After Africa: Finding Home Again

How I became interested in rangeland management.

By Abbey Kingdon

Allan Savory changed my life. But I didn't realize that until I stepped onto the tarmac of the San Francisco International Airport. As I walked to a 19-minute express flight to Sacramento after 2 days of travel from Johannesburg, South Africa, thoughts of the 2 months I spent in Africa played through my mind like an old film. I couldn't believe it was over. I'd spent a year and a half researching, saving, and planning to get myself to Africa for a Holistic Management internship. All this was because of a soft-spoken man who drank hot tea with lunch, who said "graws," not "grass," and who over the course of an afternoon interview, planted the idea of healthy, sustainable land in my mind. As the heavy glass door pushed open and I filed out behind other travelers in a neat line to the little plane, I inhaled a deep breath of ocean air. California, at last. Home.

But home had changed, too. After the open high veld (rangeland) that borders the Kalahari and the abundant bush veld (filled with impala, kudu, warthogs, mambas, and baboons) that I had walked through just days before, my Sierra Nevada mountain valley home appeared small and a little less alive. The permanent fences crisscrossing the valley stood out like weathered statues against the weak green of the early spring grass. The land looked totally occupied.

Before Africa, I saw a picturesque landscape when I looked at the valley: tall grass, thick forests, abundant wildlife, and happy cows grazing the open meadows. But that was only a glance. When I got home I knew how to take a closer look. While studying Holistic Management in

Author at age 5 with lamb.

Judy Richardson and author on an evening walk to observe veld condition at Richardson's ranch near Vryburg, South Africa.

South Africa and working on cattle farms, I'd learned that to really view the land I had to crawl through the veld with my eyes on the soil surface, stick my hands in the soil, smell for minerals and water in the soil, and notice what types and variety of life grew in that land. In Africa, I saw healthy land, abundant with all types of life and I saw sick land, choked with monocultures that slowly let the life slip away with the soil, turning the place to desert. I saw cattle as more than beef. I saw the good work their hooves could do with proper grazing planning. I marveled at the role the rumen played in the ecosystem of a low-rainfall environment. The rumen gives ruminants, like cattle, the ability to break down organic material and provide the resources for new plants to grow. I learned to love wild places, to enjoy a sunset from the veranda, listening to the birds, the baboons, the bats, and the bugs. That glimmer of hope and interest in healthy, open land that began with a conversation with Savory bloomed and took root in South Africa.

Cattle-moving camps at the Knights' cattle farm are part of their holistic grazing plan.

I chose to study Holistic Management in South Africa simply because that's where it began. I first planned to go to Zimbabwe, to Savory's ranch which is now a Holistic Management learning center, but national political instability diverted me south, to South Africa. I stayed with 2 families who were holistically managing their cattle operations.

Wayne Knight and farm staff entering a camp that had not been grazed yet during the growing season. The land was holistically managed in previous seasons.

The 1st family, the Knights, opened their homes to me, offering good South African food, conversation, advice, and lots of tea. Wayne and Hillary, and Wayne's parents Tom and Wendy, became lifelong mentors and friends to me. Dick and Judy Richardson, my 2nd hosts, are the top Holistic Management educators in Southern Africa. I left the Richardsons' ranch feeling that I had gained surrogate South African parents.

The country, culture, and people were so wonderful, so diverse, and so full of contrasts and raw natural beauty that I never wanted to leave. But Africa is not my home. My American psyche could not process some of the realities inherent in South African life, like land claims and farm murders. When I returned to the United States, I transplanted clippings of a South African love, respect, and appreciation for nature and for natural processes into my work and life.

My relationship with rangelands and their accessories—cattle, cowboys, ranchers, water, and grass—began at birth, long before I decided to attend Cal Poly, San Luis Obispo, and study animal science, ethnic studies, and agricultural communications. I was involved with rangelands long before I began working for Cal Poly's student-run newspaper, the *Mustang Daily*, which led to the sustainability issue we produced that led to the interview with Savory. As the daughter of ranchers, I was raised in cattle ranch fields of Indian Valley, my Sierra Nevada mountain valley home.

Kingdon cattle at the Johnson Ranch, Indian Valley, being moved with dogs Lucy and Todd. Taylorsville, the author's hometown, sits behind her parents' ranch.

My parents had a house, of course, but I don't remember being inside much. Before I went to school, I was following my father out to irrigate, watching his footsteps in front of me as I struggled to keep up, listening for the clink of the metal shovel as it hit rocks in the soil, then later swimming in those same ditches or jumping over them on my pony. My younger brother and I would picnic with our mother as she watched the sheep in the fields, moving them and protecting them against coyotes. As she worked, we swung from the branches of pine trees lining the meadow, raced through gullies, and made forts out of fallen cottonwood trees. We'd eat breakfast and lunch in the field with our mother. Somehow regular old Raisin Bran or sandwiches of peanut butter and jelly always tasted better in the fresh air.

