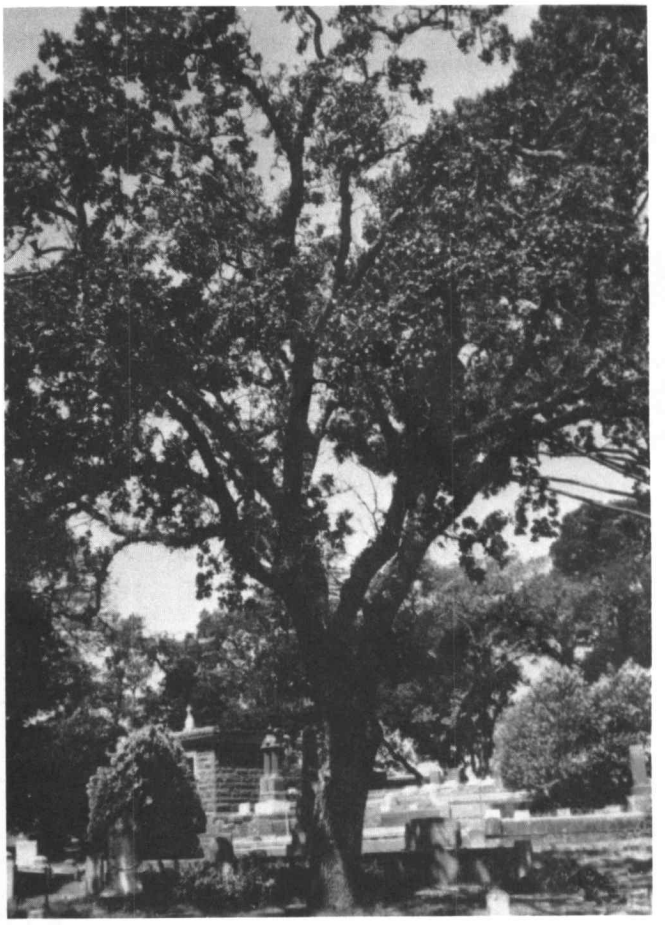
Most of our horses have been mired some of them several times (old Charley two or three times). Last night we had to turn out several times to draw animals out of the river & slues—Saw some Indians today upon a bluff—looking down upon us—I was several rods in the rear of com. & walking on foot and driving Charley before me. As I was passing them a bushy headed fellow started down the hill apparently with the intention of cutting me off from the train. I started Charley off up to the trot, and he was soon up to the company. I continued to walk on brandishing my carpentars hatchet occasionally to show the Indian that I was "armed" and ready for action. Mr. Indian came down to the trail but did not think proper to follow me, perhaps fearing my formidable weapon—an old dull hatchet loose upon the handle—the only weapon left me. My rifle and knife both lost. Indians are very suspicious of white mens weapons. Especally the little guns that shoot so many times without loading—Herriman & Warren absent tonight.

Mon. 19th Augt. 1850 This morning bought of an emigrant 200 lbs. beef at 25 dollars and concluded to remain in camp to jerk it which we did by cutting it from the bone in thin strips and laying it upon a frame made of sticks under which we built a fire, which, with the help of the sun, dried it "brown" and reduced its weight from 200 down to 25 lbs. It took us all day to defend it from the immense number of flies that seemed bent upon devouring it in spite of fire and smoke and all could do. The poor horses are almost devoured by mosquitoes. I spent the greater part of the night in fighting them away from poor old Charley.

Tues. 20th Augt. Continued our journey down river towards "sink"—enquiring of every waggon for provisions. Had flour offered us at two dollars per pound and beans at one dollar a pint. We concluded to eat meat alone rather than submit to extortion. Stopped upon the "great marsh" at the head of the "lake or sink" to bait our horses at noon, where we found good grass and passable water by wading a long way into the marsh. After noon—travelled down the marsh and encamped finding good feed and palatable water by "wading" out into the tall canes—no wood—

Wed. 21st. Aug. Two or three miles travel brought us to the lake—The "receptacle" of Humboldt's or St Mary's River.—which we found to be a large body of water, perhaps ten miles long and half as broad—water much better than we expected. No wood or grass upon the margin of the lake. We stopped at noon near the entrance upon the "Desert"—Bated our horses upon 'reeds' which we waded for and cut in the lake—

Remained here until 4 O'clock—Cooked a pound of rice—the last particle of food we had left—with the intention of eating it during our journey over the 50 mile desert.



This oak tree shades the Clark family plot in Tulocay Cemetery. The tree grew from the soil used to fill in Eleanor Clark's grave in 1887.

While waiting here Herriman came into camp but was very cooly received by all the company and seemed to take the hint that his company was not necessary. On leaving he gave me an invitation to join company with him which I declined, and consider our connection finally disolved. At 4 O'clock left the sink and started out upon our nocturnal journey anticipating a hard night—and perhaps the loss of our animals or some of them at least—At 5 1/2 O'clock left the lush place of water East of Carsons river—

After travelling 10 or 12 miles concluded to rest and eat our rice which we found to be sour. All of us however ate a little of it and started on driving our animals as rapidly as possible—passing every thing upon the road and reached the river at 6 O'clock in the morning—Having myself, travelled during the day and night 65 miles all the way on foot. The road across the desert was quite hard and smooth excepting the last 8 or 10 miles which was over soft sand and of course very hard to travel. The greatest anoyance we suffered was the intolerable stench of dead animals which lined both sides of the road the whole distance—in numbers sufficient to have made a bridge of animals the whole 30 miles. And waggons & other property abandoned sufficient to have made another of the same length—It was a most horrid picture of destruction which I never wish again to witness.

Ten miles out encountered a couple of waggons having for sale water, and other luxeries, such as cakes pies &c. Not having the "bag" I could not buy, but had the felicity of smelling the flavor of a couple of apple pies which my partner Mr. Cary Wait bought and devoured with characteristic forgetfulness of everyone but himself—a circumstance which I cannot soon forget—as they were bought with co. funds. The price of water—50 cents a gallon. "Pies one dollar &

twenty-five cents, other things in proportion.

At river found quite a trading post of provisions brought over the "Sierra Nevadas". flour selling at 1 1/4 dollars pr. pound. Bacon and other provisions about the same. Grass quite poor. The river a clear beautiful stream about 4 or 5 rods wide and 3 feet deep.

22 Aug. 9 O'clock A.M. Have just had a fine feast of pancakes (made from chile flour) and bacon. Washed up the dishes and are ready to fall into the inviting arms of Morpheus. Refreshed by two hours sleep under the shade of a cluster of oaks upon the bank of the river—arose and took a stroll through the town of waggons and tents. Many are engaged in selling provisions and meals to emigrants and the way that cakes pies and other eatables suffer is a caution—This appears to be a very fine valley and well supplied with wood upon the banks of the stream—We leave here in the morning—

Fri. 23d Augt. Left our first encampment upon the river and moved 8 miles farther up the valley for better feed. Passed several trading tents—bought nothing but ten pounds of flour at two dollars pr. pound. We might have bought liquor at one dollar a glass. We saw many patronizing the bar but none of our party indulged. We heard of flour sent out from California either by the State or by private subscription, for the relief of the destitute—but those who made application for it could get but one pound of flour each, and before they could get even that must convince the official that they were entirely destitute of any property that they could exchange for food. From what I can learn very little provisions have been furnished to the "suffering emigration" excepting what has been sold at a very high price. Among the travellers today is a woman with a small child travelling on foot and alone. Her husband left her a day or two ago and went ahead in hopes of securing provisions of which they were destitute. The person in whose charge she was left abandoned her upon the desert, when they lost their team. If she does not find her husband—hope she may find a friend who can spare her a horse to ride—

Sat. 24th 25 miles. Continued our course up Carson valley—which abounds in groves of timber of several varities, good grass and plenty of fresh water—

Sunday 25th 25 miles. Passed today over a sand desert of several miles travelling back from the river. Reached the valley again in good season finding a pleasant encampment under some large oaks. Surrounded by good grass, and water convenient.

Monday 26th 25 miles Have passed to-day (as we have every day in the valley) trading tents at short intervals—Flour is selling at $1.25, bacon or pork, sugar &c. the same. New mines have been discovered here, and quite a number of miners from the other side of the mountains are "prospecting" in the ravines which open into the valley from the mountains. The sides of the mountains here are covered with pines and are quite lofty and precipitous. Near this point "Morman Station"—is a cut-off through the mountains—which if Herri. was with us, we should be sure to take if he could persuade us to it. But wanting his aid and influance the advocates for short cuts "can carry" and we shall probably "go round". This morning I detected a "poor divil" in the act of stealing a horse—He was tried by judge Synch and condemned to whipped—and accordingly received thirty lashes well laid on. I retired from the scene—but not so far as to be out of hearing of the blows and shrieks which were most painful to my sensibilities—and I more than half repented my agency in the affair.

Tuesday 26th 25 miles Ate this morning our last morsel of provisions viz 3/4 lb. flour and 1/2 lb. bacon which we considered rather a small allowance for 6 men. Greenleaf concluded to take Mr. Hoyts mare (the best animal in the company) and go ahead in hopes of securing provisions to be in readiness for us when we got through and perhaps meet us with relief. At noon had and opportunity of selling a mule (belonging to Greenleaf) for forty dollars which cost at St. Jo $120. In funds again and a supply of provisions of course, pork & flour costing us but a dollar & half a pound.

Wednesday Aug. 27th 25 miles Bought flour & pork today at $1.25 pr pound. met trains of mules loaded with provisions to sell to the emigration, and companies of miners with their tools & provisions going to the new mines in this valley. Meet trading posts every few miles. Thus far the whole valley is uniformly beautiful. The purest water flows from the mountains—Grass & clover covers the whole plain and the sides of the mountains are shaded by beautiful pines down to the valley.

Thursday 28 Aug. After a few miles travel turned to the right into a kanyon—the mountains rising to a great height on either hand. The road rough but pleasantly shaded by the magnificient pines. A beautiful brook of water cold and pure, supplied by springs gushing out on every hand is rushing towards the valley.

At noon stopped for dinner during which time a discussion was had upon the questions—whether pancakes were bread!!!—and what amount of money would be sufficient compensation for a journey to California. Wait and Jones—Wait especially—were much vexed at the impropriety of my calling pancakes bread, and insisting upon the correctness of my position. And upon the other question, I was "no whar" in being satisified with an ounce a day—Mr. Wait swore by the "holy smut" as he had often done before that he would never return home with a less sum than $150.000.!! Travelled in the afternoon up some tremendous hills and at night entered a fine valley of small extent through which flowed a fine creek & camped for the night.

Grass & water good and abundant.

Friday 29 August Quite a severe frost during the night—in my two pair of pantaloons and three flannel shirts & with coats and blanket around me managed to spend the night comfortably warm.

Met this morning Mr. Chadwick & Stanford looking for their horses which had strayed in the night. This has been a hard days travel during which we climbed to the summit of the Nevadas and commenced our decent towards the Pacific—Snow and ice abounds in all the shaded localities. The nights are quite cold, have build a regular log heap fire of fallen pines and wait the morning.

Sat 30 Aug. Leek Spring Valley was rached after dark, said to be the last place of grass for 40 miles.—Found very little here. Bought flour at 56 cents pr pound.

Sun. 31 Augt. Encamped 28 miles from Hangtown[16] in a deep ravine away from the road (to the South). Found grass and water.

Sept. 1st. Stopped at noon to feed our horses near a little lake with a little grass upon the margin. Towards night met Greenleaf near Johnsons Ranch and went into camp a mile South of Johnsons where we found provisions in abundance—a waiting for us—Thankful that our journey was ended and that we were at last in the Land of gold & of plenty. We revelled in the luxury of a full meal for the first time in many days, and were soon in the Land of dreams.

Sept 2nd .Old Charley very sick.

Sept 4. Old Charley dead.

[16]Now Placerville, Calif.

Resource Value Rating: Definition, Determination, Application, and Use

T.E. Bedell

Resource value rating is the term used in the Range Inventory Standardization Committee (RISC) report to the Society for Range Management to denote value of vegetation or other features of an ecological site for a particular use or benefit. Not only would the concept apply to ecological site, but also to the ecological status of a site. On the surface, the concept appears to be highly applicable. To some degree range managers have been using the RVR concept, but often not within the ecological site framework.

Thus, an examination of the concept and its applicability was undertaken via a panel discussion at the 1985 Pacific Northwest Range Management Short Course held in Boise, Idaho, January 25-27, 1985. Following are written forms of the four presentations made by Bob Wagner, Bureau of Land Management; Bob Kindschy, Bureau of Land Management; Wendall Hann, U.S. Forest Service; and Bill Anderson, Certified Range Management Consultant. It was my privilege to be panel moderator. I trust you will find the ideas challenging and useful.

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Resource Value Ratings in Relation to Livestock Forage Values

Bob Wagner

Resource value rating is defined as the "value of vegetation present on an ecological site for a particular use or benefit" (RISC 1983). The Bureau of Land Management (BLM) believes that resource value ratings can be a tool to aid the manager in the decison-making process. BLM emphasizes the need for standardization of terms and guidelines to acquire consistent range condition data so that reliable estimates can be made of changes (trend) in range condition and other resource values. This is required by the Federal Land Policy and Management Act (FLPMA) of 1976 (Public Law 94-579) and the Public Rangelands Improvement Act (PRIA) of 1978 (Public Law 95-514).

FLPMA, Section 201(a), requires the Secretary to prepare and maintain an inventory of the resource values and other values on the public lands on a continuing basis. The inventory must be current, reflect changes in resource conditions, and identify new and emerging resources and other values. The PRIA Section 4(a) is more specific. This section requires the Secretary to "update, develop (where necessary), and maintain on a continuing basis an inventory of range condition and a record of trends of range conditions on the public rangelands. The record shall be kept current on a regular basis so as to reflect changes in range conditions and shall be available to the public."

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The BLM is mandated by law to manage public lands for a variety of uses. The vegetation production on these lands has a variety of uses, i.e., livestock, wildlife, watershed stability, or aesthetics. Of course, a particular constituency supports a particular use, and all these desires in the aggregate usually outdistance the public land production. Consequently, a manager must make decisions about these possible resource outputs. Some of the various constituencies are happy, while some are not happy with the decision that sliced the pie. A relative value for these resources and uses might better illustrate and explain why a decision has been made.

A resource value rating is an interpretation. If the resource changes or the use or user changes, so might the resource value rating. A common reference point or plant community needs to be used for rating the variety of values. These ratings can then assist the manager in identifying management schemes, alternatives, predicting direction of change, and monitoring accomplishments.

Utilizing value ratings of the vegetation for specific uses, the manager can better analyze and display the tradeoffs of various management alternatives to the public. The actual rating of the vegetation should be accomplished by someone knowledgeable in that specialty. There needs to be agreement on the unit and vegetation community that the rating will be applied on. This might be each seral stage of the ecological site or perhaps more than one vegetation community in a seral stage.

Managers need resource value rating interpretations of the present vegetation and the vegetation of the other seral stages. This information could improve management of public lands, improve Environmental Impact Statement (EIS) impact projections/analyses, assist Annual Management Plan (AMP) economic analyses, and possibly help develop crosswalks between earlier range condition reports and future reports of the resource status.

Most of BLM vegetational inventory methods in the past were more livestock oriented as to forage species condition and site rather than ecological site community concept. Prior to 1978, BLM inventory methods closely followed a functional livestock forage desirability classification that paid specific attention to the kind of livestock and the season of use. Quality and quantity of available vegetation determine the livestock forage value or resource value rating, but quality might be different for different kinds of livestock. This classification indicates the grazing value of each important plant species for specific kinds or mixes of livestock. It is based on palatability or preference of the animal for a plant

species in relation to other plant species, the length of time that the plant is available for grazing, and the abundance of the plant. For example, the Deming Two Phase Method was a livestock forage condition classification inventory. The method, developed by Milo H. Deming during the early 1950's, was used by the Bureau during the 1950's, 1960's, and 1970's, (BLM 1955 and 1960).

In 1978, BLM adopted a vegetation inventory method that related more to successional stages of a site. This methodology, Soil Vegetation Inventory Method (BLM 1979), was adapted from the Soil Conservation Service's (SCS) Range Site Methodology (SCS 1976). BLM continues to use the SCS range site concept for inventory and classification of rangelands (BLM 1984).

A major problem in the use of all of these methods has been the confusion concerning the variety of ratings and what they represent. For example, under the Deming Two Phase Method, a fair sheep range may be rated a poor cattle range when the operator switches to a cattle operation, although the vegetation community would be the same.

Over the years, BLM occasionally made reports to Congress on the status of range conditions on the public domain. Some cattle range reported in "poor condition" in relation to the soils and site potential actually could be in a fairly late ecological stage. The opposite could also occur. When the public saw this type of report, it raised the question, "Are the public lands even being managed?" The use and connotations of adjectives such as "poor" and "excellent" continue to raise such questions in the mind of the public.

Perhaps BLM's explanations were inadequate, misconstrued, or totally lacking. Reports that indicate "poor condition" may be misinterpreted by some to mean that poor management is occurring when this may not be the case. Possibly the stage must be retained to meet specified management objectives. If the report is "poor cattle forage condition" and the ecological status is late seral stage, the question is, "Can a crosswalk be established for better communicating management directions, objectives, and accomplishments?" Livestock forage values may or may not parallel the successional stages of an ecological site. In public land management, site potential and the current resource condition need to be considered in land use planning, management objectives development, and grazing management strategies. This information can be helpful in the discussion and display of impacts and trade-offs in multiple use management decisions.

To do this properly, accurate site identification is critical. I feel we need to pay more attention to the soils situation. In some areas, the soil surface layer has been changed significantly to the extent of creating a new ecological site, and consequently, a different potential from that of the previous site designation. Improper site identification will result in management decisions that are not going to accomplish resource capabilities, management objectives, or public user demands.

The Range Inventory Standardization Committee (RISC), Society for Range Management (RISC 1983) presented the following quoted discussion on the need for inventory in resource planning:

> Classification of ecological sites is background information desirable and necessary for the collection and proper interpretation of vegetation and soil data. This classification, and the accumulation of information relative to the sites so classified, come mainly from studies and research. An ecological site classification provides the basis for identification and delineation of sites on a given area of land and for predicting potential values or management needs and responses of the area. Using the ecological site survey as a means of stratification, the present character or status of vegetation and soil is characterized in such a way as to provide an estimate of present resource values and to predict the consequences of a change in management or continuation of present management. This requires collection of data on plant species present, their relative abundance, the productivity of the system, changes in vegetation and soil protection, an estimate of present resource outputs or values for particular uses, and current levels of use. Classifying present variation in ways meaningful to resource values furnishes much of the desired information thereby reducing the inventory process to one of identification and mapping of ecological sites and existing vegetation. Detailed information on species composition, vigor, stand structure, productivity, utilization, and soil protection are needed in most cases only on selected monitoring locations.
>
> The final step is to interpret the field data collected in terms of range condition, present or potential resource values, trends in these values, and probable causes of trends identified. Some of these computations or interpretations should be made in the field when data are collected. There is a significant difference between data collection and interpretation which must be recognized. Data collection is objective and without built in value judgments. Interpretation depends on value judgments or state of knowledge and can vary over time or among different interests. For example, measuring 50% utilization is an objective procedure, but designating that percentage utilization as safe or moderate use is a matter of professional judgment.

The use of standard terminology and definitions is important for consistency in interpreting and communicating the status of resource conditions within any agency and between agencies. Standardization of range inventories and monitoring by government agencies will be the first step in overcoming past problems experienced in comparisons of range condition information. Once standard inventories and monitoring techniques are used, the data can be aggregated and better comparisons of trend in ecological status and resource values can be made on all rangelands. To achieve consistency, BLM adopted the report of the Range Inventory Standardization Committee, Society for Range Management, entitled "Guidelines and Terminology for Range Inventories and Monitoring," February, 1983. According to BLM, this report contains a valid concept to build on.

BLM is in a transition stage for standardizing the data base. The ecological site inventory method will be used to establish the data base for determining change in ecological status and success of current management practices in achieving management objectives. The goal is to have, as a minimum, an Order 3 soil survey and an ecological site inventory on all major blocks of public rangelands. This will be an ongoing long term effort.

I am not sure that an acceptable crosswalk can be established between seral stages and forage values for national reporting. However, resource value ratings (including forage values) may aid in explaining previous national reports; for example, why an early successional stage acreage is not being proposed for advancement to a later seral stage or why the percentage of acreage in a particular seral stage is meeting land use objectives through the current management scenarios.

It may be difficult to aggregate forage values to seral stage at the national level of reporting without segregating the seral stages to the sites; however, it may be possible to indicate percentages of the seral stage acreage that are in different forage value classes and meeting management objectives. Again, the main values of resource value ratings are as an aid or tool to better identify and analyze impacts, outputs, values of a variety of resources; to improve objective setting and monitoring; and also to display and communicate tradeoffs, management objectives, and accomplishments.

In 1984, BLM established a work group to consider procedures for resource value ratings as they relate to livestock grazing. BLM has since recommended to the SCS that further work on resource value ratings for livestock grazing be accomplished as part of the National Range Handbook rewrite. The intent is to strive for interagency development and adoption of the procedures.

Literature Cited

Bureau of Land Management. 1955 and 1960. Condition surveys, range condition and trend. BLM Manual. U.S. Dept. Int. BLM Volume IX Range, Part 10 Studies, Chapter 10.3.

Bureau of Land Management. 1979. Soil vegetation inventory method. U.S. Dept. Int. BLM Manual 4412.14.

Bureau of Land Management. 1984. Ecological site inventory. U.S. Dept. Int. BLM Manual 4410; H-4410-1.

Public Law 94-579. October 21, 1976. Federal Land Policy and Management Act of 1976.

Public Law 95-514. October 25, 1978. Public Rangelands Improvement Act of 1978.

Range Inventory Standardization Committee (RISC). February 1983. Society for Range Management. Guidelines and terminology for range inventories and monitoring.

Soil Conservation Service. July 13, 1976. National range handbook. SCS, USDA.

Rangeland Vegetative Succession—Implications to Wildlife

Robert R. Kindschy

In 1928, Frederic Clements, in his epoch work "Plant Succession and Indicators" stated: "The nature of the climax as the final condition of the vegetation of a climatic region—through a climatic period—makes unavoidable its use as the primary basis for the classification of existing seres."

Oosting, in 1950, further observed: "Plant communities are never completely stable. They are characterized by constant change, sometimes radical and abrupt, sometimes so slow as to be scarcely discernible over a period of years. These changes are not haphazard, for within a climatic area, they are predictable for a given community in a particular habitat. This means, of course, that similar habitats within a climatic area support a sequence of dominants that tend to succeed each other in the same order. Contrasting habitats do not support the same sequence of communities. As a result, any region with several types of habitats will have an equal number of possible successional trends".

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Pronghorn of the tall sagebrush-dominated Great Basin often benefit from reduction in brush overstory.

Forest succession has been observed for a long period of time. Implications to wildlife are well known to Idaho ecologists due to the well documented relationship of elk to the early successional seres following the extensive forest fires in north-central Idaho during the early part of this century. The more subtle changes in rangeland vegetation were less apparent. Surely wildfire played a major role in the successional disturbance of our intermountain rangeland ecosystems. Dr. Peter Mehringer of Washington State University (in press) has examined sediment deposition in several small, permanent, lakes in southeastern Oregon. It is apparent, based upon the abundance of pollen, that the grasses dominated for periods of time—followed by a dominance of the sagebrush species. The pattern was cyclic and probably indicative of periodic climatic changes as well as the occurrence of wildfires after which natural successional advancement enabled the establishment—and perhaps dominance of the climax shrub—sagebrush.

Recent investigations (Heady and Bartolome 1977) and research on relic sites in the intermountain West leave no doubt that sagebrush is one of the so-called "climax" species within these communities. It is probable—depending on the specific site—that sagebrush provided an average of <25% ground cover under pristine conditions.

These facts are important because our native wildlife species evolved within these environments. Normally we are dealing with between 200 and 300 species of vertabrate animals when the "non-game" species are considered. Each species, or more accurately groups or "guilds" of these varied species, have habitat preferences. Some are obligatory to certain habitat conditions—without which they disappear from the local fauna. Perhaps the sage grouse is the most cited example although Brewer's sparrow, sage thrasher, and other species of birds, mammals, and reptiles are equally obligatory to the presence of sagebrush.

Townsend ground squirrels have prospered in sagebrush-free rangelands, especially in crested wheatgrass seedings. Their abundance seems to be paralleled by that of ferruginous hawks and other raptors.

under these seemingly ideal conditions the population "peak" persisted for 14 years. Ground squirrels afford an excellent prey base for many carnivores, including raptors. A population of ferruginous hawks (a species of concern due to comparative rarity) became breeding residents and fledged more successfully than heretofore observed by avian biologists (Lardy 1980). Eventually, in 1982, disease (most likely plague) decimated the squirrels. The hawks and other predators thinned correspondingly to areas of better foraging. The point is that successional change in vegetation due to fire and, in part, to the introduction of an exotic perennial grass, set the stage for a prey species which ultimately benefitted a favored predatory species.

Sage grouse may locally be a part of a more complex successional interrelationship of plants and animals. Researchers have documented repeatedly that the most prevalent problem with sage grouse is a lack of recruitment. The adults breed but young do not survive to replace the normal mortality of aged adults. Predation is highly suspect as the principal cause of this juvenile loss. Some predation by hawks, eagles, crows, ravens, magpies and other avian species has been recorded. Mammalian predation may also play a role from coyote, bobcat, badger, and other species. Why is this? What has changed to cause this increased impact of predation on sage grouse? In our area of southeastern Oregon the population of blacktailed jackrabbits has been very low to almost absent since the completion of the Vale Project and the intensive range management which all the seedings, fences, water developments, and related management facilities enabled. The range has definitely experienced successional advancement toward climax resulting in more perennial grass and forb species and less brush overstory; coupled with this are the associated zoologic successional changes. Blacktailed jackrabbits are best suited to early successional seres. Their habitat has changed from what had been good to excellent to that which is poor and very restrictive. Dependent predators, however, have shifted to other prey bases, the so-called "buffer species," of which the sage grouse may qualify. It would be interesting to observe sage grouse chick survival at a time when jackrabbits were once again abundant. Everything in the ecosystem is "hooked together"!

Range management has seemingly always professed a singular goal of "improving range conditions". While this is admirable, it surely must be qualified—improved range conditions for what? We can no longer speak of range conditions as being "poor, fair, good or excellent"; rather we must speak of the successional sere or stage as "early, middle, late or climax" or intergradations thereof. This is also politically good. No one would want to design management schemes for a "poor" or even a "fair" condition range. Yet many wildlife species require succession in the "mid" stage. In fact, I believe maximum diversity of habitat and the associated wildlife diversity normally occurs at the mid or mid-late successional sere.

Literature Cited

Clements, Frederic E. 1928. Plant succession and indicators. Hafner Pub. Co., New York, N.Y.

Heady, Harold F., and James Bartolome. 1977. The Vale Rangeland Rehabilitation Program: The desert repaired in southeastern Oregon. USDA Forest Serv. Res. Bull PNW-70.

Lardy, Michael E. 1980. Raptor inventory and ferruginous hawk breeding biology. MS Thesis, Univ. of Idaho, Moscow.

Oosting, Henry J. 1950. The study of plant communities. W.H. Freeman and Co., San Francisco, Calif.

Thomas, Jack Ward. Tech. Ed. 1979. Wildlife habitats in managed forests—the Blue Mountains of Oregon and Washington. USDA Forest Serv., Agr. Handbook No. 553.

Evaluation of Resource Values in the Northern Region of the Forest Service

Wendel J. Hann.

A resource value rating is considered to be the value of a unit of land for a given resource. This resource may range from livestock carrying capacity or diet quality to elk habitat value. Rangelands of the National Forest and Grasslands of the Northern Region, which includes northern Idaho, Montana, North Dakota, and northwestern South Dakota, contain a large amount of variability in both vegetation and site characteristics. Variability of the site potential for a given land unit can be stratified by mapping habitat types (Daubenmire 1952). This stratification produces land units that will produce one type of potential natural community and contain relatively uniform physical site characteristics. These land units are further stratified by type of existing vegetation and suitability for the resource use. The ecological status of the land unit is determined by comparing the composition and structure of the existing vegetation with the potential natural vegetation for the habitat type. This comparison is used to rate the plant community into the early seral, mid seral, late seral, or potential natural stage for the habitat type.

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The resource value of the community is rated based on the quality of the plant community for production of various resource products.

Variables sampled within each unit include (1) canopy cover, height, frequency, utilization, phenological stage, and age class distribution by species; (2) production by life form; (3) pellet group counts by animal species; (4) ground cover; and (5) evaluation of soil condition indicators. The sampling methods used to collect this information include intensive plot sampling on benchmark areas and ocular estimate sampling on all other areas. Ecological condition for vegetation in each existing vegetation/land unit is determined by calculating similarity of existing vegetation to the potential natural community and scaling it from 0 to 100.

It is apparent that there are many different types of resource value ratings that can be made for various ecosystem units including (1) forage ratings for elk, cattle, deer, grizzly bear, sheep, and other herbivores; (2) ratings of habitat suitability for wildlife relative to cover needs; (3) visual ratings; (4) water production; and others. When we have a fairly complete successional classification of community types for each habitat type, as described by Huschle and Hironaka (1980), Hann (1982), and Arno et al. (1985), actual production values can be determined for each resource by community type. For instance, a forage production value of 5 animal days use per acre can be determined for cattle in the arrowleaf balsamroot/silky lupine community type, of the Idaho fescue/bluebunch wheatgrass habitat type, on southerly aspects, 10-35% slopes, 18-22 in precipitation zone, loamy-skeletal, mixed Typic Gryocrepts and Cryoborolls on noncalcareous quartzite parent materials. Using the summary information of species composition, height, soil surface cover, animal use, and production, resource value can be determined for this community type for almost any resource use. The value for a given resource use can then be compared to the highest value for a community type within the habitat type. If the management objective is to maximize this resource product then the present vegetation should be managed to produce the vegetation with the highest rating.

For habitat types without a successional community type classification, it is much more difficult to place a "real" value on a given resource. General suitability models are often used that produce a relative rating for existing vegetation. For instance, the preferred diet composition of elk or cattle could be compared to the existing plant composition. Equal similarity would produce a relative rating of 100, in contrast to total dissimilarity, which would produce a relative rating of 0.

In order to develop the successional community type classifications by habitat type and the associated summaries and models for various resource products and values, a large amount of data is required. There are two types of methods that can be used to develop these summaries and models. One is to sample all attributes on all lands to a standard confidence level. A model is then developed and predictions are tested. This is a very sampling-intensive process, but results in precise model output for all attributes on all lands. The second method is to gather minimal data to develop model coefficients. The model is developed and predictions are tested. If the level of predictability is acceptable for management recommendations, even though this could be as low as 60% in some cases, then there is no need for more sampling. If the predictability is not acceptable for making management decisions, then additional sampling is required. In many cases the initial model using this method can be developed based on the experience of managers and researchers and data that already exist in the literature. Considering the shortage of resources for intensive sampling, it is likely that most of the initial models will use the second approach.

This type of approach fits well with the view that the need for high predictability depends on the type of resource relationship, time for response or implementation, and the geographic location of the unit being evaluated. In many cases we can accept a fairly high risk of a wrong prediction early in a planning period, but the predictability must be improved over time in order to meet long range goals. In other situations, the acceptability, of a level of risk of a wrong prediction may remain the same over the planning period. The evaluation of risk relative to the resource and management area should be a key factor used in setting standards for monitoring and predictability. By making this evaluation, the availabile resources for monitoring can be allocated to the resource evaluations that are most critical for good land management.

To obtain the amount of data needed to develop multiple resource relationship models, the Forest Service will need to coordinate the various inventory data bases. The key to coordination of this data is in the use of the same site and vegetation classifications and in development of reliable treatment history and vegetation response over time.

This can be accomplished by using computer resource data bases with relational programs and by setting standards for collection of common data using the same methods. Forest Service data bases include information on timber stands, land management planning capability areas, wildlife, range, and landtypes. Data can be accessed from these different computer files, entered into a resource relationship model and output can be determined for a vegetation/land unit. A geographic information system can then be used to synthesize the predictions for vegetation/land units into output by map unit, compare and integrate adjacent map units, and summarize resource predictions for a given management area.

In summary, the continued development of successional community type classifications by habitat type will produce a valuable information storage and retrieval system for evaluating resource values. The data from these systems can also be used to model vegetation response to treatment and resource production. By efficiently utilizing the experience of professionals, existing data and models, and coordinated inventory data from various resources, we can produce the kind of predictions and summaries that will meet the needs of land management decision makers.

Literature Cited

Arno, S.F., D.G. Simmerman, and R.E. Keane. 1985. Forest succession on four habitat types in western Montana. USDA, Forest Serv., Intermountain Forest and Range Experiment Station, Ogden, Utah. GTR INT-177. 74 p.

Daubenmire, R. 1952. Forest vegetation of northern Idaho and adjacent Washington, and its bearing on concepts of vegetation classification. Ecol. Monogr. 22:301-320.

Hann, W.J. 1982. A taxonomy for classification of seral vegetation of selected habitat types in western Montana. Ph.D. diss., University of Idaho, College of Forest, Range, and Wildlife Science, Moscow. 235 p.

Huschle, G., and M. Hironaka. 1980. Classification and ordination of seral plant communities. J. Range Manage. 33:179-182.

Rating Ecological Status and Resource Values

E. William Anderson

As early as the 1960's there was some localized recognition of the need to correct several conceptual problems that existed in the current procedure for rating range condition class. For example:

1. There was the need to measure species occurrence in the plant community by a quantitative method instead of by composition. While composition is a useful term, it is strictly a relative comparison and, when used as a measurement, a number of erroneous interpretations can be involved. Unfortunately, composition is still being used as a method of measurement in some instances.

2. Although the concept of Decreaser, Increaser and Invader species is meaningful, the use of these terms as criteria for determining how much of each species to count toward ecological status is an erroneous procedure. Range condition based upon the manipulation of the Decreaser-Increaser-Invader ratings was actually a resource value rating. As a result, many were led into equating range condition class not only with ecological status, but also with resource values, stocking rates, and other interpretations.

3. A procedure for making practical value ratings for various uses of the resource was needed. The current procedure, which required dependency upon experienced judgement, should be replaced with a procedure that could be checked and used by others with acceptable uniformity and consistency, thereby lending credibility to the process.

Toward this purpose, a procedure for quantitatively rating ecological status and resource values had been tested in Oregon prior to 1968. It has since been modified slightly to conform with suggestions made in the 1983 report of the S.R.M. Range Inventory Standardization Committee (RISC). For rating resource values, the purpose of this procedure is to quantify the relative value of the present plant community, per se, as a factor in watershed quality and as a source of food for selected herbivores. This is NOT a habitat nor watershed evaluation. The value of a habitat involves evaluation of such factors as the availability of water, steepness of slope, nearness to and kind of cover in addition to the forage value of the current vegetation. A watershed evaluation includes such factors as surface geology, soils, climate, topography, and land use as well as the vegetation.

Although much thought and testing has been involved to date, this procedure undoubtedly can and should be improved. Hopefully, it will provide a starting point for those who are interested in developing a practical field procedure.

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Guide to Rating

The first step is to develop a guide sheet for rating ecological status and resource values for each ecological site (Figure 1). Plant species usually found on each site are listed (column 1) and the approximate amount of each in the potential natural plant community (PNC) is shown (column 2) and totalled at the bottom of the column. The method of quantitative measurement represented by the guide must be indicated because the same method must also be used in measuring the present plant community in order to rate ecological status and resource values.

The rating procedure developed in Oregon uses percent canopy cover as the method of quantifying the plant community (column 2) because this method is equally adapted to grassland, shrubby, savannah, woodland and forest ecological sites. Furthermore, all species of gramineae, forbs, shrubs and trees, as well as mosses and lichens, bare ground, gravel and stones, litter and mulch can be measured by the same method of quantification. This enhances the value of the data for ecological interpretation.

In the guide to resource value ratings (RVRs), each species is ranked High (H), Medium (M) or Low (L), or not present (dash) as to its watershed value (column 3) and as food during spring (column 4), summer (column 5), fall (column 6), and winter (column 7) for a specified animal. Ratings for cattle and mule deer are illustrated in Figure 1, however, additional columns can be added to provide ratings for other herbivores such as horses, sheep, antelope, and sagegrouse. Interdisciplinary input to this process is essential and should involve the best expertise available, therefore necessitating the involvement of scientists and practitioners.

An RVR for watershed (column 3) is important because of the tendancy to overlook watershed values of the current vegetational cover. Water is a very valuable product and this fact needs constant emphasis so as to improve the degree to which it is recognized by resource users. Improving watershed quality should be emphasized as a primary objective in resource management programs.

Rating Sheet Instructions

The following step-by-step instructions for using the rating sheet (Figure 2) to rate ecological status and resource values for watershed and forage should be printed on the reverse side of the rating sheet for convenience in the field.

General

1. Identify the ecological site being rated and complete the information block at the bottom of the Rating Sheet.

2. Record the type of measurement used, i.e., % canopy cover, herbage weight, frequency hits, in the space provided above the columns. The type of measurement used in rating the present plant community must be the same as used in the Guide.

Guide to Rating Ecological Status and Resource Values

SPECIES COMMONLY FOUND ON THIS SITE AND AMOUNT IN PNC (POTENTIAL PLANT COMMUNITY)		RESOURCE VALUE RATINGS								
		WATERSHED	CATTLE FORAGE				MULE DEER FORAGE			
Measurement:	%canopy cover		Sp	Su	Fa	Wi	Sp	Su	Fa	Wi
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Mosses & liches	30	H	L	L	L	L	L	L	L	L
Bluegrass, Sandberg	35	H	H	L	L	M	H	L	L	M
Brome, cheatgrass	0	L	H	L	L	L	H	L	L	H
Needle-and-thread	0	H	M	L	L	M	H	L	L	M
Wheatgrass, bluebunch	25	H	H	M	M	H	H	L	L	M
Agoseris, annual	T	L	M	—	—	—	H	—	—	—
Balsamroot, Careys	T	H	M	L	—	—	M	L	—	—
Filaree	0	L	H	—	—	—	H	—	—	—
Fleabane, shaggy	T	M	L	L	L	L	M	L	L	L
threadleaf	1	M	L	L	L	L	M	M	L	L
Loco, woollypod	T	M	L	L	L	L	H	M	M	L
Phlox, longleaf	2	L	L	L	L	L	M	M	L	M
spreading	1	M	L	L	L	L	M	M	L	M
Yarrow	1	H	L	L	L	—	L	L	L	—
Rabbitbrush, gray	T	M	L	L	L	L	L	L	L	L
Sagebrush, basin big	0	M	L	L	L	M	L	L	M	M
PNC Total	95									
ECOL. PROVINCE: Columbia Basin Oregon		ECOL. SITE: Arid Rolling Hills								

Fig. 1. *Format for developing a guide to rating ecological status and resource values based on the species that commonly occur and the amount they contribute to the potential natural plant community of a specific ecological site.*

3. List species in the present plant community (column 1) and, for each one record its quantity in column 2. Enter the total of column 2 at the bottom as item (a).

4. Record in column 3 the amount of each species in the present plant community that occurs in the PNC. Obtain these data from the Guide to Rating Ecological Status and Resource Values (Figure 1) that applies to the site being rated. At the bottom of column 3 record the total quantity of the PNC *as shown in the Guide* (do not enter the total of this column). This total is item (b) in the community similarity formula explained in Step 5(d) below.

5. Determine how much the present plant community is like the PNC by the following procedure:

a. Where the present quantity of a species exceeds that in the PNC, record in column 4 only the amount shown for the PNC. The difference indicates how much this species has increased or invaded due to past conditions. For example, threadleaf fleabane and gray rabbitbrush have increased; cheatgrass and big sagebrush have invaded in the plant community shown in Figure 2.

b. Where the present quantity of a species is less than in the PNC, record in column 4 the lesser amount. The difference indicates how much this species has de-

R A T I N G S H E E T

ECOLOGICAL STATUS AND RESOURCE VALUES

SPECIES IN THE PRESENT PLANT COMMUNITY (PPC)	ECOLOGICAL STATUS Approx. quantity in PPC	in PNC	like PNC	RVR for WATER SHED	RESOURCE VALUE RATINGS FOR FORAGE: CATTLE Sp	Su	Fa	Wi	MULE DEER Sp	Su	Fa	Wi
Measurement: % canopy cover												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Mosses & Lichens	7	30	7	7	0	0	0	0	0	0	0	0
Bluebunch wheatgr.	10	25	10	10	10	10	10	10	10	0	0	10
Sandberg bluegrass	15	35	15	15	15	0	0	15	15	0	0	15
Cheatgrass brome	10	0	0	0	10	0	0	0	10	0	0	0
Needle-and-thread	3	0	0	3	0	0	0	0	3	0	0	0
Longleaf phlox	T	2	T	0	0	0	0	0	T	T	0	T
Threadleaf fleabane	3	1	1	1	0	0	0	0	1	1	0	0
Filaree	10	0	0	0	10	—	—	—	10	—	—	—
Yarrow	1	1	1	1	0	0	0	—	0	0	0	—
Basin big sagebrush	1	0	0	0	0	0	0	0	0	0	0	0
Gray rabbitbrush	2	T	T	T	0	0	0	0	0	0	0	0
Total	(a) 62	(b) 95	(w) 34	37	45	10	10	25	49	1	0	25
Ecological Status %	43											
Ecol. Status Class	MS											
Resource Value %				47	57	13	13	32	62	1	0	32
Resource Value Class				F	G	P	P	F	G	P	P	F

Ranch or Unit: Boeing Range Date: 4/20/70 Write-up No. A-7

Photo or map: BBB 78-121 By: Rugg - Anderson

Ecol.Province: Columbia Basin - Oregon Ecol.Site: Arid Rolling Hills

Fig. 2. *Format for determining the ecological status and for rating resource values of the present plant community for watershed and forage on a specific ecological site.*

creased due to past conditions. For example, bluebunch wheatgrass, Sandberg bluegrass, and longleaf phlox have decreased.

c. Total column 4 at the bottom as item (w).

d. Calculate the similarity between the present plant community and the PNC by the coefficient of community similarity forumula: $2w$ divided by $a + b$ where a is the sum of species values in the present plant community, b is the sum of values in the PNC, and w is the sum of the values common to both. Enter this figure in column 2 as the Ecological Status %.

6. Enter the Ecological Status Class symbol in column 2 using the following:

Ecological Status %	Ecological Status Class Symbol
76 - 100	PNC (potential natural plant community)
51 - 75	L S (late seral)
26 - 50	M S (mid seral)
0 - 25	E S (early seral)

Resource Value Rating

7. Enter the names of the animals for which ratings will be made in the spaces above seasonal forage columns 6 through 9 and 10 through 13. Add columns as necessary for additional herbivores.

8. Using the Guide to Rating Ecological Status and Resource Values that applies to the site being rated:

a. If a species is rated High in the Guide for a particular use of the vegetation, record all that occurs in the

present plant community (column 2) in the column designated for that use. For example, mosses and lichens are rated High in value for watershed, so all that occurs in the present plant community is recorded in the column for watershed (column 5). Filaree is rated High in value as spring forage for both cattle and deer, so all that occurs in the present plant community is recorded in the spring-forage columns 6 and 10.

b. If rated Medium, record the lesser of the two amounts shown for the present plant community (column 2) and the PNC (column 3). For example, bluebunch wheatgrass is rated Medium in value as summer and fall forage for cattle and as winter forage for deer, so the lesser of the two amounts (10) is recorded in columns 7, 8, and 13.

c. If rated Low, record a zero and, if not present, record a dash in appropriate columns. For example, filaree is rated low in value for watershed, so a zero is recorded in column 5. After maturity in the spring its foliage dries and blows away, so a dash is recorded in all columns representing summer, fall, and winter forage.

9. Total the watershed and each seasonal-forage column in the space provided at the bottom. This sum is item *w* in the formula used to compute Resource Value %.

10. For each column, calculate the Resource Value % by the formula: $2w$ divided by $a + b$ where a is the sum of species values in the present plant community, b is the sum of values in the PNC, and w is the sum of watershed or forage values common to both. Record the Resource Value % for each column in the appropriate space at the bottom.