When we were older, we worked with our parents, herding cows, branding, doctoring, and raking hay. They taught us to work with the cows, the grass, the water, and the seasons, but also to enjoy them. Hot summer afternoons were meant for swimming at the river and school holidays for friends coming with their horses for rides through the river willows and up overgrown mountain trails. Since then, the open spaces and growing things of rangelands have been my friends. This land is more than a place to live or work; it is something alive and amazing that deserves the best care.

Until the interview with Savory, I didn't know how to make a change, how to work toward giving rangelands the best care. So I left. Like most children of a rural community, like most of my friends and classmates, I exchanged the dwindling rural economy for college, a career, and a fast-paced life. When I met Savory, I saw that there was a chance for my generation to have a healthy, prosperous rural existence, as Holistic Management provides the tools to account for the triple bottom line: financial, social, and ecological wealth. With this tool, my thinking became positive. It gave me hope. The happy outdoor freedom of my childhood had tremendous power over my perspective and my future plans, but I didn't realize it until my introduction to Holistic Management.

Sunset over the Richardsons' ranch.

Today, I am pursuing a career in natural resource management in Modoc County, California, and getting into the cattle business. Sometimes I browse travel sites on the Internet, looking for a way back to South Africa for a visit to my friends who feel like family and the pieces of my heart that stayed in the open veld.

Author, age 23, the daughter of a cattle ranching family, grew up in Northeastern California. She graduated from Cal Poly, San Luis Obispo, and recently completed a Holistic Management internship with Holistic Management educators on cattle farms in South Africa.

My Life as a Ranch Cowgirl

By Shelby Frasier

My Goal Is to Beat My Mom!

What do ranching, rodeoing, and barrel racing have in common? From the early days, ranch work has involved riding horses to take care of the livestock on the rangelands. The early cowboys were very proud of their skills in roping cattle and riding horses. It was only a short time until the cowboys tested their skills in riding horses and roping against each other. This was the start of the professional rodeo we see today. With some exceptions, men were the primary contestants in rodeo events. Because most rodeo events are relatively dangerous, women were not allowed to compete. It is not hard to see that women also wanted to compete.

In 1948, 38 ranch women gathered in San Angelo, Texas, and organized a rodeo association just for women—the Girls Rodeo Association (GRA) was born. It was formed for 2 reasons: 1) to give women legitimate, honest opportunities to compete in all-girl rodeos and 2) to establish an alliance with the Rodeo Cowboy Association (RCA).

The GRA board members worked hard to persuade rodeo committees and producers to hold women's contests according to GRA rules. The Committees were given the option of choosing which event they would hold. Most of the Committee members picked barrel racing.

My family has pursued both ranching and professional rodeo since 1885, when my great-great grandparents homesteaded in southwest Nebraska. My papa (Grandpa), C. O., a third-generation rancher, had a passion for training and raising quality quarter horses. His RCA card was number 110, which he kept current until his death in 2001. He dearly loved rodeoing. Due to the size of the ranching and farming operation he and his wife, Elaine, loved to operate, he was not able to travel to compete in rodeos as much as he would have liked. However, in 1955, at the RCA Greeley Stampede rodeo, in Greeley, Colorado, he won his favorite event, calf roping, on a mare named Bald.

Shelby on "Red's on the Money" turning a barrel. (Editor's Note: There is an unusual aspect in the photo. See if you can find it. The answer is presented in a note at the end of Frasier's Philosophy, p. 65.) Photo courtesy of Victory Farms.

This makes me think of my mom, Deb.

In 1975, 20 years after papa won the calf roping at Greeley, my mom won the GRA barrel race, on a gelding, Bald's Breeze, a son of Bald. Slipping out to the barn to ride a couple horses papa raised, she developed her training skills on Bald's Breeze and a three-quarter brother, Bald's Folly.

The mix was right, she tallied up 3 national high school, 2 intercollegiate, and 2 GRA National Finals Rodeo (NFRs) finals. She was the first and still is the only Nebraska ranch girl to win the national high school "All Around" title. She also won the national high-school barrel racing title on Bald's Breeze. And riding Bald's Folly, she still holds state high-school records on a single run and 3-run average in the pole bending in the state of Nebraska she set in 1971.

This brings me to my pony, Rusty, and me.

My mom bought Rusty for me at the sale in Cleburne, Texas, when I was 2. He is my best friend, a little ornery, but maybe he got that from me. I spent lots of time riding him in the pasture with mom and whatever horse she was training at the time.

I started competing on him at a local roping club when I was 4 and, in 1999, we joined the NBHA (National Barrel Horse Association), a professional association for women and men with divisions for open (to all ages), youth (18 and under), and seniors (50 and over), who want to compete only in barrel racing. In 1999, my first year to compete in the NBHA, I qualified for the youth world show and have qualified every year since. In 2000 and 2001, I won the 3D and 4D divisions NBHA Year End District Championships on my pony competing against older kids on horses. I repeated those wins in 2002 and was 3D division NBHA District Champion on a horse named Seeker. In 2003, I won the 2D division NBHA Year End District Champion on Hopeshehungthemoon, a mare we raised and mom trained. In 2004, I took Rusty to the NBHA State Championship, and what do you know, he won the 4D division average to bring home the 4D NBHA State Championship buckle in the youth. We decided to take him to the NBHA World Show in Jackson, Mississippi. I was so excited to win 2nd in the 1st go round in the 4D division against 500 other horses and ponies. Of the ponies competing, he had the 2nd fastest time of the whole show. I received a World Qualifier Buckle. I was so proud.

We are going to compete one last time at the NBHA World Show this year. I will be 13 and Rusty 17. I will retire him after the NBHA World Show. A second horse I competed on at the 2004 NBHA World Show was Red's on the Money. I won the 2004 1D division NBHA Year End Championship on him. Making the transition from pony to horse hasn't been easy. But with quality horses like Red's on the Money and Hopeshehungthemoon, I've proven I can win.

I too have a passion to continue the family tradition of raising quality horses and riding in professional rodeos while living on a ranch in southwest Nebraska that has been in the Frasier name for 120 years.

I will beat my mom's records!

The author lives on a ranch outside of Benkelman in southwestern Nebraska.

Our Youth—The Real Future of Range Management

It is never too early to start learning about range management.

By Niels LeRoy Martin

There is an old country & western song lamenting the passing of singing western movie stars such as Roy Rogers and Gene Autry saying: "Who Are to Take Their Place?" It might also be said: "Who are to take the place of those who have long been dedicated to the proper management of our rangelands but who are now retired or retiring?"

There is a continuing dialogue going on in our society and among range professionals as a whole concerning what the future of range management will be. Discussions range from a proper name for the society and the *Journal of Range Management* (now *Rangeland Ecology & Management*—that is one that the advocates of change have won) to how the public perceives us and what different roles our profession will adopt. We have seen a lot of technological changes with the advent of satellite imagery, handheld computers, and other digital gadgets. Just a little over 20 years ago, I was mapping vegetation manually on Mylar using LandSat imagery as a base, but cutting and pasting cross-hatching and symbols and making 3 separations for a color printing process. Now it is all computers, GIS, and digital imaging. What has not changed is the need for new range men and women to take the place of us old-timers who are now leaving active employment in the profession. Some of us like to think that we are irreplaceable and that no one can do it as well as we did, but the fact is that there are many highly talented young people waiting in the wings. What we have to do is enlighten them about the importance of range management and about the opportunities that are waiting for them.

I refer to myself as an "accidental" high-school science teacher. After a career in range management that took me to about 25 countries on 4 continents, my wife and I settled on the plains east of Denver, Colorado, to be near most of our grown children. She began teaching at a small rural school in the tiny community of Agate. When the school was in need of a science teacher, she told the administration about me and I began teaching high school. That was almost 4 years ago. This experience has brought me into a world of youth that I believe provides me with a view that is unusual, if not unique, among those of our profession.

The youth of today face many challenges that we did not face when I was young, but they also have many opportunities for learning and growth that we did not have. The culture of drugs seems to have permeated our society to such an extent that even the students in our small schools are not immune to their reach. Television has brought into the homes of our youth social situations, language, and behavior that would have been abhorrent when I was young. On the other hand, the young people of today have such a wealth of knowledge at their fingertips that I cannot even imagine having that in my youth. They have computers, the internet, cell phones, pocket personal computers, digital cameras, satellite communications, and digital imagery to only mention a few on a long list of innovations that have such great potential in our profession.

Students going to a beaver pond during a mountain-ecology field trip.

When I teach science at the high-school level, I marvel at all of the discoveries of the past 50 years. As I began to teach chemistry, I found out that the atom is not even constructed the same way that it was when I was young. Biology has expanded in so many ways. High-school students are learning things about plant physiology that were not taught to me until I was in my junior and senior years at college. They learn typing in elementary school or middle school and practice it every day as they chat on-line to their friends. They can communicate almost instantly with cell-phone text messaging (have any of you who are more than 40 years of age figured out how to quickly use those little keys to type in messages?).

At the trade-fair booths at Fort Worth, we saw a number of high-tech systems to collect resource data. There are new technologies becoming available every day that can be applied to range management and range science. Our youth have the background and the abilities to apply these technologies to the art and science of range management.