11. For each column, enter the Resource Value Class symbol in the appropriate space using the following:

Resource Value %	Resource Value Class Symbol
76 - 100	E (Excellent)
51 - 75	G (Good)
26 - 50	F (Fair)
0 - 25	P (Poor)

Discussion

The plant community represented in Figures 1 and 2 has been simplified for illustration purposes. In this example, the present plant community has a 43% similarity to the PNC which places it in the mid seral (M S) ecological status class (bottom of column 2). Mosses and lichens, bluebunch wheatgrass, Sandberg bluegrass, and longleaf phlox have decreased on this site as a result of whatever conditions occurred in the past (compare column 2 with 3). Cheatgrass, needle-and-thread, filaree, and big sagebrush have invaded the site. No arbitrary assignment of species to Decreaser, Increaser or Invader status is involved in this interpretation which enhances the ecological significance of these terms. Speculation as to the causes of these changes necessarily includes consideration of such historic items as kind(s) of grazing animal, seasons of use, degree of utilization, crop- and growing-season climate, fire and other disturbances.

The RVR for watershed (column 5) indicates that the present plant community, per se, has a high Fair value as one factor for judging watershed quality of this particular site location.

Seasonal RVRs for forage (columns 6 through 13) take into account the relative forage value of all species presently on the site irrespective of whether they are decreasers, increasers or invaders, thereby giving a realistic assessment of the forage value of the present plant community. No arithmetic is involved as was the case with proper use factors and palatability ratings used in the past. Invaders have often been equated with undesirable forage which sometimes, but not always is true, especially when more than one herbivore or season of use is taken into account.

Seasonal RVRs for forage provide an indication of potential seasonal conflicts between herbivores grazing simultaneously on the site. For example, in Figure 2 a potential conflict between cattle and deer on this site in the spring is indicated since the plant community rates in the GOOD resource value class for each herbivore (columns 6 and 10). Persons familiar with this rangeland would likely come to the same conclusion based on experienced judgement without using this RVR procedure. However, the RVR procedure documents the rationale upon which this interpretation is based; those who are unfamiliar with this rangeland would arrive at the same interpretation by using this procedure and others could check the procedure used. Having a documented rationale based on the best expertise available provides a basis for obtaining unanimity and objectivity within and between disciplines, which is needed.

Conclusion

The foregoing procedure is based upon knowledge of specific ecological sites, the species commonly found growing on them, and the make-up of the potential natural plant community for each site. It provides a direct quantitative comparison between the present plant community and the PNC as a basis for determining ecological status. Decreaser, increaser, and invader species are identified on the basis of what has actually happened instead of by arbitrary assignment of status. Resource value ratings for watershed and forage are based on a species-by-species evaluation which results in a realistic assessment of the value of the present plant community for these uses.

The task of documenting current experienced-judgement knowledge of the value of plant species for various uses may seem insurmountable. Nevertheless, it needs to be done in order to assemble this existing knowledge for use by rangeland managers who should have not to learn, generation by generation, solely from their own experience. Furthermore, there is already a considerable amount of research which cites seasonal values of specific plant species as food for various herbivores. I have compiled a list of 62 such references mainly from the *Journal of Range Management*[1]. This RVR procedure can help synthesize such research and general knowledge into a practical field procedure thereby encouraging additional research of this type.

[1]A blank copy of the forms designed for field use, of which Figures 1 and 2 are simplified versions, and the reference list can be obtained from the author sending a self-addressed, two-stamp envelope.

Reference Cited

Range Inventory Standardization Committee. 1983. Guidelines and terminology for range inventories and monitoring. (unpublished report). Society for Range Management, 2760 West Fifth Avenue, Denver, CO 80294. 13 pg.

Youth Forum Competes in Orlando

Jan Wright

The SRM High School Youth Forum just keeps getting better! This year, twelve students enjoyed their meeting and the SRM annual convention in Orlando, Florida. They spent hours preparing for the illustrated talk competition, and an equal number of hours getting to know each other and seeing the sights around Orlando. That left few hours for sleeping!

The illustrated talk competition took place Tuesday morning. Four range professionals, Dan Merkel, Jack Bohning, Steve Waller, and Harry Fritzler, evaluated the tough competition. The students' talks covered range improvements, discussion of grazing methods, range use by wildlife, and descriptions of local range.

Russ Linhart, HSYF president for 1986, presented his 1985 first-place slide talk, "No One Needs Knapweed", to break the ice. About 30 people attended the HSYF presentations.

After tallying up scores, the **first place winner was Judy DeBock,** a sophomore from Punta Gorda, Florida. Her talk, "Florida's Range for Ecology and Economy," was very well done and gave the rest of us a view of range we weren't familiar with. "Prescribed Burning in California Brushlands", by **Mary Kimball, a Woodland, California, high school junior, tied for second place** with "Watersavers: The Dryland Alternative", by **Susie Bolstad.** Susie is a junior from Winifred, Montana.

Jason Johnson, a junior from Jacksboro, Texas, was elected by the group to return to the meeting in Boise as HSYF president. Other business brought up by the Forum delegates was how to improve the Forum, and positive points of the Forum this year. One recommendation was that the winning contestants present their talks to the group the next year. Their expenses would probably have to be supported, at least in part, by the sponsoring Section.

The judges and Youth Forum committee were very impressed with the presentations and recommend that all SRM annual meeting participants take in the presentations next year.

One highlight of the week was a tour of the Deseret Ranch, a 300,000-acre ranch that runs 30,000 cows. The Forum youth saw Florida range up close and learned about cattle management there.

The 1986 High School Youth Forum would not have been nearly as successful without the support of Wildseed, Inc., of Houston, Texas, and the dedicated committee members who helped organize the events.

The following Sections were represented by youth contestants: International Mountain, Northern Great Plains, Wyoming, California, New Mexico, Utah, Texas, and Florida. Other Sections are strongly encouraged to organize section competition so that delegates could be sent to the meeting in Boise. Questions about the HSYF should be directed to the 1987 Committee Chairman, Sherri Mauti, P.O. Box 59, Whiteriver, Arizona, 85941.—**Jan Wright**

HSYF Winners: Judy DeBock, Punta Gorda, Fla.—1st place; Mary Kimball, Woodland, Calif. and Susie Blstad, Winifred, Mont. tie for 2nd place.

1986 HSYF participants: Back row (left to right): Doug Stott, Utah; Donald Jacques, Utah; Todd Martin, Texas; Marc Kincaid, N. Mexico; Jason Johnson, Texas; Russ Linhart, Mont.; Pete Karajanis, Wyo.; Front row: Susie Bolstad, Mont., Mary Kimball, Calif.; Melissa Crenwelge, Texas; Stephanie Haupt, Alberta, Canada; Judy DeBock, Fla.

Back row (left to right): Donald Jaques, Utah; Todd Martin, Texas; Marc Kincaid, N. Mex.; Pete Karajanis, WY; Russ Linhart, Mont.; Jason Johnson, Texas
Front row: Melissa Crenwelge, Texas; Judy DeBock, Fla; Mary Kimball, Calif.; Susie Bolstad, Mont.; Stephanie Haupt, Alberta, Canada

Florida's Range for Ecology and Economy

Editor's Note: This paper was the first place finish at the High School Youth Forum at the Annual Meeting, Society for Range Management, Orlando, Florida, 11 February 1986.

Judy De Bock

The term *range* is defined as "all lands producing native forage for animal consumption and lands that are revegetated naturally or artificially to provide a forage cover that is managed like natural vegetation." The predominant use of Florida's range is livestock grazing.

Over 400 years ago, Ponce de Leon and other early Spanish explorers introduced the first cattle into the state. Prior to the Civil War, with the establishment of large Southern plantations and European settlements, cattle production assumed considerable importance. The early rancher viewed himself as a free spirit who tended his herds and flocks on a limitless sea of grass. His thoughts were on his livestock with little or no concern for the perishable nature of his basic resource. He no more tried to manage the rangeland, seemingly so vast and immutable, than the sea captain, under stress of storm, tried to manage the ocean instead of tending his ship. Needless to say, such views no longer prevail.

Today's strict economic climate makes cost containment of vital importance for the continued existence of the rancher. We are witnessing an evolution. Range is again of paramount importance to the cattle rancher. The total acreage of range pastures in Florida in 1985 amounts to some 3,383,000 acres—approximately 29% of the total Florida land area. This is somewhat less than it was a few years ago due to crops and groves, highways, housing developments, and recreation and conservation areas.

Florida's native vegetation has a production potential exceeding most areas in the United States. The state has a mild climate with 50 inches or more annual rainfall providing an opportunity for 12 full months of grazing, more than any other state. The land is predominantly a sandy soil.

Basic good range management dictates that 4 to 5 acres of good range land is required per cow and 15 to 20 acres per cow of poor range land. In the early days of the livestock industry in Florida, native grasses, legumes, and other vegetation were the principal sources of forage. Grass is still a basic item. Nearly 322 native species occur in Florida. In any one area, you can find at least 75 varieties with 12 to 15 usually contributing to the livestock diet. The desirable species of native plants, such as maidencane, creeping blue stem, chalky blue stem, and others make up a considerable amount of the feeding requirements of the cattle. Land mismanagement allows increasers such as pineland "wiregrass" and other species to thrive. When invaders such as palmetto, waxmyrtle, and gallberry are allowed to take control, the native range will be left with little or no grazing value. Animal reproduction rate also is closely tied to the natural nutrition available.

A basic factor in range ecology is plant succession. In one sense of the word, it is crop production. Harvesting the crop is no problem. We do not need large amounts of capital to purchase or lease mammoth equipment. Cattle can easily, efficiently, and economically harvest range forage. The growing, management, and harvesting can be done with the lowest possible input of energy of any grassland enterprise.

It is now more clearly understood how ecology fits into the picture of Florida's range goals. Range management is both an art and a science founded on ecological principles with economic results. The United States, with only 6% of the world's population uses over one-third of the world's energy. All of the United States' population is well-informed of the fossil fuel energy crisis. Fossil fuels and irrigation are essential to improved pasture. This improved pasture, the apple of the eye of many ranchers, is a major user of both fossil fuels, for fertilization and cultivation, and labor. The introduction of good range management techniques has considerably reduced the use of these expensive commodities.

In the not-too-distant future, water for pasture irrigation may be prohibited by both cost and legislation. The quality and availability of irrigation water in Florida is questionable. The range must rely on the God-given precipitation—an average of 50 inches a year—at NO cost. The native species of grasses and legumes are able to withstand the extremes of flood and draught. Florida's climate only encourages the natural functions of plant growth. With proper management, insects and disease are easily controllable. The pesticide and veterinary bills are kept to a minimum.

Among good management techniques, controlled burning every two or three years helps to maintain the forage stand and improve the quality of forage on the native range. Burning is used to remove unpalatable or dead vegetation, make forage and browse more available, improve forage quality, maintain a diverse herbaceous population, and reduce the size and density of shrubs which impede the working and grazing of cattle.

Benefits of proper range management and planning should be used to maximize net returns per acre. The ratio of grazed to rested land must be finely balanced, with strict adherence to proper stocking rates. A free choice mixture of minerals, proteins, and vitamins is advised. Good management techniques of the range have definite economic superiority over improved pasture methods. High interest rates, possible lack of usable capital, cost of fossil fuels and irrigation, and the colossal price of heavy farm equipment make range a common-sense approach to farming in Florida in the twentieth century, and the approach must be convincing if range programs are to continue into the twenty-first century.

The evidence is all around us that our native range resources are neither limitless nor immutable. It is clear to everyone that careful management is necessary because the penalty for failing is great. A proper management job is like walking a tight rope requiring resolution and determination, modern knowledge and modern technology, but human ingenuity is equal to the task. The Florida rancher is well known to have these characteristics; he recognizes that his primary occupation is husbandry of the range and that tending his livestock is secondary. Thus has the spirited cowboy, famous in both legend and song, become, in the end, a humble grower of grass. He is a practicing ecologist and an avid economist. He follows ecological principles but is limited to low cost measures as dictated by today's economics. Florida is number 8 on the list of beef producers in our great nation. Success *is* written in statistics.

Bibliography

Beef Cattle in Florida: 1977 Department of Agriculture, Tallahassee, Florida, Bulletin No. 28.

Florida's Native Grazing Resource: University of Florida, Gainesville, Florida SB-CIR.1.

Range Resources of the South: University of Georgia, College of Agriculture, May 1974, Bulletin NS.9. Published by University of Georgia Coastal Plain Experiment Station, Tifton, Georgia.

Rangeland Policies for the Future: Proceedings of a Symposium, University of Arizona, Tucson, Arizona (available: Superintended of Documents, U.S. Govt. Printing Office).

Symposium: Range and Pasture Management: Volume 39, 1980. Reprint from Soil & Crop Science Society of Florida proceedings.

Yearbook of Agriculture: 1983. "Using our Natural Resources" by: U.S.D.A. Washington, D.C.

Prescribed Burning in California Brushlands

Mary Kimball

Editor's Note: This paper tied for second place at the High School Youth Forum at the Annual Meeting, Society for Range Management, Orlando, Florida, 11 February 1986.

The Huey helicopter swept low over the ridge, the engine noise reverberating up the canyon, shattering the stillness of the afternoon. As it reached the crest of the skyline, it dumped its explosive cargo of napalm into the vegetation, quickly turning the canopy into a blazing inferno. This wasn't a scene from the movie "Rambo," nor news footage from Vietnam, but a common range management practice used every year in California's brushlands, the prescribed burn.

Fire is a natural factor on California brushlands. In fact, there's probably no range site in California that has developed without being influenced by fire. Due to California's hot, dry climate, various brush species such as manzanita and ceanothus have developed with fire being an important part of their life cycle. Biswell, a noted range scientist, considers fire as nature's way of keeping rangelands open and in a stable equilibrium, and less susceptible to intense, out-of-control fires. Biswell further concluded that fire exclusion is something new and unnatural in brushland environments.

Burning is the oldest known practice used by man to manipulate the vegetation on grazing lands. Fire has been used as a tool for at least a quarter of a million years. The Peking man is the earliest known man to have controlled fire, 500,000 years ago. Deliberate burning was used by primitive man for hunting by increasing the visibility for finding game animals, and to attract them after the burning by vegetative resprouting.

Burning was also used to reduce woody plants for improved pasture for livestock grazing, and for clearing land for cultivation of crops. The California Indian was a prime example of man using fire for his advantage. As a result, equilibrium was maintained in the California brushlands, with both naturally and Indian set fires. This continued until the 1950's when fire exclusion, also known as the "Smokey Bear Mentality", greatly decreased the occurrence of fires in the brushland ecosystem, thereby upsetting the delicate ecological balance. The result was a fuel accumulation and an increase in the severity of wildfires. This, coupled with a decrease in accessibility for grazing animals, adversely affected California's brushlands. This has caused a shift back to the use of periodic burning by range conservationists. Although fire is not a cure-all for all range problems, burning can be an effective and practical tool in range improvement.

What is prescribed fire? Prescribed fire can be defined as fire used under particular conditions of weather and fuel to achieve specific management objectives in the California brushlands. These management objectives are numerous, and affect many sectors of the public. One objective, which affects all of us, is to decrease the fuel buildup that occurs in brushland where fire has been excluded. The resulting accumulation of tinder dry brush makes for severe wildfires that cause not only millions of dollars in damage to buildings and property, but also the loss of human lives. For example, in 1968, the Canyon Fire in Los Angeles County killed 20 firefighters and caused 10 million dollars in damages. It is more advantageous to have numerous prescribed burns than to risk one out-of-control wildfire. Another objective, which is most important to the livestock industry, is improving the grazing capacity of the lands. California's rapidly growing population has created an increased demand for food. As a result, the livestock industry has to more effectively utilize previously unproductive brushland. One efficient way to improve this brushland, and thus the grazing, is through prescribed burning.

Prescribed burning accomplishes this goal in several ways. It removes old, dead material and increases the palatability of forages. It also reduces the size of undergrazed areas. By decreasing the amount of brush, prescribed burning improves the access and availability of forage to grazing animals. Also, the total amount of forage is increased. In a study done by Biswell, brushlands will only produce from 13 to 106 pounds of browse per acre before burning, whereas after burning these same communities produce from 750 to 3,000 pounds per acre. Often times dramatic increases in grazing capacity are realized when prescribed burning is combined with other management practices, such as reseeding to annual or perennial grasses to increase forage production. The end result is more productive rangeland, producing a larger number of lambs and steers for an ever increasing population.

For millions of years, fire has been an important part of California's brushland communities. Due to fire's presence in the ecosystem, from naturally occurring and man caused, brush communities have evolved with fire being an important factor in maintaining the balance of the climax system. This balance was upset with the fire exclusion practices of the 1950's. As a result, the brushlands grew unchecked and accumulated vast amounts of highly combustible fuel which contributed to wildfires that were extremely expensive and hard to stop. So man, with his advanced technology and expensive machinery, went back to one of the oldest tools known to man, fire. Through the use of prescribed fire, man has decreased this fuel accumulation and lessened the severity of wildfires. Stockmen have used this tool, the prescribed burn, to open up previously unproductive brushlands to be used for the grazing of sheep and cattle. Whether by helitorch or with a simple match, prescribed fires are an important management tool utilized in California's brushlands.

The Methuselah Bush

Sarah Steinberg Gustafson

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When Frank Vasek first encountered the ring of scrubby-looking plants, he didn't know he might be looking at the oldest thing alive. At that time scientists believed that a 4,900-year-old-bristlecone pine was the modern-day Methuselah. But after studying circular clumps of creosote bushes, Vasek, a botanist at the University of California at Riverside, discovered that one such creosote clump began growing in the Mojave Desert northeast of Los Angeles almost 12,000 years ago. If Vasek's arithmetic is right, this ring, dubbed King Clone, may be the oldest living plant on Earth and may help explain how desert vegetation rebounded after the last ice age.

A creosote ring begins with a single seed. The seedling's lower stems send out new branches that develop their own roots. The original seedling diets and decays, and the process repeats itself. Over thousands of years, the ring expands like ripples in a pond—leaving a middle area of bare soil surrounded by a ring of genetically identical bushes.

Such propagation can creep over a large area. Vasek has found hundreds of creosote rings exceeding 30 feet in diameter. King Clone, a rough ellipse, spans 70 feet across its longest dimension. As a rings spreads, it breaks the soil into fine sand, which stores water more efficiently than the coarser soil outside the ring, thereby helping the clone weather droughts. "Although each bush in the ring can survive on its own," says Vasek, "the entire clone functions as a unit."

Vasek first became interested in the clones' age a decade ago when he was on an archeological tour. After noticing a number of creosote bushes that had been crushed by motorcycles, a tour member asked Vasek how old the destroyed bushes were. "I started to answer 300 or 400 years when it dawned on me that I simply did not know," says Vasek. That's when I decided to look into it."

Like trees, young creosote bushes can be dated by counting their annual growth rings. But after 100 years or so, a creosote clone grows by making more bushes rather than by adding bulk to a single bush. Rooting around in the sandy center of older clones, Vasek uncovered chunks of dead wood, which he radiocarbon dated. Dividing a chunk's age by its distance from living bushes yielded a rate of growth for each clone. Averaging the growth rates from a number of clones and applying the result, Vasek estimated King Clone to be 11,700 years old. "This is the oldest living clone we know of," he says. "There may be older ones, but nobody's made the case for them."

Because of its age, King Clone offers clues about how today's Mojave Desert evolved. The highest and northernmost desert of the American Southwest, the Mojave was slow to recover after each ice age. During the last major freeze, which ended about 10,000 years ago, ice covered the mountains of southern California, forcing piñon and junipers to migrate down onto the Mojave plateau. When the Earth warmed, the conifers returned to the hills, and desert plants reclaimed the plateau.

Now the dominant plant of the Southwestern deserts, creosote bushes originated in South America. For years botanists have wondered how long the ubiquitous bushes have been in the Mojave Desert. If they arrived before the last glaciation, did they retreat to a warmer desert when the climate cooled? Or did some, perhaps King Clone's predecessors, remain in the Mojave during the last advance of cold, ready to spread when conditions improved?

Until now pack rats provided most of the answers. Based on examination of seeds and other fossils found—or not found—in pack rat nests, some scientists believe creosote bushes didn't reach the Mojave until 9,000 years ago. "When you deal with fossils," says Vasek, "you take your chances on

what you find where. King Clone shows that creosote bushes may have been in the desert area sooner than we thought, probably even during the last stages of the last ice age."

Researchers may quibble with Vasek over a few thousand years, but they all agree King Clone is ancient. Because the seedling it spread from was probably one of the first desert plants in the state, it deserves further study.

Fortunately for King Clone, the Nature Conservancy agrees. In March it bought a 17-acre parcel on which King Clone resides—none too soon, with a house going up less than a mile away. 'We're preserving King Clone because of its scientific value," says Lester Olmstead-Rose, the Conservancy's land protection assistant. "Besides being the oldest plant alive, King Clone represents an important genetic link to life during the last ice age."

Grass—the Next Cinderella Crop

H. Allan Nation

Agronomists all over the United States are scanning the horizon for the next Cinderella crop to hit American agriculture. In the 1970's the Cinderella crop in much of the U.S. was soybean, but today with fearsome competition arising in the Southern Hemisphere the soybean looks more and more like the Wicked Stepmother to farmers who grow it. Corn, wheat, cotton, and rice are all in gross oversupply in the United States, and few expect a dramatic turn-around in the demand for any of those U.S. crops in the remainder of this decade.

I hope to be able to make a credible case that America's Cinderella crop for the remainder of this century is all around you. It is here and has always been here and that crop is grass.

The Good Lord in his magnificent plan for the universe has deemed grass to be the ultimate climax crop in his universe. He absolutely will not allow a bare piece of ground. Grass cools the soil, tempers the fall of the raindrop, and heals and rebuilds the soil organic matter and nitrogen. Grass is the only crop we can grow that puts *more* into the soil than it takes out of it.

The stirring and tilling of the soil and the planting of monocultures is not found naturally anywhere on earth. These activities eventually destroy the organic matter God's grass crop carefully built in the soil and will economically destroy the farmer eventually. Without organic matter, the soil's life-force of microbes dies, and when the life dies in the soil, crop residues will no longer recycle. Herbicides will no longer work and can actually do more damage than good. The soil has no water holding ability and the soil will eventually literally blow in the wind.

In the Mississippi Delta, farmers are having to almost continuously run center pivot irrigators to grow cotton in a 60 inch rainfall area! The soil has so little organic matter than it can only hold one-half an inch of water in an area where the summer daily evaporative rate is one-third of an inch. The only thing that can break the death spiral for these farmers is to put this land back to grass for four or five years and heal the soil. Unfortunately, many of these farmers were able to get a degree in agriculture with virtually no understanding of soil science or ecology. They, in their ignorance, still believe that cotton is king and grass is something you try to kill.

These farmers, who are going broke by the bushel basket, will tell you that their land is too good for grass and yet any soil scientist can tell them that their land has been rendered virtually worthless by their continuous cropping. Research in Georgia shows a virtual doubling combinations of species and classes of animals offer a much better harvest than any one species or class. All of our grasses have seasonal protein requirements high enough to allow our grazing animals to breed and our breeding seasons must mesh with these periods.

We have placed entirely too much emphasis on weaning weights and not nearly enough emphasis on genetically matching animals and their environments. For example, much of the Southwest is covered with brush and yet there are cattle in Africa who can make up 90% of their diet from brush. It would be much more cost-effective to genetically adapt the cattle to the brush than to chemically adapt the environment to our present breeds of cattle.

There will never be one "ideal" steer in the United States. Genetics will have to be altered to allow the animals to maximize the harvest of the existing environments. The correct emphasis for any cowman is not on the steer calf but on the replacment heifers he is carefully adapting to his specific environment. Genetic adaptation comes not so much from the bull we buy, but the cow we cull. The more ruthless we cull, the faster we adapt our herd. A 75% calf crop indicates that we are three-quarters of the way there in getting rid of cows who can't hack it under our environment.

Our customers, the American consumers, are telling us to route fewer animals to the feedlot and more to the hamburger stand. We need to allow every heifer we produce to have a chance to make it as a productive breeding animal that is better adapted to our environment than her mother. If she, in fact, proves she is so adapted, Momma goes to McDonald's and daughter takes her place. Those who say we have too many cattle in the United States totally overlook the fact that we import one billion pounds of hamburger grade beef a year. That's the slaughter equivalent of the entire cowherd of Missouri, our second largest cow-calf state.

Our post-weaning steer programs need to be regeared for producing animals in the 850 to 1,000-pound weight category prior to being placed in the feedlot for a quick finish. Our critics point out that cattle are wasteful users of the grain resources of the world. Economists point out that cattle will

Editor's Note: Allan Nation is editor, Stockman/Grass Farmer's Journal, Jackson, Miss. This paper was presented at the Information and Education Committee Communications Workshop at the 1986 Annual Meeting, Society for Range Management, Orlando, Fla., 10-14 Feb. 1986.

never anywhere equal the feed efficiency of chickens, and both the critics and the economists are right. However, if we place cattle on feed at this weight category, the total feed efficiency of grain to liveweight slaughter equals or exceeds that of poultry. I'm not going to overly worry about poultry competition until they breed a bird that can gain two pounds a day on grass, and as far as a waste of our grain resources, I am far more worried about our waste of grass resources.

The central plains area was originally a summer fattening range for yearlings driven up from Texas and it worked extremely well as such. When we started shifting the post-weaning growing program from grass to grain we created a huge under-utilized resource, and man hates to see a resource go to waste, so we expanded the only part of the cattle business left to grass—the cow. This set us off on the roller-coaster we have been on for the last 35 years whereby the availability of grain rather than grass dictated the size of the cow herd. Every mouthful of grass a steer eats relieves the pressure to have that mouthful of grass eaten by a cow.

If we start routing cull cows to slaughter rather than heifers to the feedlot, and if we start growing all our steer production to 850 to 1,000 pounds before placing them on feed, you can start to see that we could have a much better utilization of our grass resources without that much increase in total tonnage of beef. It would also largely free us from the grain market vagaries. We do not have cattle to eat surplus grain. We have cattle to harvest grass.

Let's look at the pieces of our puzzle so far. We've got a crop that God will grow for free. We've got a harvesting machine that runs on sunlight and water, but we've had one key element missing. That element was the ability to efficiently control and steer our harvesting combine. And, it was this one missing element that allowed rowcrop farming to be more profitable than grazing.

Consider for example, the economics of growing a crop, but having a combine aimlessly churning through the field during the entire growing season. It would be bad enough if this combine were only loosed to do its damage when the crop was ready to harvest, but I am talking about a combine that wanders aimlessly over the crop from the day the first seed is planted. Picture that, please. Can you imagine how much of the crop would be crushed by the wheels of the combine compared to how much wound up in the hopper?

While this sounds totally ridiculous in the context of a soybean or corn crop, it is precisely how we have been attempting to harvest our grass crop. Our cows only harvest approximately one-third of the grass we grow with continuous grazing.

Our biggest problem in grassland farming has been that we have been attempting to grow more grass rather than attempting to more efficiently harvest what we have already grown. It is on this one key missing piece of the puzzle that all of our grassland economics have foundered, and it is on this one key piece of the puzzle we are starting to separate the men from the boys, and the winners from the losers, in the grass business. In my opinion, the greatest technological breakthrough in the history of the cattle business has been these new New Zealand electric fences. As a boy, I grew up on a commercial cattle ranch, and I hated every minute of it. Looking back, it was not the cows I hated. It was those damned barbed wire fences that were always needing repair. I recently visited a man in Alabama with 9,000 head of cattle and not one fence on his place was more than a one wire New Zealand style electric fence.

Fencing costs, which were the major capital cost of a grassland farming operation just a few years ago, are a minor expense now. Now for the first time, we can start effectively controlling that combine on our crop. Just like the rowcrop farmer, we can keep our combine off the crop until it is at its peak and whack it off again.

Like the cotton farmer, we can also pick and scrap. We can let our yearlings pick the prime crop and the cows follow them and scrap the rest. With control over our cattle, we can start effectively harvesting alfalfa, johnsongrass, orchardgrass, and other extremely high quality forages that were previously only harvestable as hay.

Rather than going to all the trouble of harvesting corn as silage, we can grow a corn crop, allow it to stand and dry down until we need it in the winter, and then take one of these reel-type electric fences and ration off only as much of the corn crop as our yearlings can eat that day. In effect, we can combine a rowcrop just like a grass crop.

Want to fatten steers on grain sorghum? Stagger plant your crop and strip graze it while the grain heads are still in the soft, green, doughy stage. After you've gone across the crop like this approximately twice in much of the U.S., you'll still have an excellent standing hay crop to winter your dry cows on. Virtually any crop we can harvest with an oil-burning, iron combine, we can harvest with a solar-powered animal combine.

I hope I have shown you that all of the pieces of the puzzle are finally in place. All we need now are grass farmers willing to put these pieces together in their most optimum form for their particular area. If you'll forget the past, ignore prejudices and old wive's tales about cattle and grass, and if you'll start to think of grass as a crop and animals as a combine, I think you too will start to see that grass is indeed America's next and most enduring Cinderella crop.

Grass

By GEO. A. ABBOTT, FALLS CITY, NEB.

[Read at the Annual convention of the Nebraska Dairymen's Association, 1889.]

MORE THAN THIRTY YEARS AGO, when the white man made his first appearance upon the rich, billowy prairies of Richardson County, he found a soil rich beyond conception in plant food, the result of countless ages of accumulation, a veritable "Nature's strong box" which had only to be unlocked with the plow to yield an abundance of golden harvests. Year after year, without any return to the soil, in the way of fertilizers, our farmers have continued to draw exhausting crops of the cereals from the ground, shipping them to the markets. This skimming process together with the drifting winds of winter, and the washing rains of summer, has been continued, until today, measured by their productive capacity, our hill soils are worth but little more than half as much as they were thirty years ago. And while our farmers may point with pride to their palatial residences, magnificent barns, and respectable bank accounts as evidence of their success, they seem to forget the fact that these things are only the original wealth of the soil, metamorphosed into new shape and substance; that if they should strike a balance, taking into account the impoverished condition of their fields, they are but little better off than they were thirty years ago, when these splendid improvements were held locked in the unmortgaged bosom of the soil.

How, then, may we make a substantial growth and at the same time restore to our famished lands their original fertility? The answer is found in the one word—grass.

As illustrative of the advantages of grass farming over grain farming, permit me to cite one of the many instances that have come under my immediate observation.

About fifteen years ago one of my neighbors, blessed with sufficient foresight to penetrate the future and discern whither we were drifting, began sowing a major portion of his farm to grass and to gradually stock it up. While the hum of the thresher and sheller were heard at the farms of others, who, with long lines of teams, were carting away to a glutted corn and wheat market the cream of their soil, he, with his flocks and herds, was marching along a surer road to fortune. To-day he is the proud owner of two fine farms, three-fourths of which are kept constantly in grass, covered with several hundreds of thoroughbred sheep, together with large herds of fine horses, cattle, and hogs.

Result: He and the mortgage fiend have long since parted company, and the preserved fertility of his soil is evidenced in the superior abundance of its yield and the absence of foul and noxious weeds; besides all along the line of his life he has the constant enjoyment of that peace of mind which can come to the husbandman only from the contemplation of grassy fields, lowing herds and bleating flocks, and the knowledge of the fact that the wolf is far removed from his door.

One other instance I hope I may be permitted to cite without subjecting myself to the charge of egotism.

FOR A LONG TIME I DID WHAT A GREAT MANY OTHERS DID and are still doing. I followed the more exhaustless system of grain farming with its resultant concomitant, interest paying; but "whom the Lord loveth He chasteneth," and in 1883 there came a great flood down the valley on which my farm (which consists chiefly of bottom land) is situated, overflowing and drowning out a large percentage of my crops. I then concluded to put into practice a plan which I had for some time been contemplating, that of starting a horse ranch, so the following fall I sowed twelve acres to timothy, having previously sown my timber land to Kentucky blue grass, and the following spring I sowed twenty acres more in timothy and red clover and have added to these other acres, since, until now my farm is all in grass but about forty acres; the result is I have more horses than I can ride, have long since made my parting salaams to the mortgage fiend, am beginning to suspect that I may in time become one myself, as I frequently catch myself asking the question if the usury laws which prevent us from charging our neighbors two per cent a month for the use of our surplus cash may not after all stand in the way of our best interests and highest possible development of the country.

Suppose any gentleman present should conclude to quit farming and embark in the mercantile business. Making a sale of his effects he finds himself with ten or twenty thousand dollars; he invests in dry goods and begins to sell them. He follows the same line of policy he did on the farm, that is, he continues day after day to draw from his shelves and throw on the market his original supply, never replenishing, never returning anything to his shelves, but from day to day living upon the proceeds of his sales; how long will it be until he is bankrupt? I venture the assertion, and defy contradiction, that no business on earth will stand as much mismanagement, as much neglect, as much exhausting and as little replenishing as farming. But even our richest soils will in time become impoverished, as one may plainly see by visiting some of the older hill fields of this county.

Editor's Note: This paper was delivered as a speech at the annual convention of the Nebraska Dairymen's Association in 1889. The paper was published in the Annual Report, Nebraska State Board of Agriculture, For the Year 1889, Ed. Robert W. Furness, Lincoln, Nebraska, 1890.

The author was born in 1838 in Lawrence county, Indiana. After working in Oregon, California, and Colorado he settled on a farm in eastern Nebraska in 1862 where he lived the rest of his life. He died in 1915, at the age of 76, in Falls City, Nebraska. This information was furnished by the Nebraska State Historical Society, Lincoln.

The paper was sent to this editor by F. Robert Gartner, Rapid City, South Dakota. In 1953, a copy of the paper was sent from Ross F. Le Cheur, SCS, Broken Bow, Nebraska, to E.J. Dyksterhuis, SCS, Lincoln, Nebraska, who routed it to all Ranking Field Officers in Nebraska, Conservation Specialists, and Range Specialists, SCS, Nebraska. In 1970 a copy was sent from Ralph S. Cole, SCS, Rapid City, South Dakota to F. Robert Gartner.

There are various statements on the correspondence from the various people referring to the fact that the comments of Mr. Abbott are still valid. I will add my thoughts that very little has changed in the 100 years since Mr. Abbott made his observations. We are still faced with the same problem.

If at the end of thirty years we find what we at one time thought was an inexhaustible supply of plant food greatly diminished and a mortgage upon the remainder, what may we expect thirty years hence?

In the past we have not known what it was to lay out large sums annually for costly commercial fertilizers, hence we have been able to compete, although at a distance from the market, with the worn out fields of the east; and if we are wise and begin, ere it is too late, a judicious system of grassing our lands, we may restore the partially exhausted fertility of our soils.

Grass means stock, and stock means barn-yard manures, which may be utilized advantageously, but the chief fertilization will come from the grass itself.

IF ANY ONE DOUBTS THIS LET HIM SOW ONE OF HIS fields to grass and after a few years break it up again, and he will be astonished at the yield of corn or wheat.

There is another advantage to be derived from grassing our lands; the product of our farms can thus be reduced to smaller bulk and shipped to market at less cost and in this way we may be able to beat the elevator combines who at present have a monopoly of the grain business, and pay us just what they please.

There is one other advantage, in my judgment, to be derived from the grassing of lands, in the stating of which I know I am running counter to the generally accepted theory; it is this: the restoration of the underground water supply to our wells and springs. It is a well established fact that as countries get older and are brought under the dominion of the plow, springs and wells dry up.

In the early settlement of Illinois the prairie portions were found to be almost one continous swamp or bog, and good wells could be had by sinking from five to fifteen feet almost anywhere, the country could not be farmed successfully until it was tiled, and these tillings ran full and flush with water the year round like so many living springs, but I am informed by parties from there that of late years those tile ditches are dry nearly all the time, that the wells have had to be sunk deeper and that the country is surely getting drier.

IF THEN, AS ACCORDING TO THE ACCEPTED theory, more of the rainfall is absorbed into the ground after it has been broken and plowed than before, why do not those tile ditches show an increased water flow, and the wells hold out their water supply?

In 1841 my father emigrated to what was then known as the "Platte purchase" in Missouri. We found almost every draw or swale running flush with "spring branches," as they were called, and wherever there were pools of water deep enough, we found an abundance of fish, proving conclusively that the supply of water in those draws and pools must have been constant or fish could not have grown and lived there.

In fifteen years those draws had become dry, except immediately after rains, and where used to hold running streams none are now found, and wells that once furnished an abundance of water at a depth of fifteen and twenty feet below the surface have entirely failed and have had to be dug deeper. When I settled in this country in 1862 I thought then it was the best watered country I had ever seen. Now I can take any one to dozens of places in a radius of ten miles where bold flush springs used to run and he will find them as dry as a powder house.

Mr. F.W. Ingham, the proprietor of our windmill and well factory, and whom I consider the best authority in our county upon the subject of water supply, informs me that there are very few wells of ten years' standing in this county but have either gone entirely dry, or show a permanent decrease in water supply, while he had constant calls to sink wells deeper in search of water where the supply was at one time thought to be inexhaustible. I found on my farm, when I settled it, a number of "wet weather" springs, and also some I considered permanent, before the prairies on the highlands above me were broken; since those uplands have been brought under cultivation my "wet weather" springs have all dried up, and I can cultivate right over the land where they were, and the permanent springs show a decreased flow. Again I ask, if a larger per cent of the rainfall enters the earth now than did before the sod was broken, and the amount of the rainfall has increased as these self-styled *learned* men tell us, why do we not find more "wet weather" springs and a greater supply in our wells and permanent springs?

It devolves upon the wiseacres, who believe in the established theory that the rainfall and rain absorption is increasing, to answer these questions and account for the well established fact that countries get drier as they get older.

I know we have some gentlemen, with the handle of professor to their names, who have the made the remarkable discovery, and tell us in a very learned way that a cubic foot of earth taken from a wet cornfield has been found to weigh more than a cubic foot of earth taken from a dry prairie, and hence plowed ground absorbs a greater per cent of the rainfall than grasslands; and to the superficial thinker this will at first sight appear true. But this theory cannot account for the facts as we find them; that floods are becoming more frequent in our water courses, and that the underground runs and reservoirs of water, which must receive their supply from surface absorption, are drying up and failing.

I HAVE THIS THEORY, WHICH I THINK THE FACTS warrant: that when the surface of the earth is covered with grass, every tiny stem and spire acts as a miniature dam to check and retard the flow of water; that after a rain the water finds its way to the draws and water courses more slowly. Thus more of it has time to become absorbed, every root and fibre acting as conductors to lead it into the ground, just as straws slanted the wrong way will lead water into a wheat stack; hence more water in our wells and springs, and disastrous floods become less frequent.

Break the sod and the grass roots decay and you destroy the conductors. What rainfall does not flow away to make floods is retained near the surface and the lower earth or subsoil becomes dry and your wells fail.

I have been asked, what will renters do who are not able to follow grass farming, which necessitates the keeping of stock? I will answer, he will have to go on skimming the ground and raising cockleburs and tramps unless the owners of the land have sufficient good sense to make other terms with them and furnish them with stock.

A man who commenced thirty years ago to make his farm finds himself now, if he has been economical, with a comfortable home, and if he has acted wisely, with good improvements and preserved fertility of soil; but he also finds he is getting old and not able to work as he once did; he wants to

retire; he is offered four or five hundred dollars a year by some strong young man for the use of his farm, a bargain is made, and the sapping process is commenced.

The farm is worth ten thousand dollars, it represents the old man's capital; he gets five hundred dollars per annum, or five per cent; but at the end of a few years he begins to realize that it is not the *interest* on his principal that he has been receiving and eating up, but a part of the principal itself. He finds his farm run down, what were once fertile fields, now poor and seeded to noxious weeds; the improvements dilapidated, and, in fact, the farm not worth in the market near as much as when he left it. He finds, in fact, that he has not been living on what his renter paid him as he supposed, but he has actually been eating up his own reserved capital.

Hence if our wealthy retired farmers will be wise in time they will grass their farms, stock them up, and place them in the hands of trusty men on shares, thus holding a certain right of supervision that will not only enable them to preserve the fertility of their lands, but in the end receive a greater dividend upon their investment.

(Copy filed in the Nebraska State Historical Society Library, Lincoln, Neb.)

Prescribed Burning with a Helitorch on the Texas Rolling Plains

Robert A. Masters, G. Allen Rasmussen, and Guy R. McPherson

Historically, redberry juniper *(Juniperus pinchotii)* occurred primarily on rough and shallow rocky slopes and along drainages in xeric regions of the southern Great Plains (Ellis and Schuster 1968). In recent times range deterioration resulting from overuse by livestock and protection from fire has prompted expansion of redberry juniper into more productive range sites. Today, management practices employing fire are increasingly used on redberry juniper infested rangelands.

A recommended management scheme to improve rangeland dominated by redberry juniper consists of sequential mechanical and fire treatments. Initially, infested areas are chained to knock down or uproot established juniper. Subsequent pasture deferment provides the fine fuel needed for the fire treatment. Fire consumes downed woody debris and suppresses redberry juniper seedlings and crown sprouts. Steuter and Wright (1983) recommend a fire frequency of 10 to 15 years after initial burn to maintain redberry juniper in a non-reproductive state. Fire reduces the sphere of influence of juniper plants thus enhancing forage production.

Traditionally, ground ignition methods have been used to ignite prescribed fires in redberry juniper-mixed grass communities. These methods work well on small easily traversed areas. However, ground ignition is difficult on large, rough and dissected areas because of the increased frequency of fuel breaks. In such areas, aerial ignition with a helitorch is a potential tool for prescribed burning. What follows is a description of the current use of the helitorch, helitorch components, decision-making process in determining when to use a helitorch, and organizational considerations of a burn using a helitorch.

Aerial ignition with the helitorch has been successful in forested regions of the northwest U.S. for slash reduction and wildlife habitat improvement. Generally, these burns encompass less than 1,000 acres. Continuous slash depths of 4 ft and fuel loads in excess of 40 tons/acre are common. High intensity fires and difficulty moving across these heavily fueled units create potentially dangerous situations when attempting ignition using ground techniques. Moreover, the helitorch provides good control over ignition pattern and fire behavior. For example, initial ignition of the center portion of the unit to be burned (center fire) builds heat, causing the fire along the unit boundary to pull toward the center thus reduc-

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The authors would like to thank Henry A. Wright and Carlton M. Britton for their help in conduct of the burn and manuscript preparation. We would also like to express our gratitude to a number of staff members and graduate and undergraduate students who assisted in fireline construction and main unit headfire. We wish to thank Jimmy Propst and Gene Kreasey of Propst Helicopter for their patience and expertise with the helitorch and Foard Country Soil Conservation Service Staff for their assistance.