As a high-school science teacher with a background in range management, I approached the school administration about teaching some range-related courses using college texts and they eagerly agreed. We now have a program set up with one of the junior colleges so the students can get college credit for the courses concurrently with earning high-school science credits. I have taught introductory range management, animal science, and plant identification. This provides an opportunity for the students to have an exposure to the field of range management before they leave high school.

Many students are capable of reaching far beyond the skills and knowledge base we normally expect from teenagers. By providing high-school students with challenges outside of normal expectations, they are able (and usually willing) to learn as well as students in our colleges and universities. I have students who have learned genus, species, and common names for most of the plants used in the plant-identification contest at our national meetings. They also collect rangeland plants and press and mount them and add them to a growing collection for our high-school herbarium. I have a few exceptional high-school sophomores who are able to put together research papers that would be completely acceptable in a college science course because it is required of them and because they rise to the challenge.

Since my health is poor and I lack the stamina necessary to keep up with 14- to 18-year-old youth on a daily basis, I find it necessary to leave high-school teaching. The program that I initiated in Agate High School will not, however, retire with me. We are now starting an Agricultural Education/Future Farmers of America (FFA) program at the school and the administration is adamant about keeping the range-management curriculum that we have been teaching. The agriculture teacher will teach the college-level courses as part of the advanced level of the agriculture curriculum, and students will continue to be challenged and will be encouraged to reach beyond their normal high-school comfort zone.

Agate High School is not unique in that there are numerous rural (and even urban) high schools where range-management programs may be introduced. Agricultural Education/FFA programs throughout the West and Southeast and anywhere grazing land is important in the local agricultural economy could benefit from the introduction of college-level or advanced-placement range-management curricula. Many (at least in Colorado) already have an introduction to range management at a basic level and they participate in range judging as a part of the FFA program, just as FFA members everywhere judge livestock. It is not a huge step to go on to the next level of actually developing a curriculum with a few college-level courses that will allow some of the students to specialize.

How do we as members of SRM help to make this happen? Get involved in high-school education at a local level. I am not advocating that large numbers of us become high-school teachers. My situation was unique, but I believe that many of the lessons I learned can be applied to a very high percentage of our high schools. Following are some of my thoughts on how this may be done:

1. Offer your talents in range management to your local school district. If there is an Agricultural Education

Camp along Blacktail Creek in Routt National Forest, Colorado.

department, visit with the teacher and volunteer to assist by speaking to the students about rangelands and range management. If the teacher is so inclined, offer to help organize a range-management course or even a full curriculum that he/she could teach with your help.

2. Assist your section youth committee and find out what you can do to help promote the High School Youth Forum at the annual meeting.
3. If your section has a youth range camp or range-judging contest, volunteer to help with it. Help find candidates from among local high-school youth for these activities. If there are no such programs in your section, work with range extension specialists and your section to get them established. It was the Oregon range-management camp that introduced me to range management. I was in FFA and was selected to participate in a camp in eastern Oregon when Barry Freeman was the range extension specialist there. I had an interest in botany and loved to work on the western Oregon ranches near my home but had not even heard of range management until that time. It was a perfect fit for me and I have been very happy that I went to that camp and learned of our profession.
4. Become involved with local school politics and let your school board know that range management is important and that students should have the opportunity to learn about rangelands. Better yet, run for the school board and be in a prime position to have a positive impact upon the youth of your area.
5. For those who are retired, find out what the requirements are to become a substitute teacher. Depending on the requirements of your state and local school district, you may already have the qualifications and, with just a little paperwork, could be substituting occasionally for the science or agricultural teacher. That would be a perfect way to get involved with the school and perhaps have some influence on having some range management taught in your local area. Even substituting for the elementary and middle school may allow for teaching about rangelands on a very basic level.

I recognize that we may not find many students in any one place that will become range managers and members of the Society. We will, however, have a very positive impact upon the way the general public views rangelands. We will develop doctors, lawyers, teachers, firemen, soldiers, scientists, engineers, and people in all the professions that will have an appreciation for range management. And, yes, there will be a few who will be touched like I was, with the desire to become involved in the profession of range management.

I don't know how many, if any, of my students and former students may end up in a range-related career. I do know that some will be ranchers. These future ranchers will have a better understanding of, and be better stewards for, the rangelands on which their cattle will graze. I have already witnessed some of this. Some of their parents have commented that their sons and daughters have been pointing out plants that they know and have made comments about potential for water developments and about better grazing-management ideas. One of my former students went on to college and began majoring in agriculture. She then changed to nursing. She won't be in a field directly related to range management, but she will be a nurse that understands rangelands and range-related issues.