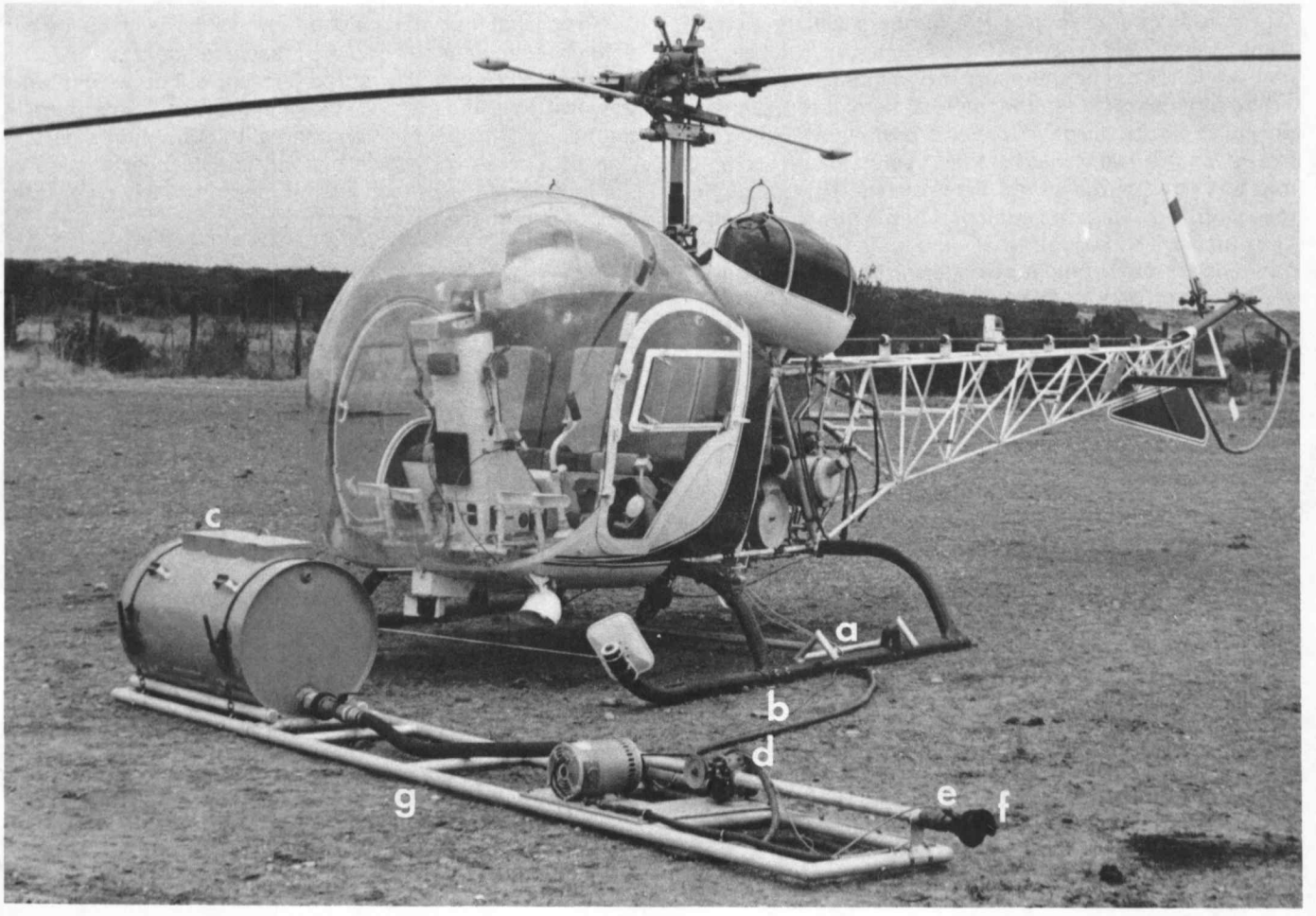


Fig. 1. *Helitorch is composed of a spreader bar (a), electric power cable (b), fuel drum (c), fuel pump (d), ignitor (e), nozzle (f), and support frame (g).*

ing the likelihood of fire escape.

The helitorch is suspended 10 to 15 ft underneath a helicopter (Fig. 1). A spreader bar reduces swaying and circular motion of the helitorch while in flight. Alumagel:gasoline fuel (gasoline mixed with alumagel (fuel thickener) at approximately 4 lbs/10 gal) is pumped through the nozzle and ignited. In heavy woody fuels a nozzle delivering large droplets of fuel with minimal horizontal spread is desirable. Grassland fuels are efficiently ignited using a spreader nozzle which minimizes droplet size and increases horizontal fuel spread.

A helicopter with helitorch can fly between 40 and 50 mi/hr. Seven to 9 miles of line can be ignited with a 55-gal load of alumagel:gasoline fuel in about 9 minutes. During a burn conducted on the Texas Rolling Plains using a helitorch, fuel was applied at 40 mi/hr from a height of 150 to 200 ft. Swath width was about 15 ft and droplets were golfball sized.

Factors Influencing Ignition Method

The first consideration prior to burning is to determine ranch objectives and whether they can be met with prescribed fire. Once the decision has been made to use prescribed fire it is necessary to determine the most efficient and safe method of conducting the burn. Influencing factors are size and topography of the area, number and length of roads on the area, manpower, time availability, safety, and costs.

Importance of size of the area to be burned varies with vegetation type, fuel load, and fuel type. In redberry juniper-mixed grass communities ground ignition is impractical if the area exceeds 4,000 acres, especially if the area is dissected by drainage channels and has abrupt changes in elevation. In addition, roads act as fuel breaks and hinder fire spread, requiring ignition of more lines of fire to ensure uniform fire spread. Personnel safety is directly influenced by size and topography of the area burned, and is more difficult to ensure on large, rough and broken areas with many roads.

A prescribed burn was conducted using a helitorch during the spring of 1985 in the Texas Rolling Plains. The site was dominated by a redberry juniper-mixed grass community. The pasture had been chained in 2 directions 2 to 3 years prior to burning. Chaining coupled with a light stocking rate (1 AU/40 acre) provided abundant fine fuel. The objectives of the burn were to remove downed woody debris, suppress redberry juniper resprouts, kill juniper seedlings, and rejuvenate decadent grass plants.

The pasture was 9,914 acres and dissected with numerous drainages. Over 70 miles of roads ranging from well estab-

lished roads to infrequently used jeep trails crisscrossed the unit. We estimated that it would take 120 man-hours (5 man crew, 4 days @ 6 hr/day) to ignite along roads using ground ignition. If natural fuel breaks were ignited in conjunction with roads, nearly 600 man-hours would be required. However, with aerial ignition only 70 man-hours (7 men, 2 days @ 5 hr/day) were required to burn the pasture.

Organization of the Burn

To enhance planning and execution of the burn a fire use plan developed by Fischer (1978) was used. Included in the fire use plan were site description, burn objectives, treatment constraints, and methodology of conducting the burn (fireline construction, organizational structure, and responsibilities of burn personnel).

Firelines were constructed before main headfire ignition and completed by 20 February 1985. In anticipation of a southwest wind at the time of main headfire ignition, 400 ft wide fireline were placed on the east and north boundaries of the pasture to be burned. Firelines were constructed according to recommendations for high-volatile fuel types by Wright and Bailey (1982). Desired weather for fireline construction (relative humidity: 40-60%, air temperatures: 40-60° F, and wind speed: 0-10 mi/hr) differs from that of the main headfire (relative humidity: 25-40%, air temperature: 70-80° F, and wind speed: 5-15 mi/hr).

During main headfire ignition the workforce was divided into 3 crews and 4 supervisors (Fig. 2). Supervisory personnel were the burn, aerial ignition, holding, and helipad bosses. The burn boss was positioned at a point allowing maximum visibility of the area burned. This individual was the communication link between supervisory team members and had ultimate authority in determining conduct of the burn. Reports from supervisory team members by two-way radios to the burn boss enabled prompt assessment of the fire status and coordination of activities to circumvent potential problems.

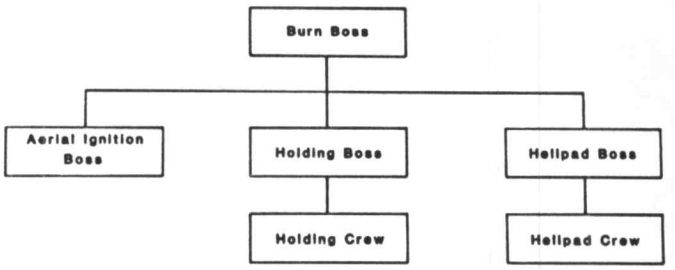


Fig. 2. *Organizational structure used for helitorch burn.*

The aerial ignition boss directed ignition from the helicopter. He reported fire behavior information and suggested alumagel:gasoline fuel mix modifications to the burn boss. An aerial ignition boss is not a critical assignment on burns where the burn boss can maintain visual contact with the helicopter. In such situations the burn boss can direct the pilot during ignition. However, when igniting a large area the burn boss may lose sight of the helicopter and the need for an aerial ignition boss becomes imperative.

The helipad boss responsibilities included directing the helipad crew while mixing alumagel:gasoline fuel and minimizing time required (less than 5 minutes) for helitorch refueling. The helipad boss served as helicopter marshaller, ensuring safety precautions were followed at the helipad and that the helicopter was not approached by the ground crew until it had landed safely.

The holding boss coordinated and directed suppression crews at areas of potential danger of fire escape during aerial ignition. In addition to suppression activities, the holding boss directed ground ignition crews to widen firelines in areas where they might be breeched by the main headfire. Upon cessation of aerial ignition the holding boss supervised mop-up activities.

Ignition of the main headfires was completed in 2 days (10 hr ignition time) with no fire escapes. Refueling time at the helipad was limited to 2 minutes per stop. On the first day (25 February 1985) weather conditions (relative humidity: 30-40%, air temperature: 65-69° F, and wind speed: 6-10 mi/hr) were adequate for a successful burn.

The aerial ignition boss played a crucial role the first day of main headfire ignition. Prior to burning, the supervisory team decided to ignite the headfire along roads and natural fuel breaks. However, during the first attempts at ignition the aerial ignition boss observed fires of low intensity. Upon consulting with the burn boss the ignition pattern was changed to a strip headfire with strips 100 to 300 yd apart ignited in an east to west orientation. Furthermore, the aerial ignition boss suggested that less alumagel be added to the gasoline causing the helitorch fuel to be of a thinner consistency. These two factors improved ignition success and burn objectives were met. During the burn the holding boss directed 2 crews in suppression and ignition activities. One crew, composed of 3 men, were equipped with a truck-mounted 300-gal water pumper and hand tools. They were responsible for initial fire suppression duties along the north boundary of the unit. The second suppression crew, made up of 7 individuals and equipped with a truck-mounted 100-gal water pumper, hand tools, and backpack sprayers, mopped-up after the initial fire suppression crew.

Ignition pattern achieved using a helitorch.

At the time of main headfire ignition it was expected that the wind would be southwesterly. As a result, 400 ft wide firelines were established along the east and north boundaries. However, on the first day, within 2 hours of igniting the

the main headfire the wind shifted to the southeast. The only fireline on the west boundary was a line, 10 ft wide, to mineral soil along the perimeter fence of the pasture. To compensate for the wind shift and resultant fire behavior the 7 person suppression crew was deployed as an ignition crew. They constructed a 400 ft wide fireline along the west boundary using the strip headfire technique. Meanwhile, the 3 man initial suppression crew followed behind the ignition crew preventing fire escapes. With the new fireline in place the helitorch continued igniting the main headfire. By the end of the first day 6,000 acres were burned.

Rainy weather delayed completion of the burn for 11 days. During this time mild temperatures and precipitation stimulated plant growth thus increasing the green or live plant tissue component of the fine fuel. In an effort to conduct a burn before the increasing green portion of the fine fuel reduced the likelihood of success, a less than optimal day was chosen for the final day (6 March 1985) of burning. A cold front had passed 24 hours prior to this day and another was predicted within 36 hours. As a result the weather (relative humidity: 40-50%, air temperature: 54-59° F, and wind speed: 8 mi/hr) was less than desirable for a satisfactory burn. Although ignition, refueling, and communications between supervisory team members proceeded efficiently, burn objectives were not met.

Due to this experience the strategy for prescribed burns using the helitorch in redberry juniper-dominated rangelands was modified. In the future, all firelines will be in place by February 1, thereby enabling the fire workforce to take advantage of warm days which might occur earlier in the winter. To further enhance flexibility in burning, the helicopter, pilot, and support crew will be on standby starting February 1.

Literature Cited

Ellis, D., and J.L. Schuster. 1968. Juniper age and distribution on an isolated butte in Garza County, Texas. Southwest Natur. 13:343-358.

Fischer, W.C. 1978. Planning and evaluating prescribed fires . . . a standard procedure. USDA Forest Serv. Gen. Tech. Rep. INT-43.

Steuter, A.A., and H.A. Wright. 1983. Spring burning effects on redberry juniper-mixed grass habitats. J. Range Manage. 36:161-164.

Wright, H.A., and A.W. Bailey. 1982. Fire ecology. John Wiley & Sons, New York.

The Western Range

Under a spreading Sagebrush tree
A single bunch grass stands;
This grass, a mighty plant is she;
The binder of our sands;
But seedlings of this refugee
Are weak as rubber bands.

The lambies going out to graze
Look here and there for feed.
They love to eat the seedlings rare—
Both stem and leaf and seed.
To save their lives they needs must graze
Each shrub, and grass, and weed.

Week in, week out, from dawn to dusk
They vainly hunt new shoots—
Their herder trudging after them
With worn and dusty boots.
No tops are left, and, if they could,
They'd even eat the roots.

The sheepman's not to blame, you know,
He does the best he can,
(His kids needs shoes; his wife needs more
Than a healthy coat of tan).
To pay his tax, his interest, too,
And he owes 'most every man.

But soils devoid of grass and weeds
Are very apt to blow,
And sudden rains are sure to cause
A heavy run-off flow,
And wash away the soil, and flood
The farmers' field below.

And so we try, as best we can,
To regulate the range—
To leave some grass to go to seed
To some may seem quite strange—
But when the seedlings grow up tall
They're grateful for the change.

For when the soil is held in place,
The grass stems hold the snow,
And heavy rains sink in the soil
And cause the springs to flow,
And sheep and sheepmen are amazed
How fast the grass does grow.

Vernon T. Heidenreich (1940)

USDA-SCS Fact Sheet

Prescribed Burning

What: Prescribed burning is a relatively new technique used to improve rangeland in parts of the Southwest. Prescribed burning is done just at the end of the dormant season or just at the time the desirable grasses are beginning spring growth. This suppresses certain undesirable plants thus giving an improved environment for the better plants.

Why: Because chemical and mechanical brush control is so expensive, ranchers have been hunting for a less expensive method. Under certain conditions, prescribed burning is a viable and effective brush control alternative that can be carried out more economically. Prescribed burning is also an effective method to improve distribution of livestock. Burning removes old growth from plants and at least for a few months reduces the animals' preference for one plant over another.

When: Prescribed burning should be done when it will achieve the objectives desired by the producer.

When done properly, prescribed burning produces a "cool" fire that will suppress juniper, pricklypear, tasajillo, buckbrush, dogwood, broomweed seedlings, and many other less desirable plants.

How: Prescribed burning is done with a combination of headfires, firebreaks, fireguards, flank fires, and backfires. A **headfire** is a fire burning with a wind. **Flank fires** burn crosswind while **backfires** burn into the wind.

A **firebreak** is a pre-burned strip around the projected downwind sides of the area to be burned. It can be created by burning between two fireguards, or by using backfires and flank fires during the prescribed burn. Firebreaks should be at least 100 ft. wide except when the area to be burned contains dry juniper. Because the dry plants are explosive, juniper firebreaks should be at least 500 ft. wide.

A **fireguard** is a strip of land where the vegetation has been removed by blading, disking, or treating with fire retardant material. Fireguards are about 10 ft. wide when bladed with a bulldozer or maintainer; they are 2 to 5 ft. wide when sprayed with a fire retardant material, depending on the height of the fuel.

Fine Fuel: Fine fuel is dormant grasses, forbs, and other plants that will carry the fire. Before burning, most rangeland needs to be deferred during the previous growing season to produce sufficient fine fuel that is evenly distributed.

Weather Conditions: Burning should be prescribed for each situation based on objectives and need. Generally, this is when wind speeds are between 6 to 15 mph and when the relative humidity is from 20 to 60 percent with the temperature ranging from 45 to 70 degrees Fahrenheit.

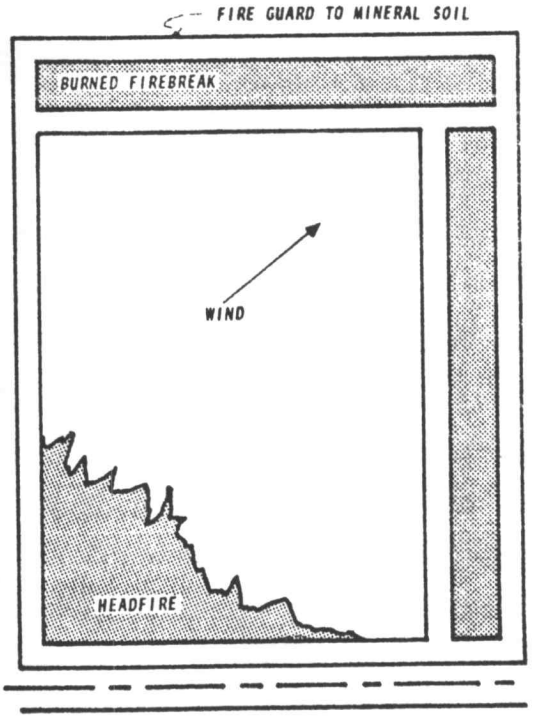
Wind Direction: Prescribed burns should be directed away from highways, populated areas, homes, or other places where smoke would be a hazard. Burn toward a plowed field or toward a producer's own land instead of a neighbor's.

Topography: This factor should be considered in designing a burn because fuel will burn rapidly uphill; a slope can turn backfires into headfires and can turn headfires into flank or backfires.

Fire Plan: A fire plan should **always** be worked up before the practice is carried out. Factors to be considered include the amount and distribution of fine fuel; desired weather conditions; preferred wind velocities; direction to burn; and the location of highways, buildings, and other improvements.

An actual prescription of wind speed and direction, relative humidity, and air temperature should be designated for each burn. Fireguards and firebreaks are then planned and a lighting sequence is developed for setting the fire.

Fire Boss: For each prescribed burn, the producer or someone experienced with carrying out the practice should serve as the fire boss. The boss coordinates the burn and tells others when to set backfires, flank fires, and head fires.



Example: In a typical prescribed burn, fireguards and firebreaks are installed before the burn, then a headfire is started. In this example, the fire is designed to burn away from a highway at the bottom of the drawing.

Equipment Needed: To plan and carry out a safe burn, equipment needed will usually include at least one or more drip torches, relative humidity gage, wind meter, spray equipment, and wet feed sacks.

Follow-up Deferment: After the burn, the pasture should generally be deferred for a period, depending on range condition and the producer's goals for improvement.

Special Considerations: When using prescribed burning on land infested with juniper or other plants high in oil, dry brush piles and large green trees should be removed near fireguards before the burn. Otherwise, they can explode and produce firebrands that can travel several hundred feet and ignite other land.

Warning: When the practice is not carried out properly, fire can escape to adjoining property. If smoke crosses highways, it can cause traffic accidents and death. If weather conditions are not as prescribed in the burning plan, the practice should not be carried out.

Where to Get Help: For technical assistance in planning and carrying out prescribed burning, contact your local office of the U.S. Department of Agriculture's Soil Conservation Service.

What Shall We Do about Grazing Systems Studies?

Donald A. Jameson

There are many grazing management research questions that can only be answered by large scale grazing studies; one such question is addressed in so-called "grazing systems" research. There are two major difficulties in applying standard research procedures to such studies.

1. In a replicated grazing systems experiment with large pastures, the replication effect is usually greater than the treatment effect. Instead of having a single set of treatments which are replicated 2 or 3 times, we effectively have 2 or 3 different studies, none of which are replicated at all.

2. In years of lower than usual rainfall, fixed grazing schedule treatments with fixed heavy stocking rates must be interrupted. Only the lighter stocking rates can be applied with fixed grazing schedules in such years, and with light stocking rates there is usually no difference between different grazing systems.

Thus, two critical elements in standard experimental design, (1) replications and (2) fixed treatments, are difficult if not impossible to apply in large-scale grazing studies.

An alternative approach is to use sequential or adaptive methods of research and analysis. In this approach, the animals, soil, and vegetation are monitored and grazing adjustments made as needed. This is what good range managers do all the time; the problem is to see how range researchers can use these methods.

An adaptive system requires that some measurements or other observations be taken at intervals; a predictive model is used to supply information between measurements. We might not think that we are using a model, but we do. For example, suppose that we measure something about the range on June 1, and don't remeasure it until July 1. Anything that we can say about the range between these measurement periods comes from our concept or "model" of how the range will perform during this time. Although models may be very complex, the model used in this case may simply say that everything remains the same during the rest of June as it was on June 1. Without a model we would have to measure continuously to know what's going on. To keep our understanding about the range at a satisfactory level, we can use either better models or better measurements. The combination of models and measurements we call "monitoring." As a result of monitoring, needed changes in management can be made in an "adaptive management" scheme. Changes in grazing based on residual plant biomass is one example of management based on monitoring.

The adaptive management method seems like a good idea, but perhaps a little near-sighted if used exactly as described in the previous paragraph. Suppose we try this method to make adjustments in grazing schedules; as it turns out, the simple-minded adaptive approach is perfectly acceptable if:

1. The statistical errors in the measurements and models are not strongly skewed from a normal distribution.

2. The cost or penalty for a given degree of undergrazing is about the same as for the same degree of overgrazing.

3. The changes in plant and animal performance from an undergrazed condition to an overgrazed condition follow the same pathway (but are opposite in direction) as the changes from an overgrazed condition back to an undergrazed condition.

In pastures managed as a single species, particularly if coupled with a supplementation program, the three conditions described above are reasonable, and the adaptive approach shouldn't get us into too much trouble. Under these conditions, we can use simple observations of vegetation and animal performance to make adjustments to grazing schedules and stocking rates. In a lot of vegetation types, such as the shortgrass plains, this method will be very useful.

On the other hand, we don't have to think too hard to realize that the three required conditions for adaptive management as described above don't always apply to range-

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lands. For example, forage responses which depend heavily on rainfall most likely will not be normally distributed, but will have a skewed distribution because periods below the mean rainfall are more common than periods of above mean rainfall. As another example, the time required to shift from plant species that are "decreasers" to species that are "increasers" may be much less than the time required to shift from "increasers" to "decreasers". Since we cannot develop recommendations based on fixed grazing schedules even in the simplest cases, and can't use the simpler forms of adaptive management in many vegetation communities, we often seem to be at a loss in approaching grazing systems research.

There are at least two things that might be done in the difficult problem situations:

(a). Find or develop biological indicators for the range system that meets the three required conditions listed above for adaptive management. According to the principles of production economics, these indicators should be used to guide the manager toward stocking rates that are greater than those yielding the maximum gain per animal, but less than those which yield maximum gain per acre. Appropriate indicators might include animal responses such as fecal nitrogen or length of grazing time between animal rest periods. On the other hand, the indicators may be derived from plant responses; intuition (backed up by a few hundred studies about clipping and grazing effects on plant growth) suggests that management based on observations of plant roots might be appropriate. A major problem with the root approach is that we presently do not have good methods for observing roots; all of our existing methods are very costly and have high sampling error. We're not even sure what it is about the root system that is meaningful as a grazing management indicator, but recent research on this question is at least providing some clues.

A good root measurement program would also address the problem of predicting the impact of this year's grazing on next year's range performance, and thus provide an "early warning" of impending changes in range performance. It is clear that observations only on top growth don't get a handle on this question.

(b). Use a stochastic dynamic programming model that considers all of the uncertainty, possible management corrections, and measurements which will be encountered throughout the length of the planning period (2 years, 10 years?), and compare the results to a decision model in which the uncertainty of future events is ignored. In general, ignoring the uncertainty of future events requires the same three conditions as mentioned earlier for the simpler approaches to adaptive management. If a computational approach that considers uncertainty of future events yields the same decision as a simpler approach that ignores uncertainty, we then know that the simpler approach is appropriate. A research program can be designed to determine if the two approaches yield the same or different results; if the results are equivalent, we can say that "certainty equivalence" applies. If we can ignore future uncertainty, the computational load ranges from trivial to reasonable, and could be done under many management situations. If the three required conditions don't apply and the more complex approach must be used, the computational load ranges from uncomfortable to unbearable and probably won't be done by managers.

It seems like the best immediate approach in grazing systems research is to (1) quit wasting our resources trying to find desirable fixed schedule grazing systems, and (2) emphasize grazing trials that use flexible scheduling and flexible stocking rates based on the things we currently know how to observe. Where this doesn't work, we should design research programs to include (a) suitable biological indicators for adaptive management and (b) computational methods that consider the uncertainty of future events. Until we make some fundamental progress in these areas, range researchers must merely bow to experienced range managers and wish them well.

Remember Rangeland Reference Areas?

Barbara H. Allen

The Society for Range Management has renewed its policy and strong commitment to the identification, description, and preservation of rangeland reference areas. These areas serve as a valuable educational and research resource where comparisons of rangeland ecosystems with and without grazing can be made. The rangeland reference area network is far from complete, and valuable, old reference exclosures are being torn down. It is time to re-examine our rangeland ecosystems and ensure a representative rangeland reference area network is maintained.

What are Rangelands Reference Areas?

A rangeland reference area is defined as:

> An area set aside which illustrates or typifies virgin conditions of forest or range growth, as well as other (including grazed) conditions that have special or unique characteristics of scientific interest and importance from a range resource standpoint, to be retained primarily for the purpose of science, research and education (Laycock 1975).

There are 4 categories of rangeland reference areas:

1. **Research Natural Areas**—Baseline areas of large size (usually at least 300 hundred acres), which are representative of original, pristine (or climax) vegetation and which will receive nondestructive or nonconsumptive management.
2. **Exclosures**—Smaller areas set aside and protected from grazing either to preserve representative areas in excellent range condition or to allow observation of succession on depleted rangeland without grazing.
3. **Managed Range Study Areas**—Grazed areas that illustrate either excellent range condition or a specific type of livestock management. They could include part or all of federal, state, or university experimental ranges where long-term grazing management studies are carried out or other areas where the results of specific types of range management can be seen.
4. **Other Reference Areas**—Educational areas; endangered species preserves; botanical, geological, or archeological special interest areas; recreational areas, or other types of reference areas that do not readily fit into the other categories of the Rangeland Reference Area Program. These areas often have only local or regional significance.

History

The reference area program formally began with an article called "Natural Areas" by E. William Anderson in 1966. Natural areas include a variety of sites which are variously referred to as natural areas, research natural areas, ecological reserves, ecosystem preserves, nature reserves, nature sanctuaries, and nature preserves. Over time state and federal agencies and private organizations began to include wilderness areas, primitive areas, recreational areas, scenic areas, botanical areas, geological, historical or archealogical areas under the term natural areas also. The term natural area came to mean something much broader than an area set aside where natural biological and physical processes are allowed to occur unhindered.

In 1969, the SRM adopted the name reference area instead of natural area. The objective was the same: to preserve areas to serve as baselines against which the effects of management of the natural environment could be evaluated. The Society recognized reference areas as the cornerstone of the science of range management. Without them, no clear differentiation of range sites or determination of range condition and trend on grazed lands would be possible (Laycock 1975). In addition, the areas would enable researchers and managers to compare vegetational change associated with or not associated with grazing.

The Rangeland Reference Area Committee was established by the SRM Board of Directors in 1966. E. William Anderson was the first chairman from 1966-1971. William Laycock served as chairman from 1971-1975. Committee activities culminated in the SRM publication *Rangeland Reference Areas* (Laycock 1975), which provides a comprehensive overview of the policy and commitment of the parent Society and range professionals to the identification and preservation of rangeland reference areas. Range professionals, including, E.W. Anderson, A.A. Beetle, H. Cosby, F.C. Hall, D.E. Hutchison, P. Jensen, and A. Johnson contributed their time and expertise to the development of the Society's policy on rangeland reference areas.

Laycock (1975) stated that the recognition of the value of rangeland reference areas and the deficiencies of the existing system clearly pointed to the need for a reference areas program in each Section of the SRM. He developed a 7 point action plan for identifying, describing, and cataloging existing reference areas and suggested criteria for selection of new reference areas.

In 1975, the Reference Area Committee was disbanded only to be re-established in 1980 and merged with the Research Affairs Committee in 1984. Bill Laycock guided the Committee and served as the coordinator of Section activities involving reference areas during this entire period.

Why Establish Rangeland Reference Areas?

The reasons for preserving rangeland reference areas haven't changed in 20 years. Anderson (1966), Soulé and Wilcox (1980), and Franklin and Trappe (1968) are just a few who have eloquently stated reasons for establishing a system of reference (natural) areas. The following reasons,

Editor's Note: The Rangelands Reference Area Committee is a subcommittee under the Research Affairs Committee. Barbara Allen is the chairman of this subcommittee. The Board of Directors, Society of Range Management, and the SRM Research Affairs Committee would like to see additional and rekindled interest in rangeland reference areas. The Rangelands Reference Area Subcommittee has been charged with the task of renewing the interest and completing the cataloging of rangeland reference areas in the United States.

though not all inclusive, have been selected because of their general acceptance of profound nature.

1). Because natural biological and physical processes can occur unhindered in rangeland reference areas, they serve as a baseline or standard against which the effects of human intervention in other parts of the natural environment can be studied and evaluated.

2). Reference areas are the cornerstones of the sciences of resource management. In range science they provide the basis for defining range sites or ecological types, determining range condition and range trend under grazing and other uses, all of which are the fundamental ecological basis for range resource management.

3). Rangeland reference areas provide representative plant communities or ecosystems which serve as outdoor laboratories for teaching and research on ecological dynamics, the specific effects of herbivores, and the impacts of ever-increasing human manipulation of the environment.

4). Rangeland reference areas are vital sanctuaries for individual species and communities. They provide essential genetic reservoirs of native fauna and flora. All domesticated crops spring from the pool of wild genes and preserving this source of wild genes is actually preserving our future supplies of food, fiber, medicines, and organic chemicals.

Work Already Done

Members from some SRM Sections have published lists of rangeland reference areas for their region. Table 1 lists those publications. Other efforts are underway, but the job is far from done.

Table 1. Existing publications of rangeland reference areas.

Section	Author	Year	Scope
Arizona	Turner et al.	1980	380 exclosures and remote areas
Kansas/ Oklahoma	Section Newsletter	1973	166 natural areas with location, map
Montana	Ross et al.	1973	Soil, vegetation inventory, nearly pristine areas
Nebraska	Section Newsletter	1973	20 areas, location, description
Pacific Northwest	Section	1969	Reference area location, veg type, agency
Utah	Laycock	1969	Exclosures and reference areas
Wyoming	Williams	1963	Exclosures
Saskatchewan	NRC	1972	Natural areas described, policy included

Other state and federal agencies and private foundations are establishing research natural areas (FS, BLM, NPS, F&WL), nature reserves (University of California, The Nature Conservancy), and significant natural areas (California Dept. of Forestry). The federal effort in the identification, description and preservation of research natural areas produced directories of these areas in 1968 and 1977. Other organizations such as the Society of American Foresters and Soil Conservation Society of America also have large natural area programs. The American Association for the Advancement of Science (1963) published a comprehensive bibliography of natural areas. The SRM Rangeland Reference Area (Laycock 1975) publication provides additional valuable literature citations.

What Needs to be Done

Sections that have not compiled a list of reference areas need to do so now, before the areas are gone, exclosures are dismantled, and no suitable areas are left to designate as rangeland reference areas. A form for recording information on potential reference areas is available (Table 2—*see next page*). The suggested criteria for establishment are found in Laycock (1975).

Sections with existing lists need to evaluate their list and suggest additions as appropriate. More importantly, all Sections need to stay in touch with public and private groups to be notified that a reference area and/or exclosure is going to be removed. Be part of that decision making process and fight to keep valuable reference areas.

Each major vegetation type should be well represented to ensure that we can meet future needs. Make an assessment of rangeland types in your Section. Check statewide data bases for their lists of natural areas. Which rangeland types are not included in existing natural area reserve systems? Evaluate and work through state and federal planning groups to promote the establishment and/or maintenance of areas and exclosures. Publicize the location, ownership, vegetation type and other pertinent information so that researchers and educators can make use of the areas.

Finally, think about the potential reference areas in your Section and report these areas to your Section. Resource conservation district personnel, extension agents, farm advisors, ranchers, and others can catalog and report old exclosures to their SRM Sections. Sections should designate a person-in-charge who can maintain contact with the Rangeland Reference Area subcommittee. Now you have a way to contribute by preserving valuable exclosures and areas of specific rangeland types that once destroyed are gone forever—that's that bottom line.

Literature Cited

Anderson, E.W. 1966. Natural areas. J. Range Manage. 19:239-242.

Association for the Advancement of Science. 1963. Natural areas as research facilities. Washington, D.C.

Franklin, J.F., and J.M. Trappe. 1968. Natural areas: needs, concepts, and criteria. J. Forestry 66:456-461.

Kansas/Oklahoma Section SRM. 1973. Kansas-Oklahoma section Society for Range Management Natural Areas. Spec. Publ.

Laycock, W.A. 1969. Exclosures and natural areas on rangelands in Utah. USDA Forest Service Intermt. Forest & Range Exp. Sta. Res. Paper INT-62.

Laycock, W.A. 1975. Rangeland reference areas. Soc. Range Manage. Range Sci. Series #3.

Nebraska Section SRM. 1973. List of Nebraska SRM reference areas. SRM Newsletter 22(3).

NRC IBP Saskatchewan Region. 1972. Natural areas in Saskatchewan. Progress Report.

Pacific Northwest Section SRM. 1969. Tentative list of rangeland reference areas. Unpubl.

Ross, R.L., E.P. Murray, and J.B. Haigh. 1973. Soil and vegetation inventory of near-pristine sites in Montana. USDA SCS, Bozeman, Mont.

Soulé, M.E., and B.A. Wilcox, eds. 1980. Conservation Biology: An Evolutionary-Ecological Perspective. Sinauer Ass., Sunderland, MA.

Turner, R.M., L.H. Applegate, P.M. Begthold, S. Gallizioli and S.C. Martin. 1980. Arizona range reference areas. USDA FS Gen. Tech. Rep. RM-79.

USDA. 1968. A directory of research natural areas on federal lands of the USA. Compiled by the Federal Committee on RNAs. US Gov. Printing, Washington, D.C.

USDA 1977. A directory of research natural areas on federal lands of the USA. Federal Committee on Ecol. Reserves. USDA FS. Washington, D.C.

Williams, C. 1963. Range exclosures within the state of Wyoming. Wyo. Range Manage. 170:1-19.

Table 2.

SOCIETY FOR RANGE MANAGEMENT

_____SECTION
RANGELAND REFERENCE AREAS COMMITTEE

INVENTORY OF EXISTING AND POSSIBLE RANGELAND REFERENCE AREAS

NAME OF AREA (or proposed name): _____

_____

Location: Quarter section_____ Section_____ Township_____
Range_____ County_____ Township_____
Ownership of land (National Park, National Forest, BLM, State, Province, private, etc.): _____

SIZE AND DIMENSIONS: _____

VEGETATION COMMUNITY, TYPE, OR ASSOC.: _____

SAF FOREST TYPE NUMBER AND NAME (if applicable): _____

KÜCHLER TYPE NUMBER AND NAME (if applicable): _____

SCS RANGE SITE NAME: _____
OTHER CLASSIFICATION: _____

MAJOR SPECIES
(3 most abundant—Use SCS National List of Scientific Plant Names):

_____

_____

OTHER SPECIES PRESENT (List as many as possible): _____

_____

_____

MANAGEMENT OR USE DURING PAST 50 YEARS (if known): _____

_____

_____

CATEGORY DESIGNATION: (Check one)

_____ Research Natural Area

_____ Managed Range Study Area

Kind of livestock managed: _____

_____ Exclosure

Kind of livestock or animals excluded: _____

_____ Other Reference Area—Important features: _____

_____

PLEASE FILL IN AS MANY BLANKS AS POSSIBLE ON BOTH SIDES OF THIS FORM AND INCLUDE A MAP SHOW LOCATION OF AREA

GENERAL COMMENTS: (Evidence of rodents, insects, disease, or other influences): _____

_____

_____

ALTITUDE: _____ EXPOSURE: _____ SLOPE (%):_____

GENERAL DESCRIPTION OF AREA: _____

_____

DATE ESTABLISHED: _____
Subsequent alterations: _____

_____

NO. OF PARTS (IF EXCLOSURE): _____

TYPE AND HEIGHT OF FENCE (EACH PART): CONDITION OF FENCE:

_____ In good condition _____

_____ Needs minor repairs _____

_____ Needs extensive repairs _____

VEGETATION TREATMENTS (seeding, spraying, etc.) if any: _____

_____

VEGETATION SAMPLING:
Has vegetation in exclosure been sampled? _____ When and by what methods? _____

Has range outside exclosure been sampled? _____ When and by what methods? _____

Where are records retained? _____

Is the outside plot marked? _____ How? _____

PHOTOGRAPHS:
Have photographs been taken of the exclosure?_____

Grazed area? _____ If so, when? _____

Black and white _____ Color transparency _____

Where and photos and/or negatives filed? _____

GEOLOGICAL FORMATION: _____

_____

SOIL TYPES: _____

Soil depth: _____

Has profile been described? _____

(If soil survey has been made of the area, attach a copy)

BUFFER AREA:
Is one officially designated? _____
Size: _____

Is it marked? _____

REPORTED BY: _____ TITLE_____ DATE _____

Send completed forms and requests for more forms to: _____

_____

Cattle Behavior Used to Control Noxious Weeds

Mark Parman

A Richland County rancher thinks his cattle might be more cost effective than chemicals when it comes to controlling leafy spurge. Gene Foss, who ranches 10 miles south of Culbertson, Mont., estimates that he has invested $32 per acre per year in chemical control with little additional forage being produced. He is now using his cows to control leafy spurge without spending money for chemicals.

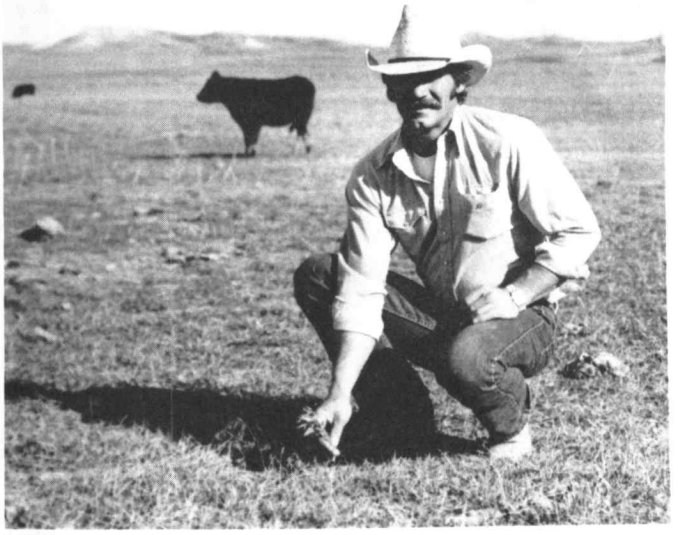
Foss's trial with cattle started with his observation that leafy spurge could not tolerate physical damage. After noticing that grass was growing where he drove through a spurge infestation, Foss concluded, "You can control spurge with a rubber tire." He also observed that cattle concentrations eliminated leafy spurge infestations. For example, in his cattle trap where cattle were concentrated for 2 or 3 days in a year, grasses were abundant while across the fence spurge dominated the plant community.

Foss is capitalizing on these observations with his newly implemented time control grazing program. To increase his cattle concentrations, he divided 8,400 acres into 21 pastures, grouped his cattle into 1 herd and moved them through the pastures in a planned manner. There are plans to further divide these 21 pastures into 40 by 1987. Gene also added cattle to his herd to further increase the physical impact on the spurge. He estimates that stock density in the spurge pastures was increased to a minimum of 2 cows per acre in early spring of 1985.

"In my first grazing periods, I didn't get the physical damage to the leafy spurge I wanted," Foss said. Increased stock density had little effect on the plant populations. Grazing cows were very careful where they placed their feet and caused little damage.

To further increase physical impact, Gene stimulated a herding behavior with mineral supplements. In getting to the supplement, the cattle trampled the spurge plants, breaking off stems and stepping on seedlings. Foss believes that repeated animal impact will eliminate spurge's dominance and allow desirable forage plants to increase in these areas. The preliminary results are encouraging. Grass seedlings are establishing in areas of leafy spurge and a more diverse community may be established. Arnold Norman, area resource conservationist for the Soil Conservation Service, is also optimistic. "Many ranchers have successfully controlled brush species with this technique. Gene appears to have a good start at controlling his leafy spurge."

Weed control is one of the goals of the Holistic Resource Management plan Foss adopted in March 1985. HRM is a planning tool that allows a rancher to make sound economic and ecological decisions that help achieve the goals of his ranch. Gene bases the length of grazing in a pasture on the plant growth rate, the quality of forage in the pasture, and the number of total pastures. His pastures are rested for 30 to 90 days depending on the growth rate of the plants. Plants are not regrazed until they have recovered from the initial grazing. This grazing pattern allows for animal impact on the land and reduces the stress of grazing on plants.



Gene Foss, Richland County rancher, holds a trampled leafy spurge plant in one of his pastures. Foss thinks his cattle are more cost effective than chemicals in controlling leafy spurge on his ranch.

Foss thinks that by using HRM he may be able to control leafy spurge without the high cost of chemical application. The physical animal impact structured into HRM will advance the successional level of his plant community to a point where leafy spurge will no longer pose a significant problem.

Capital Corral

Predicting the impact of Gramm-Rudman-Hollings legislation on various federal programs seems to the number one growth industry in Washington in 1986. Consultants are selling advice, and newsletters devoted to predictions of effects on specific areas (such as conservation) are selling well.

The best assessment of this year's budget climate and its probable results for range management came from a panel of agency range experts plus two Congressional staffers at an informal meeting at USDA May 28. Dean Boe of the Forest Service says career ladders will be affected and that there will be less range expertise in some geographic areas, with less responsiveness to information requests. GRH is already forcing better analysis and priority-setting with emphasis on range condition—the health of the ecosystem—on top. BLM's Billy Templeton sees a similar outlook, and points to budgets that have already diminished to fit within GRH limitations.

SCS may be more affected by what happens before and after GRH in view of the 30% budget cut in the 1987 proposal. Jim Newman describes how Farm Bill provisions will increasingly shift SCS program emphasis over a period of several years. He spoke of "doing the same with less", as did Extension Service's John Vance, who realistically talked about even "doing *less* with less!" ES, like SCS, may be more heavily impacted by the cuts in established programs proposed in the 1987 Budget than by the action of the GRH process.

Nancy Dorn of Congressman Loeffler's (R—TX) staff pointed out the strong incentive GRH limitations gave the House Appropriations Committee to seek federal grazing fee increases to offset some appropriation hikes. Bob Lamina, who works for Congressman Skeen (R-NM) said the General Accounting office is taking another look at grazing fees at the request of Congressman Synar. Both staffers agreed that natural resources programs were taking more than their share of cuts, and urged conservation professionals and resource users to do a better job of making their case to the Administration and Congress.

Political action committees were the subject of several items in the May *Journal of Forestry*. SAF Executive Vice-President Ron Christensen gave resource professionals some food for thought when he said, ". . . Our influence in the political arena comes from educating the executive, legislative, and judicial branches by communicating sound and understandable research and position statements. Our continued credibility as objective professionals concerned with the wise use of the resource base and the ultimate welfare of the public is an underestimated political advantage. Our objectivity is respected by the decision-makers and ought not be risked lightly in partisanship or the single-issue orientation of the PAC world."

Nevada Wilderness advanced as the House of Representatives approved legislation (H.R. 4642) designating 11 areas totaling 592,000 acres of the Humboldt and Toiyabe National Forests. The act also would transfer 175,000 acres of the Humboldt to the National Park Service to become the Great Basin National Park and Preserve. About 130,000 acres would be given park status and the remaining 45,000 acres would be managed as a preserve. The legislation specifically permits livestock grazing in the park and preserve, but hunting and fishing would be allowed only in the preserve area.

Wild Horse and Burro Advisory Board members were announced May 23 by Secretary of the Interior Donald Hodel. An organizational meeting will be scheduled in Washington, to be followed by field meetings. Appointed for two-year terms were: Norman B. Livermore of San Rafael, California, public at large and chairman of the board; Helen Reilly of Reno, Nevada, wild horse and burro management; Dr. Laurence R. Jahn of Washington, D.C., wildlife management; Brad Little of Emmett, Idaho, rangeland management; William E. Towell of Southern Pines, North Carolina, conservation; Dennis White of Denver, Colorado, humane organizations; James M. Magagna of Rock Springs Wyoming, livestock management; Terry Swanson, DVM, of Littleton, Colorado, veterinary medicine; and Dr. Michael Pontrelli of Reno, Nevada, wild horse and burro research.

Thad Box, SRM stalwart and Dean of the College of Natural Resources at Utah State University visited Washington May 22 to collect his Chevron Conservation Award in an impressive ceremony recognizing 20 individuals and 5 organizations. Dr. Box received his recognition in the Professional category. He is a thousand dollars richer, and possesses a handsome plaque.