The rangelands of the world are critical producers of food, fiber, water, energy, and wildlife. They provide recreational opportunities and aesthetic values. The future of these lands lies in the hands of our youth. We as a society can work together to educate our young people so that their minds will be enlightened and their hands skilled in providing a bright future for the lands we have worked so hard to conserve. Their education will ensure that these rangelands will be available for the use and pleasure of innumerable future generations.

The author has been teaching at a rural country school in Eastern Colorado.

Natural Resources Conservation Workshop for Arizona Youth

By Kim McReynolds

Each summer, a group of high-school students and natural-resource professionals pack up and head to the mountains of Arizona to spend a week together learning about the diverse resource base of the state. The Natural Resources Conservation Workshop for Arizona Youth (NRCWAY) provides students with an opportunity for hands-on learning in the field and professionals with the hope that some of the students will choose careers in natural resource fields. What the students don't expect are some of the life-long friendships that are formed, the professional connections that are made during the week, and a new respect for differing opinions.

The development of the NRCWAY dates back to the 1950s. At that time, the Arizona Association of Conservation Districts (AACD) learned of youth camps in other states and began developing plans for one in Arizona with help from the Arizona State Land Department and the University of Arizona. The first workshop was held in 1962 as a boys-only range and livestock management camp on the San Carlos Apache Reservation. This was a true outdoor experience complete with tents, cutting wood for the fire, and chuck-wagon cooking. The workshop has moved to different locations with established facilities around the state since then and started accepting female participants in 1974. The Arizona Section, Society for Range Management, took over the role of planning and implementing the workshop in 1975.

Core sampling a tree to find its age. Photo courtesy of Susan Pater.

Since SRM's direct involvement, the NRCWAY has been a program designed to introduce the concepts of natural-resource management to high-school age youth. Approximately 40 outstanding students who have expressed an interest in environmental issues have been selected each year to attend the workshop. The week-long program provides hands-on training in such areas as basic ecology, geology of Arizona, wildlife ecology and management, forestry, range management, soils, water resources, recreation, and watershed management. The program varies from year to year, depending on location, instructor availability, and current issues (ie, prolonged drought, wildfire threats, massive outbreaks of insects and related tree mortality). Instructors include professionals directly involved in resource management from private industry, state and federal agencies, and Arizona's universities.

The goal of the NRCWAY is to introduce students to different disciplines of natural resources and career opportunities. Program objectives focus on the students learning that 1) natural resources are sustainable, 2) all land-management activities and natural resources are interrelated, 3) management decisions are made based on science, and 4) the public

Looking for aquatic insects in a stream. Photo courtesy of Susan Pater.

(students included) have a voice in management decisions.

In 2000, the Arizona Section applied for and received a grant to conduct a survey of former workshop attendees to determine what impact the workshop had on them related to the stated objectives. The study included a sample of former students from a 20-year period—1979 to 1999. Finding the students was a difficult task. A total of 43 former students participated in both a phone interview and a follow-up written survey. They were grouped in 5-year increments in order to look at differences in those who had attended recently (still in high school or college) vs those who had attended in earlier years. Although responses varied when asked what they remembered most about NRCWAY, the largest percentage answered: the instructors, meeting interesting people, the workshop location, and field trips. All but 2 of the respondents stated that the workshop gave them the basis to make more informed choices regarding natural-resource issues. Former students were also asked about their schooling and occupation to determine how many had entered the field or were studying toward a degree in natural resources. Seventeen individuals had either gone into fields or were majoring in areas such as forestry, recreation, range management, watershed management, and wildlife biology. Careers ranged from an attorney for a federal land-management agency, to field professionals, such as a soil scientist, to 1 individual who was the head of a state agency with natural-resource responsibilities. One unsolicited comment returned with the written survey stated, "The single most important thing I gained from NRCWAY was the well-rounded general knowledge about how all our natural resources are linked together. Now that I'm a parent, I'm even more grateful for the program because of the wealth of knowledge I get to pass along to my kids! I can just see the wheels turning in their minds when we're outside playing and I take a moment to tell them a fact or two on whatever topic seems appropriate at the time. Every day offers countless opportunities to teach them about natural resources! Thanks!"

One aspect of the workshop that can be seen, but not easily measured, is the change in attitude with respect to listening to opposing views. This has become more apparent as the student base has changed from largely rural, farm- and ranch-based students to urban students with no direct tie to the land. One such encounter between the 2 groups stands out in many of the instructors minds. The mix of students that particular year included 1 girl from a very rural, traditional ranching family and another who wore only tie-dyed clothes and belonged to Earth First! One evening, the wrap-up discussion was on range management and livestock grazing. Heated discussion on the benefits and destruction caused by livestock grazing continued for quite a while, with many of the other students choosing sides with the main 2 debaters. As the discussion was about to end, the girl from the ranching family stood up and faced the other girl. She said that, though she still did not agree with her position against livestock grazing, she did respect her for listening to the other side of the issue. Then the second girl stood and said that, although she did not like cattle grazing, she now understood that at least some ranchers cared about the environment. It was a great lesson for everyone, students and instructors alike.