Ernest C. Shea, Assistant Secretary of Agriculture in Maryland, has been named Executive Vice-President of the National Association of Conservation Districts. **Peter Myers** has been sworn in as Deputy Secretary of Agriculture following a brief delay in his confirmation by the Senate Agriculture Committee. Approval came after USDA fulfilled an earlier promise to buy 5 million pounds of Maine potatoes, according to the *Washington Post*. George S. Dunlop, Chief of Staff for the Senate Committee on Agriculture was confirmed by the Senate and sworn in as Assistant Secretary of Agriculture for Natural Resources and Environment.

SRM President Fee Fusby testified before the President's Council on Americans Outdoors in Denver and Cheyenne during recent field hearings.

SRM testimony on budget requests for six USDA agencies (SCS, ARS, CSRS, ES, APHIS, and ASCS) was heard by the Senate Appropriations Committee chaired by Congressman Jamie Whittenx April 16. Pete Jackson joined me at this key hearing. Earlier, I testified on BLM and FS budgets. In supporting stronger natural resource budgets, we made the point that renewable resources should have no less priority than national defense, and that in fact national security depends in many ways upon a healthy natural resource base.

AFA's Resource Hotline has been quoted frequently in the Legislative Log. If you prefer not to wait for the expurgated version, a subscription can be had for $24.50 ($14.50 for AFA

members). Write American Forestry Assn. 1319 18th St. NW, Washington, D.C. 20036.

A proposed consolidation of the SCS National Technical Centers was suspended May 21 by Sec. of Agriculture Richard Lyng, who determined that, after a preliminary review of the proposal, questions remained as to the appropriateness and efficacy of consolidating the four National Technical Centers into a single center at Fort Worth, Texas. A final decision will be made no later than Feb. 1, 1987.

The four SCS technical centers are located at Portland, Oregon; Lincoln, Nebraska; Chester, Pennsylvania; and Fort Worth, Texas.

A second sign-up for the 1986 Conservation Reserve Program has taken 3 million more acres of highly erodible cropland out of cultivation. Counting lands put into the program during the first sign-up in March, the reserve will set-aside 3.8 million acres of erodible land during the 1986 crop year.

Animal Damage Control Advisory Committee members will likely not be named until late this year, according to APHIS officials. Following charter approval and clearances for nominees, the 20-member committee should be functioning early in 1987. A USDA policy group is already in place and working.

Fees! Congressman Buddy Darden (GA) has introduced legislation to establish a new formula for setting public land grazing fees. The bill, H.R. 4713, would require the Bureau of Land Management and the U.S. Forest Service to charge fair market value for livestock forage as defined in the 1985 Grazing Fee Review and Evaluation report.

Under Darden's bill, the fee could climb to 4 times the current level of $1.35 per animal per month. Darden said that this bill would raise a minimum of $31.2 million dollars over three years for the federal treasury, and it would "level the playing field" for livestock producers who have no access to public rangeland. Only 2 percent of America's 1.6 million livestockmen use no public land.

Joseph W. Haas has been named associate chief of the Soil Conservation Service. The appointment was effective June 8. Haas replaces Thomas G. Rockenbaugh, who retired June 3, as second-in-command to SCS chief Wilson Scaling. Haas is a native of Illinois. He holds a bachelor's degree in agricultural engineering from the University of Illinois and a master's degree in civil engineering from Stanford University.

Haas began his federal career with the Soil Conservation Service as an agricultural engineer in Illinois in 1956. He was assistant state conservationist in Pennsylvania for two years before joining the SCS water resources staff in Washington, D.C., in 1969. He became assistant SCS administrator for water resources in 1975, deputy chief for natural resource projects in 1980, deputy chief for programs in 1984, and deputy chief for technology earlier this year.

The administrator of the USDA Extension Service, Dr. Mary Nell Greenwood, stepped down July 14. She is succeeded on an interim basis by Dr. Myron Johnsrud, director of the North Dakota Cooperative Extension Service. Dr. Orville G. Bentley, assistant secretary for science and education, said that Dr. Greenwood had requested to be relieved of her administrative responsibilities because of health factors. She will become an assistant to the administrator.

Grazing fees were challenged May 12 in a suit filed in Federal District Court by the Natural Resources Defense Council and 8 other organizations alleging that by adopting the PRIA formula for an indefinite period, Interior and Agriculture violated the Administrative procedures Act, Nat'l Environmental Policy Act, and the statutory requirements to set grazing fees at fair market value. No hearing is expected before fall.—**Ray Housley** Washington Representative

Meetings of Interest

Aug. 18-22, 1986 - International Ranchers Roundup
Y O Ranch Hilton, Kerville, Texas. Contact: Dr. Tom Troxel (512) 278-9151.

Sept. 10, 1986 - Ecology and Management of Orange Sneezeweed—Tour Craig, Colo. Contact: Dr. Roy Roath (303) 491-6543.

Sept. 28-30, 1986 - Public Lands Council
Discussion on Legislative Efficiency
Denver, Colo. Contact: Ron Michieli (202) 347-0228.

Nov. 12-14, 1986 - Multiple Use Management of California Hardwood Resources
Cal. Poly. State University
San Louis Obispo, Calif. Contact: Dr. Tim Plumb (805) 546-2702.

Nov. 18-20, 1986 - California Watershed Management Conference
Sacramento, Calif. Contact: Dr. Robert Calahan (415) 642-0263.

Jan. 20-22, - Pacific Northwest Range Short Course
Indian Hills Red Lyon, Pendleton, Ore. Contact: Dr. Tom Bodell (503) 754-3341.

- Southwest Brush and Weed Conference
3rd weed of Jan.

Feb. 8-13, 1987 - Symposia at Annual Meeting, Society for Range Management Red Lyon Inn, Boise, Ida.
(1) Ecology and Economic Impact of Poisonous Plants on livestock
Contact: Lynn F. James (801) 752-2941
(2) International Rangeland Development: Institutions for Rangeland Development; Strategies and lessons learned
Contact: Dr. James O'Rourke
(3) WRCC-40: Monitoring Animal Prefor- Forage Production
Contact: Dr. Don Jameson
(4) Annual Plants on Rangelands
Contact: Richard Mack
(5) 4th Annual Communication Workshop
Contact: Carylon Sieg
(6) Evaluation of the Vale District Program
Contact: Dave Lavindsky

Feb. 18-21, 1987 - International Stockman School
Houston, Texas
Contact: Dr. L.S. Pope (409) 845-3894

Current Literature

This section has the objective of alerting SRM members and other readers of *Rangelands* to the availability of new, useful literature being published on applied range management. Readers are requested to suggest literature items—and preferably also contribute single copies for review—for including in this section in subsequent issues. Personal copies should be requested from the respective publisher or senior author (address shown in parentheses for each citation).

Changes in Protected and Grazed Sagebrush-Grass in Eastern Oregon, 1937 to 1974; by Forrest A. Sneva, L.R. Rittenhouse, P.T. Tueller, and P. Reece; 1984; Ore. Agric. Expt. Sta. Bul. 663; 11 p. (Bulletin Room, Agric. Expt. Sta., Corvallis, Ore. 97331) Concluded that competition from sagebrush rather than grazing was the primary competitive force suppressing herbaceous production.

Characterization of Sympatric or Adjacent Habitats of 2 Deer Species in West Texas; by Ernie P. Wiggers and Samuel L. Beasom; 1986; J. Wildl. Mgt. 50(1):129-134. (Caesar Kleberg Wildlife Res. Inst., P.O. Box 218, Texas A&I Univ., Kingsville, Tex. 78363) Concluded that limiting woody plant canopy cover to about 40% enhanced mule deer populations, while white-tailed deer populations were favored by higher levels; 50% canopy cover was considered ideal for a mixture of the two species.

Controlling Riparian Zone Damage with Little Forage Loss; by Clayton B. Marlow; 1985; Mon. AgRes. 2(3):1-7. (Agric. Bulletin Room, Mon. State Univ., Bozeman, Mon. 59717) A deferred rotation grazing system protected riparian areas while resulting in little, if any, loss of forage for cattle, based on four years of research at the Red Bluff Research Ranch.

Dynamics of Digestion in Cattle, Sheep, Goats, and Deer; by J.E. Huston, B.S. Rector, W.C. Ellis, and M.L. Allen; 1986; J. Anim. Sci. 62(1):208-215. (Tex. Agric. Expt. Sta., 7887 N. Highway 87, San Angelo, Tex. 76901) Compared differences in the physiology of digestion for the four species; concluded there were differences in gastrointestinal dynamics which may determine adaptability to different grazing situations.

The Effects of Spring Burning on the Productivity and Nutrient Concentration of Several Shrub Species in the Southern Rocky Mountain Trench; by Dennis A. Demarchi and Susan Lofts; 1985; B.C. Min. Environ. MOE Tech. Rep. 19; 89 p. (Maps B.C., Ministry of Environment, Parliament Bldg, Victoria, B.C. V8V 1X5; $6) A study of the effects of prescribed burning and/or browsing by livestock and big game on shrub productivity and nutrient status.

Efficacy and Economics of Leafy Spurge *(Euphorbia esula)* Control in Pasture; by Steven Gylling and W. Eugene Arnold; 1985; Weed Sci. 33(3):381-385. (Dept. Plant Sci., S. Dak. State Univ., Brookings, S. Dak. 57007) Several herbicide treatments exceeded 90% control of leafy spurge; cost effectiveness under varying pasture conditions were evaluated for the different herbicides.

Ergot Toxicity from Endophyte-Infected Grasses: A Review; by Charles W. Bacon, Philip C. Lyons, James K. Porter, and Joe D. Robbins; 1986; Agron. J. 78(1):106-116. (R.B. Russell Agric. Res. Center, USDA—ARS, Athens, Ga. 30613) Combines study and literature review in discussing the interrelationships of toxic fungi with primary and weedy pasture grasses, toxicities with cattle, and management practices suggested.

Estimating Profitability of Cow-Calf Operations and Retained Ownership Alternatives in North Dakota; by Randall D. Little and David L. Watt; 1986; N. Dak. Farm Res. 43(5):32-35. (Bulletin Room, N. Dak. State Univ., Fargo, N. Dak. 58105) Presents research results through estimation of profitability of cow-calf operations combined with several vertical integration alternatives.

Habitat Management for Sage Grouse in Nevada; by Donald A. Klebenow; 1984-5; World Pheasant Assoc. J. 10:34-46. (Dept. Range, Wildl., & For., Univ. Nev., Reno, Nev. 89557) Discusses past and present sage grouse populations, habitat requirements, significance of meadows, grazing relationships, and present management practices.

Habitat Relations of Mule Deer in the Texas Panhandle; by Benjamin H. Koerth, Bok F. Sowell, Fred C. Bryant, and Ernie P. Wiggers; 1985; Southwestern Nat. 30(4):579-587. (Dept. Range & Wildl. Mgt., Texas Tech Univ., Lubbock, Tex. 79409) A study and discussion of management implications of the relationships between the seasonal and annual home ranges of adult mule deer does with macro-vegetation types and micro-habitat features.

Incorporating Precipitation-Induced Variation in Annual Forage Production into Economic Analyses of Range Improvement Practices; by W.T. Hamilton, J.R. Conner, J.W. Stuth, G.L. McBryde, and A.J. Vega; 1986; Texas Agric. Expt. Sta. Bul. 1519; 16 p. (Agric. Mailing Room; Texas A&M Univ., College Station, Tex. 77843) Presents procedures for estimating stocking rates under three precipitation regimes and estimating the economic feasibility of range improvement practices under these assumed annual precipitation levels; also considers utility value of woody plants in drought years and compares procedures with using only normal rainfall as the planning basis.

Influence of Mesquite Control on Soil Erosion on a Depleted Range Site; by Donald J. Bedunah and Ronald E. Sosebee; 1986; J. Soil & Water Cons. 41(2):131-135. (Dept. Range & Wild., Texas Tech Univ., Lubbock, Tex. 79409). Mesquite control by shredding, mechanical grubbing, vibratilling and kleingrass seeding, or foliar spraying reduced erosion; mere grazing removal in the check for 3 years did not reduce erosion.

Intensive Early Stocking Vs. Summer-Long Stocking Programs for Stocker Cattle on Cross Timbers Rangeland; by F.T. McCollum, R.L. Gillen, D.M. Engle, and G.W. Horn; 1985; Okla. Agric. Expt. Sta. Misc. Pub. 117, p. 229-232. (Bulletin Room, Div. Agric., Okla. State Univ., Stillwater, Okla. 74074) Doubling normal stocking density during the first 84 days of the 146-day grazing period increased gain per acre, maintained lower costs of gain, and increased profit; average daily gains on pasture were increased 22% and gains per acre by 41% based on first year results.

Interaction of Cattle and Deer on Mountain Rangeland; by Eric R. Loft, John W. Menke, and John G. Kie; 1986; Calif. Agric. 40(1-2):6-9. (Agric. Mailing Room, Univ. Calif., Berkeley, Cal. 94720) Emphasis given to cattle management to minimize effects on deer habitat.

Proceedings of the 1986 International Rangeland Development Symposium, Orlando, Florida, USA, February 11, 1986; by James T. O'Rourke (Ed.); 1986; Winrock International, Morrilton, Ark.; 146 p. (Source: Winrock International, Route 3, Morrilton, Ark. 72110; $15.00) Comprises 20 papers concentrating on new and innovative approaches to designing successful international rangeland management programs.

Quantification of Tiller Pull-Up During Grazing of Pinegrass; by Darryl G. Stout and Barbara Brooke; 1985; Can. J. Plant Sci. 65(4):943-950. (Research Sta., Agric. Can., 3015 Ord Road, Kamloops, B.C. V2B 8A9) Contrasted leaf cropping versus complete pull-up of tillers and related this physical action to the physiology and ecology of pinegrass under grazing.

Compiled by John F. Vallentine, Professor of Range Science, Brigham Young University, Provo Utah 84602.

Reclamation Technology of Tailing Impoundments. Part 1: Containment; Part 2: Revegetation; by Richard C. Barth; 1986; Mineral & Energy Resources 29(1):1-25 and 29(2):1-25. (Available from the author at Soil-Plant Systems, 5930 McIntrye St., Golden, Colo. 80403 or for $8 from the publisher, Colo. School of Mines Press, Golden Colo. 80401) Provides explanations and recommendations for treating the two phases of tailing reclamation: containment on the site and revegetation; made particularly important recently because of increasing concern over toxic waste.

Residual Forms of Fertilizer Nitrogen in a Grassland Soil; by S.J. Smith and J.F. Power; 1985; Soil Sci. 140(5):362-367. (USDA, ARS, Northern Great Plains Res. Center, Mandan, N.D. 58554) Investigated the sequential fate, behavior, and duration of residual N associated with perennial grassland production in the Northern Great Plains.

Response of Slash Pines to Grazing from Regeneration to the First Pulpwood Thinning; by H.E. Grelen, H.A. Pearson, and R.E. Thill; 1985; USDA, For. Serv. Gen. Tech. Rep. SO-54, p. 523-527. (USDA, Southern For. Expt. Sta, New Orleans, La. 70113). Heavy cattle grazing significantly reduced first-year seeding survival but still maintained tree densities above minimal levels at age 5 and did not reduce sawtimber volume at age 18.

Seasonal Deer Diets in Central Texas and Their Response to Brush Control; by Douglas D. Waid, Robert J. Warren, and Dale Rollins; 1984; Southwestern Nat. 29(3):301-307. (Dept. Range & Wildl. Mgt., Texas Tech Univ., Lubbock, Tex. 79409) Woody canopy removal at various intensities up to 80% did not significantly affect diets; precipitation and related herbaceous forage availability was the major factor influencing forage selection.

Stocker Cattle Costs and Returns for Different Purchase and Sale Dates on Selected Forage Pastures, Southern Plains; by John D. Nance, Bill E. Dahl, and Don E. Ethridge; 1985; Texas Tech Univ., Coll. Agric. Sci. Pub. T-1-231; 85 p. (Source: Dr. Dahl in Range & Wildl. Dept. or Dr. Ethridge in Agric. Econ. Dept., Tex. Tech Univ., Lubbock, Tex. 79409) Presents detailed cost and return budgets for 50 selected enterprises and a review summary of all 566 enterrises examined.

Stream Habitat and Fisheries Response to Livestock Grazing and Instream Improvement Structures, Big Creek, Utah; by William S. Platts and Rodger Loren Nelson; 1985; J. Soil & Water Cons. 40(4):374-379. (USDA, For. Sci. Lab., Boise, Ida. 83702) Small size livestock exclosures around the fisheries did not improve fish populations when upstream sites continued to provide fine sediment.

Trailblazer-Switchgrass for Higher Animal Gains; by John Ward, Kenneth Vogel, and Bruce Anderson; 1986; IANR (Neb.) Quarterly 32(2):8-9. (Bulletin Room, Agric. Expt. Sta., Univ. Neb., Lincoln, Neb. 68503) Trailblazer switchgrass somewhat exceeded Pathfinder switchgrass under grazing tests, but both were shown highly productive for summer grazing.

Watering Livestock During Northern Plains Winter; by V.L. Anderson and Dexter Johnson; 1986; N. Dak. Farm Res. 43(5):36-40. (Bulletin Room, Agric. Expt. Sta., Fargo N. Dak. 58105) Reviews the development of watering systems and compares some of the current commercial water fountains for use with cattle in very cold climates.

Wildlife Habitats in Managed Rangelands—The Great Basin of Southeastern Oregon; Management Practices and Options; by Frederick C. Hall; 1985; USDA, For. Serv. Gen. Tech. Box 3890, Portland Ore. 97208) Deals primarily with livestock management in relationship to wildlife and wildlife habitat; one of a series.

Book Review: **Holistic Ranch Management Workshop Proceedings,** ed. J. Powell, 28-30 May 1985, Casper, Wyo.; Wyoming Agricultural Extension Service.

The title of the Proceedings suggests that the reader will be introduced to Holistic Ranch Management—how it operates and how cause-effect interactions among various management alternatives affect the whole. Not to be. The editor has put together a mixture of papers that do not address the implication of the title or the concepts expressed in the opening paper in the Proceedings. The opening paper by Allan Savory was an introduction to "Holistic *Resource* Management" not "Holistic *Ranch* Management" (a term referred to in this opening paper as "a contradiction in terms."). Savory explains that "time proven" methods and technologies have not worked for the rancher or environment, especially where resource improvement is concerned. These opening comments imply that the papers that follow would address the Holistic approach to improved resource *and* ranch management. Other papers in the Proceedings did not deal directly with Holistic methods of resource improvement and how the methods interact to better the ranch and/or resource situation. In fact, the other papers contradicted Savory's message that "time proven" methods and technologies are not working for the rancher. Management alternatives and solutions presented dealt with "time proven" accepted and standard sociological, financial, marketing methods and strategies; methods that, for many ranchers, are working.

Many of the papers present an explanation of the obvious—if you are not making money by what you are doing, do something else. Implications are that ranchers and farmers have not considered production or management alternatives to increase ranch income. Surely, most have considered alternative production schemes. Perhaps a paper discussing the role of politics in ranch success would have been more enlightening. Also, many ranchers have spent their entire life on the ranch producing cattle and do not have the possibility to develop new skills; a paper dealing with this issue or the issue of family tradition would have been more appropriate than a paper dealing with "Stress and the Two-Generation Ranch Family." The papers published were not interrelated so that a good management alternative could be developed or how the alternatives suggested could be incorporated into a holistic management goal. Papers from these Proceedings could be better used if they were available as extension handouts.—**Roger Simanton**

Editor's Note: Copies of the proceedings are available for $7.50 per single copy or $7.00 per copy for orders of 10 copies or more per mailing by writing: Holistic Ranch Management, Department of Range Management, P.O. Box 3354, University Station, University of Wyoming, Laramie, Wyoming 82071.

Nominations for 1988 Honor Awards

It is now time to sit down and spend a few minutes submitting your nomination of a worthy individual for an Honor Award to be presented at the 1988 Annual Winter Meeting of SRM. All nominations must be submitted a year or more in advance.

There are three kinds of awards presented each year: the Renner Award, the Fellow Award, and that given for Outstanding Achievement.

Procedures and Nomination Format are provided in this issue for your guidance in making nominations. Be sure to study the criteria by which each candidate is judged. Then sit down, fill out the criteria and submit to: Herb Fisser, Range Management Division, University of Wyoming, Laramie, Wyo. 82071.

Procedures and Format for Nomination
Honor Awards Committee
Society for Range Management

Instruction to Nominators:

a. It is the responsibility of the person or Section Awards Committee making the nomination to furnish all supporting documentation to the SRM Honor Awards Committee. It is important that the information submitted be complete and follow the format given below so that the Committee can make a fair evaluation of it.

b. Make sure you are nominating your candidate for the correct award and that the information furnished clearly shows the candidate's qualifications for meeting the criteria of that award. The Fellow Award is given to SRM members (10 consecutive years or more) who have performed *exceptional service to SRM and its programs* which is widely effective and generally recognized throughout the Society. The Outstanding Achievement Award is given to individuals or groups whose contributions or careers have become eminently noteworthy in the advancement of the science and art of range related resource management. Candidates for this award do not have to be SRM members. The Renner Award is the highest award given by SRM. Qualifications for it are similar to the Outstanding Achievement Award except that emphasis is placed on *current contributions* (last 5 years). The Outstanding Young Range Professional Award is given to an individual who is less than 40 years old and who has demonstrated *extraordinary potential and promise* as a range professional. Special Awards are designed to recognize individuals who have significantly influenced the profession of range management through *truly exemplary service* (they do not have to be members of SRM). Additional information on criteria is contained in the Honor Awards Handbook which may be obtained upon request from the SRM Executive Vice-President.

c. Not all categories of information requested below will apply equally to all nominees or to all awards. Item "i" is particularly important for the Fellow Award, Item "k" for the Renner Award. Items "a-e" may be more important for scientists or teachers, while Items "f-j" may assume more importance for ranchers or businessmen. Item "1" is especially important for all nominations.

d. Nominations complete with all supporting documentation received by the Awards Committee **prior to January 1** will be considered at the following annual winter meeting in February. Nominations recommended by the Committee for awards will be presented for Board of Directors approval at the following annual summer meeting in July. Awards approved by the Board in July will be presented at the next annual winter meeting. Nominations not approved by the Board will be returned to the nominator after the annual summer meeting and will be eligible for resubmission immediately.