The year 2005 marks the 43rd year since the first NRCWAY. Unfortunately, there were not enough applicants to hold the workshop this summer. Numbers have been steadily dwindling for the last 10 years. Marketing and recruiting strategies this year included lowering the age limit to include junior high and lower high-school age students and introducing more technology related to natural resources, such as GPS and GIS applications.

Just as times have changed NRCWAY from an all boys range and livestock camp to a coed natural-resources workshop, times are changing again. The NRCWAY is at a crossroads, and the Arizona Section will be determining what future direction to take.

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Youth Forum

Rangeland Trend: Quality vs Quantity

By Naomi D. Cox

Editor's Note: This paper is the 1st Place winner of the High School Youth Forum contest at the Society for Range Management Annual Meeting, February 2005, Fort Worth, Texas.

How healthy is your rangeland? Do you know how to measure rangeland health? Are you using species composition, the Similarity Index, as the sole method of determining range health?

Range trend is a qualitative method of determining range health.

What is *rangeland trend*? It is defined as the direction of change in a rangeland compared with its historic potential. Instead of evaluating the *quantity*, you are evaluating the *quality* of the rangeland by using proven methods so that once the trend is determined, action can be taken to improve the rangeland (Photo 1). Range trend is useful only if it is used as a long-term, moment-in-time monitoring technique. Without repetition it is not reliable; if only 1 measurement is taken, it is not a trend. We estimate or measure trend because we want to monitor rangeland health: it gives valuable information on how current or past management practices are affecting the plant community; it gives you an idea of whether or not you are meeting your goals; and it can be a warning sign if serious, negative changes are occurring.[1]

For a farmer or rancher, the benefits of monitoring the trend of the land resources are great. The rancher who monitors the trend will know "on average" what species he or she has and in what quantity. Also, knowing what improvements need to be made and where to make them is vital to a successful landowner.

This approach was developed as a tool for conducting a moment-in-time, qualitative assessment of rangeland condition and as a communication and training tool for helping land managers and other interested people to better understand rangeland ecological processes and their relationship to indicators. Every land manager must consider ranch-specific goals. What are the overall objectives of the ranch operation? Is there a management plan or a set of goals? Has a "problem" been identified on the ranch? Having a goal or a common agreement on what needs to be accomplished is a crucial step to successful range management. Goals should be realistic and achievable, and once they are developed, range trend can be used to monitor and make sure you are meeting those goals.[2]

Rating Range Trend

Rangeland trend is determined by evaluating an ecological site and rating it with 5 major factors on a scale of 1 to 5. A rating of 1 means the site is in very poor condition in that specific category; 3 is average; and 5 means that the site is performing as it should. The 5 major factors are 1) plant composition changes, 2) abundance of seedlings and young plants, 3) plant litter and residue, 4) plant vigor, and 5) condition of soil surface.[3]

Photo 1.

Plant Composition Changes

When measuring plant composition change, the ideal is for all major plant species in the Historic Climax Plant Community to be present and in proper balance. Too many invader species, undesirable plants, or weeds produce problems.

Abundance of Seedlings and Young Plants

The native plants on the rangeland must be reproducing at a suitable rate. Many weeds or undesirable seedlings and young plants; no new growth in native, desirable plants; or no new growth at all is the worst scenario for this factor. Reproduction of main grasses and forbs is vital in keeping rangelands healthy.

Plant Litter and Residue

Plant litter present on the soil surface is very important. Plant litter provides shade on the soil, keeping plants cooler and conserving moisture.

Plant Vigor

Having the right kinds of plants is important, but if those plants are not in good health, it is detrimental. Plant vigor is an essential part of determining range trend.

Condition of the Soil

The condition of the soil leads to the condition of the plants. The consequences of poor soil condition or soil erosion are harmful to plants, and therefore produce an unhealthy rangeland. If soil loss is occurring and many plant pedestals are evident, soil treatment and erosion control are necessary.

Determining Range Trend

In determining range trend, one must take into account all these factors. Leaving out any one of them could result in a wrong interpretation of range condition, and because of that the rangeland could deteriorate quickly.