Nomination Format

The nomination should follow the following format, with each section clearly labeled:

Title: Nomination of _____ for the _____ Award (insert nominee and specific award).

Nominee: a. Name
b. Date and place of birth
c. Address (with zip code)
d. Phone number with area code)

Nominator: a. Name
b. Address (with zip code)
c. Phone number (with area code)

Qualifications of Nominee:

a. Education— give major field, institution, and date for any degrees received.
b. Honors and awards received, including membership in honorary societies.
c. Occupational background— summarize employment history giving nature of business or position, date, and locations.
d. Publications related to range management— give comlete list.
e. Other educational contributions— teaching classes, movies or TV programs, workshops, tours, etc.
f. Development of programs, practices, and/or products for improvement of rangeland resources— give emphasis to planning, coordinating, developing procedures, invention or modification of equipment, etc.
g. Application of programs, practices, and/or products for improvement of rangeland resources—emphasis here should be on successful day-to-day on-the-ground management.
h. Other contributions— may be in field related to nomination.
i. Service to the Society for Range Management— offices held, committee assignments, services rendered, etc. (This is an important section for Fellow Award.)
j. Service to other organized groups—elected and appointtions, service clubs, government, churches, 4-H, NRCD, etc.
k. Summary of accomplishments for past five years (for Renner Award nominees only.)
l. Evaluation— identify in this section the contributions on which this nomination is based. Explain why the nominee is especially qualified to receive the Award. (This is very important and should be carefully prepared by the nominator.)

The following awards have been given in the past:

SPECIAL AWARDS

1957-Sampson, Arthur W.; 1981-Chapline, W. R.; 1968-Clouston, John G.; 1969-Campbell, Robert S., 1986- Daubenmire, Rexford F.

FREDERIC G. RENNER

1972—Jackson, Peter V., III; 1973—Hormay, August L.; 1974—Colbert, Francis T.; 1975-Gonzales, Martin H.; 1976—Plummer, A. Perry; 1977—Robertson, Joseph H.; 1978—Cook, C. Wayne; 1979—Anderson, E. William; 1980—Heady, Harold F.; 1981—Whetsell, William C. (Dick); 1982—Freeman, John D. (Danny); 1983—Van Dyne, George M.; (Posthumous), 1984—Merrill, John L.; 1985—Beetle, Alan A.; 1986-Wright, Henry A.;

OUTSTANDING ACHIEVEMENT

1967—Campbell, Robert S.; Chapline, W. Ridgely; Dyksterhuis, Edsko J.; Pechanec, Joseph F.; Stoddart, Laurence A.; **1968**—Anderson, E. William; Parker, Kenneth W.; Renner, Frederic G.; **1969**—Allred, Berten W.; Flory, Evan L.; Heady, Harold F.; Wasser, Clinton H.; Willis, T. G.; **1970**—Costello, David F.; Gonzales, Martin H.,; Johnston, Alex; Thomas, Gerald W.; **1971**—Hanson, Wallace, R.; Lundin, Herbert A.; Reid, Elbert H.; Talbot, Murrell W.; Whitman, Warren C.; **1972**—Anderson, Kling L.; Clawson, Marion E.; Cook, C. Wayne; DeNio, Reginald M.; Hormay, August L.; Robertson, Joseph H.; Ross, Robert L.; Tisdale, E. W.; **1973**—Hyder, Donald N.; Linger, Lyman G.; McGinnies, William G., Sr.; McIlvain, E. H. (Pat); McKinnon, Charles H; **1974**—Currier, Wilbur F. (Bill); Hull, Alvin C., Jr.; Morris, Melvin S.; Plummer, A. Perry; Wolff, Otto J.; **1975**—Huss, Donald L.; Martin, S. Clark; Smith, Arthur D; Walker, A. H.; **1976**—Harris, Robert W.; Lieurance, Maxwell T.; McLean, Alastair; Merrill, L. B.; Schwendiman, John L.; Sharp, Lee A.; Smoliak, Sylvester; **1977**—Beetle, Alan A.; Dillon, Claude C.; Fritz, Fred J.; Freeman, John D. (Danny); Merkel Daniel L.; **1978**—Bohning, John W.; Eckert, Richard E.; Humphrey, Robert R.; Thompson, E. Lavelle; Van Dyne, George M.; **1979**—Hutchinson, David E.; King, John Gordon; Powell, Jeff; Stewart, William H.; **1980**—None Given; **1981**—Sharp Brothers Seed Co.; Sneva, Forrest A.; **1982**—Hughes, John F.; Wallace, Myron Thomas; **1983**—Bement, Robert E.; Driscoll, Richard S.; Jameson, Donald A.; Wright, Henry A.; **1984**—Cliff, Edward P.; Cole, Ralph S.; Dahl, Billie E.; Fisher, Charles E.; Giltmier, James W.; Lewis, James K. (Tex); Lewis, Mont E.; Wilson, Alma M.; **1985**—Currie, Pat O.; Laycock, William A.; McGinnies, William J.; Pearson, Henry A.; Scifres, Charles J.; **1986**—Biswell, Harold H.; Hironaka, Minoru; Poulton, Charles E.; Shiflet, Thomas N.; Smith, Patricia G.; Young, James A.

FELLOW

1977—Anderson, E. William; Bell, Hershel M.; Berry, Lester J.; Bredemeier, Lorenz F.; Campbell, Robert S.; Chapline, W. Ridgely; Clouston, John G.; Cook, C. Wayne; Cox, Don A.; Dyksterhuis, E. J.; Freeman, John D. (Danny); Gonzales, Martin H.; Heady, Harold F.; Jackson, Peter V., III,; Johnston, Alex; Kessler, Wayne; McGinnies, William G., Sr.; McKinnon, Edward A.; Morris, Melvin S.; Pechanec, Joseph F.; Reid, Elbert H.; Renner, Frederic G.; Ross, Robert L.; Tomanek, Gerald W.; Valdez, Gilberto, Whitman, Warren C.; 1977—Posthumous-Allred, Berten W.; Colbert, Francis T.; Deming, Milo H.; Dutton, Walt L.; Hafenrichter, A. L.; Hervey, Donald E.; Sampson, Arthur D.; Savage, David A.; Stoddart, Laurence, A.; Talbot, Murrell W.; Wagner, Joe A.; White, Wilton T.; Woolfolk, E. Joseph **1978**—Artz, John L.; Beetle, Alan A.; Eaman, Thomas K.; Eckert, Richard E.; Fonte, Carlton S.; Gates, Dillard H.; Hurst, William D.; Huss, Donald L.; Kinsinger, Floyd E.; Leinweber, Charles L.; McIlvain, E. H. (Pat); McLean, Alastair; Merkel, Daniel L.; Parker, Karl G.; Plummer, A. Perry; Powell, Jeff; Price, J. Boyd; Thomas, Gerald W.; Tisdale, E. W.; Wasser, Clinton H.; Williams, Robert E.; **1978**—Posthumous-Ellison, Lincoln; Kennedy, Fred; Parker, Kenneth W.; Sharp, Gerald W.; **1979**—Biswell, Harold H.; Burzlaff, Donald F.; Cassady, John T.; Colbert, Elizabeth (Libby); Currier, Wilbur F. (Bill); Freeman, Barry N.; Harris, V. M.; Hoffman, Garyln O.; Hull, Alvin C., Jr.; Hyder, Donald N.; Johnson, Donald E.; Linger, Lyman G.; Little, William J.; McKinnon, Charles H.; Merrill, John L.; Poulton, Charles E.; Riordan, Laurence, E.; Schwendiman, John L.; Smith, Arthur D.; **1980**—Bedell, Thomas E.; Jarecki, Charles M.; Polk, David B.; Smoliak, Sylvester; **1981**—Bentley, Jay R.; Gartner, F. Robert; Hedrick, Donald W.; Larson, Floyd; **1982**—Harris, Grant A.; Schmutz, Ervin M.; **1983**— Laycock, William A.; Ragsdale, Bob J.; **1984**—Hunter, John R.; Martin, S. Clark; Schuster, Joseph L.; Waldrip, William J. (Dub); Williamson, Robert M.; **1985**—Currie, Pat O.; Dahl, Billie E.; DeNio, Reginald M.; Hendee, Clare W.; Lodge, Robert W.; **1986**—Frischknecht, Neil C.; Norris, Jr.; Joseph B.; Pieper, Rex

State University Dean Receives National Conservation Honor

Thadis W. Box, Logan, Utah, has received a 1986 Chevron Conservation Award for his continuing work in teaching the principles of conservation. Dr. Box is Dean of the College of Natural Resources at Utah State University.

Over the past 25 years, Dr. Box has influenced thousands of students, who have carried the methods and commitment of conservation worldwide. During his tenure, the College has grown into a major research organization for addressing the scientific foundation of natural resource management. Dr. Box is also an internationally recognized authority on the rehabilitation of arid lands.

In all, 1986 Chevron Conservation Awards went to 20 individuals and five groups from the public, private, and nonprofit sectors. The recipients represent a cross-section of people from 12 states, the District of Columbia, and Mexico. Each received a $1,000 cash award, a citation, and a bronze plaque commemorating their achievement at the Chevron Conservation Awards Program ceremony on May 22, in Washington, D.C.

Although 1986 marks the first year Chevron Corporation is sponsoring the event, these conservation awards date back 32 years and constitute the oldest program of its kind in the nation. It is designed to pay tribute to various individuals and organizations throughout North America that have spent years, often an entire lifetime, preserving and protecting key elements of the environment.

Gulf Oil Corporation sponsored the conservation awards from 1980 until last year, when it became part of Chevron. Prior to 1980, the program had been sponsored by American Motors Corporation.

Ed Zern, a nationally prominent outdoor writer and director of the awards program since its inception 32 years ago, said the honorees' accomplishments reflect a widespread but often unsung commitment to the conservation of America's wildlife and natural resources.

Noting that these honorees often work in virtual anonymity and do not seek or expect recognition for their efforts, he said, "Through their work, which often goes unnoticed by the rest of us, the quality of our environment and the quality of life have been improved significantly. This is something that will be good for all of us and for our children, and for theirs."

Chevron President James R. Sylla, whose company takes over sponsorship of the Conservation Awards program for the first time this year echoed Mr. Zern's sentiments.

"The tireless work of these honorees creates an awareness of how vital it is to conserve our natural resources. We are proud to be part of an effort that draws international attention to the importance of our environment to our quality of life. Their work also proves that we can enjoy both a healthy environment and a healthy economy. We can work side-by-side for the overall betterment of society," he said.

President's Notes

The "Trail Boss" Read the *Journal of Range Management*

Catchy title, huh? Actually, I'm not sure the "Trail Boss" read *JRM*, but I decided to discuss both the "Trail Boss" and *JRM* in this issue and thought I should pick a title that would entice you to read the article.

Ever since I joined the SRM, I have heard negative comments about using the "Trail Boss" as our symbol. Many of our members and nonmembers believe that this symbol identifies us as just a livestock-oriented organization. I've recently been reading the writings of Charles Russell, who drew the "Trail Boss," and Fred Renner, who is an authority on Charlie Russell and who was SRM's second president. From these writings, I have become convinced that Charlie Russell was a great range conservationist. In particular, his writing in *Trails Plowed Under* indicates his personal concern for what the "white man" was doing to the land, vegetation, native animals, and native people.

Thus, I believe Russell's drawing of the "Trail Boss" shows a concerned user and manager of the range—the kind of caring range manager that each of us should aspire to become. I don't know that the "Trail Boss" read the *Journal*, but I feel sure that he had a unique ability to "read the range," and he used what he learned from the landscape to do a good job of managing that range.

Today, we need to develop our ability to "read the range." But society is much more complex today than in the days of the "Trail Boss," and so we are challenged to do a better job by more and more people who are interested in what happens to "their rangelands." Sometimes old ideas get the job done. But I have observed that we must often develop new ideas to solve problems. It is this work of developing new ideas that I think makes access to the *Journal* so important.

I've often heard people say that agricultural and mineral production are the only sources of new wealth because these are the only industries that produce something of value from raw products. I believe, however, that the basic source of new wealth is the ability to rearrange old ideas into new ones.

Few of today's problems will be solved by the results of one research project. But look back in the *Journal* 10 to 20 years and you will see the articles that can be "joined together" to provide solutions. I predict that 10 to 20 years from now, we will recognize the 1986 issues of *JRM* as the storehouse of information needed to solve problems of the future era.

Unfortunately, none of us have time to go back and catch up by reading 20 years of *JRM*. Range managers who are prepared to solve today's problems are those who have been reading and studying all along.

This is why I believe *JRM* is an integral part of SRM membership. Sure, we could separate *JRM* from the basic membership and lower dues slightly. However, I believe we would lower the quality of our profession more. I encourage you to pick up those past few *Journals* you laid aside without reading. Look through the table of contents. Find a couple of articles that are of interest. Read them. Browse through the entire *Journal*. Look at the titles, read the abstracts, and read the picture and table captions. In other words, plant the ideas in your mind and see what grows.

I encourage you to be reading and otherwise studying the range. Only those with the drive to do that will become a Trail Boss.—**Fee Busby,** President, SRM

The Executive Vice-President's Report

Summer is here for sure. How can I tell? Well, at the Denver office the weeds have been growing a foot a minute and I could use some help.

It's been a good grass year as the old timers would put it, especially in the north country like Montana and Alberta. But because times have been so hard with a cold, snowy winter and high priced hay that was as scarce as hen's teeth, an awful lot of the ranchers have had to sell down dramatically. Some people are saying that it's a shame that the fellows don't have the cattle to take advantage of all that new grass so they could make a little money and pay a few bills. Well, maybe it's a blessing in disguise. In the words of one of our great range managers, Dick Whetsell of Pawhuska, Okla., it's not an obstacle—it's a mountain of opportunity. This could just be the chance we need to gain that insurance policy of extra grass we have all been needing to tide us over bad times. In my own case, I've never wasted a spear of grass by just leaving it out there on the rangeland. It's always there either waiting to help or forming good humus to give next year's crop an even better start in those dry years that come no matter how scientific we get. It simply boils down to working with nature, and it will pay off every time.

Now as for you members who are too proud to admit that you lost that green sheet that the crew at the Denver office keeps harping about, here's a way to save face. When your September *JRM* arrives in the mail, just open up the Denver Notes inside the plastic cover and you will find a copy of the sheet that you have been missing. Please make it out and send it in; we really need it badly to complete our computer membership records.

By the way, as long as you have gone so far as to open the *JRM* plastic cover, take one more step and read over the table of contents. As I have said many times before, I feel absolutely sure that at least one article or perhaps more will have some good basic information that is of direct benefit now or is the basis of something that will be of great value to all of us involved in the science and art of range management ten

years down the line.

Back to basics. Where have I represented the society since my last report? Perhaps the most important session was the Grazing Lands Forum Symposium, "Grazing Lands and Water Quality," held at Harpers Ferry, West Virginia. In my opinion it was especially important because the broad array of interests represented there were able to sit down together in a most pleasant atmosphere of relaxed congeniality and simply discuss the situation. I feel the stage has been set for getting together again and working out solutions to problems in an intelligent manner—a situation long overdue.

A second affair that certainly needs more publicity was the Annual Science Day held in Washington D.C. SRM is joint sponsor of this meeting and President Fee Busby and I had attended it for the first time. Frankly, it was a well-attended, very informative session that everyone of us should try to get to in the future.

In case there has been any question in your mind about the SRM Annual Meeting in Boise next February, you can relax. I attended this June meeting and went away feeling that things are well in hand, planned to perfection, and the hotels are absolutely beautiful. I have heard complaints in the past that the students have been housed in second-rate places to save them money. This is not the case for 1987. I stayed in the Red Lion downtown and it is a first class hotel with reasonable rates, so get your plans in order to attend. This meeting has every chance of being one of the great ones.

Having a new president each year has its disadvantages but it certainly has some great advantages. It was my privilege to travel with President Fee to Arizona, where he was requested to teach a day-long class at a BLM school. I don't know what the students got out of it, but I certainly learned a lot. It was time well spent. In addition we took the time to visit the range schools at the University of Arizona and Arizona State University. They are schools to be proud of with top notch facilities. This trip also gave us the chance to visit at length with the officers of the Arizona Section and that was very productive.

Monitoring—you're certainly going to hear a lot of that word in the future. I represented you at a workshop sponsored by the Public Lands Council and the NCA at Salt Lake City, Utah. For a full day the pro's and con's were debated on what responsibilities should be given to the users of the public lands and which must be kept by the administering agencies. I'm not sure how much was really accomplished, but I am pleased that a high priority may be given to a record system of some kind on the type and intensity of use of rangelands by both commercial and recreational users.

How sweet it is— an old saying by Jackie Gleason the comedian really typifies our most recent project. I participated in the filming of Fred and Ginger Renner at their home in Phoenix, Ariz. What an experience it was to record the early history of the range profession and the SRM on tape for future reference by our membership. I certainly hope that it turns out as nice as it appeared to be.

This is more than enough for one EVP Report. If you have any questions, see me at Jackson Hole . As you know, I love to visit.—**Peter V. Jackson,** Executive Vice-President

University lobbied for accredited range school

reprinted from the *Calgary Herald*

Orlando, Fla., is known to most readers as the location of Disney World and Cape Canaveral.

For most of next week the place will see an influx of ranchers, rangemen, scientists, educators and civil servants dealing with land management from all over the world as the Society of Range Management holds its annual meeting.

The meeting will be presided over by one of the noted rangemen of modern times, Ed McKinnon of Calgary.

McKinnon originates from a pioneer ranching family in Alberta, who founded the LK Ranch. It is only fitting that one of them should become the first Canadian president of that world organization.

His five brothers have been members or supporters of SRM at one time and another. Third generation McKinnons are now members. Dan McKinnon of Airdrie is vice-president of the International Mountain Section of SRM.

Even though much of Canada, 40 per cent of the earth's total area and more than two-thirds of the land in Alberta is rangeland—much of it only suitable for wildlife and cattle—there is no university in Canada which grants a degree in range management.

Therefore, as president of SRM, as an Albertan and a Canadian, McKinnon has been active in the past year trying to persuade the University of Alberta to establish an accredited range school.

Although some courses are offered there, the Canadian students must study at a foreign university to obtain such a degree.

Even though there appears to be so much rangeland that everybody who wants to can go out and roar around in the great outdoors, Ed McKinnon is one person who knows this is short-sighted.

Rangeland is extremely fragile and must be given special treatment, he will tell you. It takes a great deal of professional training and experience to handle this type of terrain correctly.

From its head office in Denver, the SRM publishes a bimonthly professional magazine, *Rangelands*. It also publishes many research papers and technical and professional viewpoints on the subject.

Rangeland includes natural grasslands, savannahs, shrublands, most deserts, tundra, alpine communities, coastal marshes and wet meadows.

The October, 1985, issue of *Rangelands* defines rangelands as lands capable of producing a variety of resources beneficial to man. Its principal characteristics are:

- A natural vegetation of predominantly grasses, grass-like plants, herbs or shrubs.
- A suitability to ecological management rather than agronomic management.

The limits of the broad category of rangeland are not precise. SRM recognizes that the term, "range," in the popular sense embraces forest lands with an understory of periodic cover of herbaceous or shrubby vegetation.

Rangelands have also been seeded to domesticated or

exotic plant species. Seeded lands which are managed by ecological principles rather than agronomic principles are properly termed rangelands.

Range resources include both tangible and intangible products: grazeable forage, wildlife habitat, water, natural beauty, recreational opportunities, minerals, some wood products, germplasm for domestication and plant breeding, open space and areas for ecological studies of natural systems. The kinds and amounts of these rangeland resources will vary over time and from one location to another.

It can thus be seen that Ed McKinnon will be presiding at a meeting covering a wide range of agricultural and ecological activities, government policies and other topics. In fact, some 350 papers of great impact and profundity on range management will be given by learned scientists and lay people.

Like all farm organizations, declining membership is SRM's most pressing problem.

McKinnon has made repeated references to the problem in speeches he gave over the past year and his column in the SRM magazine.

The Mexican membership is down to a handful because of economic crises and the devalued peso at a time when the range could be at greater risk from overgrazing.

Problems in the Denver office, especially computer records, haven't been keeping membership current.

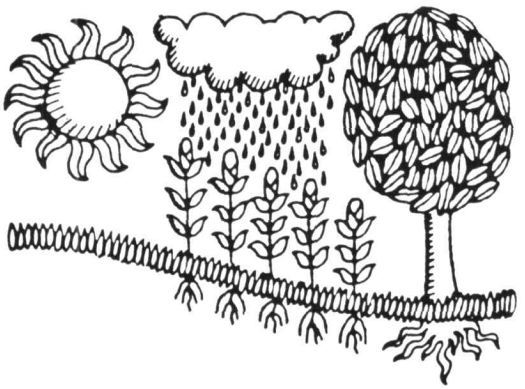
There was some discussion about moving the office to Washington—but this isn't going to happen.

McKinnon advocates a representative in Washington to keep a watching brief on government actions which apply to land—but, more important, what legislation is in the making.

He has had a vigorous year riding herd on an organization of 5,000 members in 37 countries.—**John Schmidt**

Range Research: Basic Problems and Techniques

editors: C. Wayne Cook and James Stubbendieck



RANGE RESEARCH: BASIC PROBLEMS AND TECHNIQUES, a major revision of an earlier publication of the National Academy of Science, presents steps in research planning, evaluation of results, and methods and procedures in range research, including sampling techniques and experimental design. Chapter titles include: The Range Research Problem, Assessment of Habitat Factors, Methods of Studying Vegetation, Studies of Root Habits and Development, Methods of Measuring Herbage and Browse Utilization, Livestock Selection and Management in Range Research, Methods for Studying Rangeland Hydrology, Economic Research in Range Management, Sampling Methods with Special Reference to Range Management, Experimental Design, and Problems Involved in the Application of Research Techniques in Range Management. The book is designed to serve as a reference guide for range research methodology and as a textbook for advanced students who anticipate careers in this increasingly important field.

1986. 336 pages ISBN 09603692-3-6. $28/hard.

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Vegetation Changes on Western Rangelands

by Farrel A. Branson

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Range professors and students, private and public range managers, soil conservationists, wildlife managers, and others will find the book a valuable contribution to their libraries. **Available from the Society for Range Management 2760 W. Fifth Ave, Denver, CO 80204.**

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