After each factor of trend has been determined, it must be rated. Using a 1–5 scale method, as described by Montana State University, the evaluator adds the numbers together to find an average score. Range trend is then decided by the category that the number and rangeland fit:

- **Away From** is range trend moving away from historic or desirable plant community
- **Not Apparent** is range trend not in movement. In other words, range condition has not moved over time.
- **Toward** is range trend moving closer to climax historic levels or desirable plant community.[3]

The trend in rangeland condition can remain about the same, go down, or go up. In the Northern Great Plains, trend movement can be slow but gradual, with changes occurring over time. These changes can be from weather or management practices with each factor affected differently.

Monitoring range resources should be done annually; however, not all factors need to be monitored each year. Plant species composition changes occur more slowly; thus monitoring every 3 to 5 years is sufficient. However, abundance of seedlings/young plants and plant litter/residue can change more rapidly, requiring more frequent monitoring. Management alternatives can be changed to prevent undesirable trend developments in overall range health.

Attempting to monitor every inch of a given rangeland is not physically possible. Instead, representative study sites are chosen based on their ability to interpret range conditions over much larger areas. Unfortunately, there is no "cookbook" procedure that can determine the best location and monitoring system for any given ranch. An area, or several areas, must be chosen that represent as much of the land as possible. Observations and recommendations are then made based on those areas.[4]

Some research methods used to determine range trend are line-transect methods using points and frames, visual estimates, and photo points. The line transect methods are most commonly used by scientists and public and private agencies. They are more detailed but are time-consuming, labor-intensive, and more expensive. A visual estimate is just what it says—a visual estimate of the representative site. It is important to walk around to get a good idea of what the plant community and soil surface look like and then rate the factors accordingly. This method requires learning key plants and soil features. An observer or range evaluator will become more proficient with time, and practice is relatively inexpensive. Photo points are where you take a picture of the rangeland and evaluate changes over time from repeated years of picture taking to create a permanent record (Photo 2). It is important to identify the date and location in the picture, to take the pictures during the same stage of growth, and to include the same skyline, and even an object on the skyline, for easy relocation. Repeated photographs taken at permanent locations are an effective and efficient method for long-

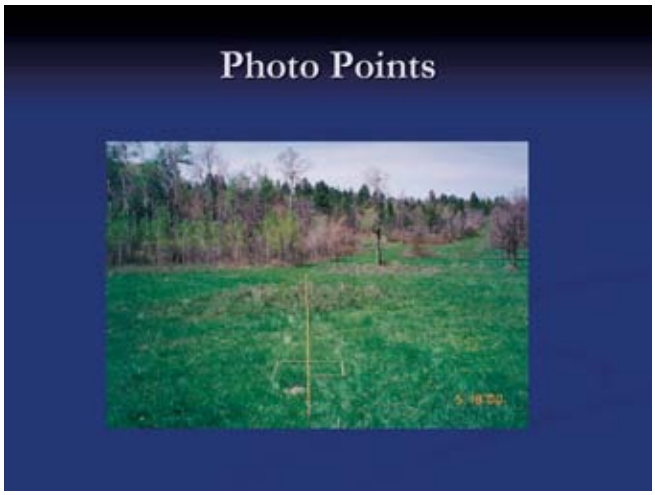

Photo 2.

term monitoring. Select a monitoring program that fits your objectives, resources, labor, and time. [5]

Locating key monitoring areas is the most significant step in beginning the rangeland monitoring program. Once chosen, monitoring methods range from simple photo-point plots to advanced quantitative measurements. Most rangeland monitoring programs do not need grazing exclosures or elegant statistical processes. Remember, determining rangeland trend requires that repeated measurements be made over time.[4]

Range trend can be used to determine best management practices that simulate natural, biological processes to ensure an improvement in the rangeland resource.

Author is homeschooled and a 4-H member from Aneta, Nelson County, North Dakota.

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Youth Forum

Winter Grazing at 13,000 Feet: Improving Forages for Subsistence Agriculture in the Bolivian Altiplano

By Zachary V. Anderson

Editor's Note: This paper is the 2nd Place winner of the High School Youth Forum contest at the Society for Range Management Annual Meeting, February 2005, Fort Worth, Texas.

From this title, you might envision something like sheep buried in snow. Actually, livestock winter grazing at 13,000 feet and higher is not uncommon on the Andean Altiplano. The Altiplano is a high plain surrounded by majestic mountains extending over 20,000 feet.

The Andean Altiplano.

The Altiplano itself gets very little snow and, in fact, is a cold desert for about 8 months of the year. During the growing season (December–April), the majority of the annual precipitation is received in the form of rain. This results in lush forage availability from remnant perennial grasses and ephemeral weeds. Animals grazing these lands are in a positive nutritional cycle through this period and into fall as crop aftermath from barley, quinoa, and legumes become available as supplemental feed.

By late fall the natural rangeland forages are gone and the aftermath depleted. Animals at this point begin to burn fat and muscle tissue to sustain themselves on very limited quantities of low-quality forage. This is a critical time as animals are in gestation and many are still suckling young. The bottom line is a very low-efficiency livestock production system with low levels of fecundity and long periods from birth to marketability. The Bolivian Altiplano is typical of the Andean situation. The landlocked status of Bolivia increases its dependence on subsistence agriculture on the high plain.

Through the Benson Institute at BYU, a project was established to evaluate alternative forage species and strategies for the winter forage bottleneck. This project was to determine if forages grown in other cold desert environments of the world could be grown on the Bolivian Altiplano. The idea was to find species that could be used to create forage banks of a mixture of grasses to provide energy and palatable shrubs to supply late-season protein.

Author assisting in forage production evaluation.

While rangeland forage is plentiful during the growing season, animals graze on communal lands. As the season progresses and feed is depleted, animals are supplemented with crop aftermath back on individually owned small plots. The forage banks would also be individually grown and controlled on private areas. Using the forage bank strategy, late in the dry season animals would be allowed to forage as best they could during the day and then be allowed to graze in the forage banks for a short period each evening prior to being locked away for the night. The brief nightly exposure to high-quality forage would hopefully improve animal health during the harshest part of the year.

This scenario formed the hypothesis from which forage adaptability trials were initiated. Six grasses were seeded, including timothy, orchardgrass, crested wheatgrass, pubescent wheatgrass, smooth brome, and weeping lovegrass. Additionally, 6 shrub species were grown in greenhouses and transplanted into evaluation plots, including forage kochia, 4-wing saltbrush, bitterbrush, birchleaf mountain mahogany, black sage, and seabuckthorn. These plots were established at several locations across a rainfall gradient and replicated 3 times at each site. Establishment and production has been followed on these species over the past 3 growing seasons.

I went to Bolivia to participate in data collection for the 2004 field season, along with Rachel Fugal (an MS student assigned to the project), other BYU students, and supervising faculty Dr Val Anderson and Dr Bruce Roundy.

The timing was early August, which was early winter there. We found that while all grasses were established, highest production was achieved by weeping lovegrass, pubescent wheatgrass, and orchardgrass. The shrubs that established best were forage kochia and 4-wing saltbrush.

Production, however, was only half the equation. Camelids (llamas and alpacas) were the target livestock species for this study and we needed to evaluate their acceptance of these new forages.

Author with friendly llama.

I developed new skills in llama "rassling" and spit avoidance as we marked several llamas with different colored ribbons and collected bite-count data and scan sampling to determine forage preference.

Evaluating llama forage preference.

Llama bites were relatively easy to count because of the typical bite and rip action of their heads. Much to the dismay of project leaders, the llamas would not touch the shrubs—they ate dried weeds between and under shrubs and, when gone, they seemed to prefer dirt and rocks to the shrubs!

The grasses, on the other hand, were all utilized to some extent, but by far the greatest preference was for timothy, and least preferred was weeping lovegrass. By covering the timothy we were able to evaluate the other grasses and found pubescent wheatgrass was favored, with the others being utilized to a lesser extent.

Camelid grazing on the Altiplano in winter is a bleak reality. Improving late-season nutrition using forage banks is a viable option that needs further work and refinement. However, with these forage banks being introduced, there is a light at the end of the tunnel that could lead to a better life for the animals and the livestock producers that endure life in the enchanted but harsh environment of the Andean high plain. ◆

Youth Forum

Salt Cedar Management in New Mexico

By Adam Powell

Editor's Note: This paper is the 3rd Place winner of the High School Youth Forum contest at the Society for Range Management Annual Meeting, February 2005, Fort Worth, Texas.

Salt cedar (*Tamarix* spp.) is a shrub or small tree-like plant that can grow anywhere from 5–20 feet tall. The plant has scale-like leaves with red or pink flowers that normally flower spring through summer. The plant gets its name from salt-secreting glands that are located within the plant.

Banks of the Rio Grande, New Mexico. Photo courtesy of Sierra County Soil and Water, New Mexico.

Salt cedar was introduced in the 1820s from the Middle East and Asia as an ornamental plant. By 1897 it had escaped into Utah's watersheds. Between 1900 and 1930 it was widely planted to stop bank erosion and stabilize stream banks. Salt cedar was introduced into New Mexico in 1908. And after only 3 years, people were trying to get rid of it. In the 1940s it was spreading through most of the western United States' water systems.

Salt cedar generally occupies riparian ecosystems. It is now considered an invasive plant. It has taken over 1 million acres of private and federal land. Excluding Hawaii, all states are affected by salt cedar. New Mexico has the greatest infestation of the shrub in the western United States. All major rivers in New Mexico have large amounts of salt cedar growing along their banks, with the lower Rio Grande basin having the worst infestation.

There are 8 different species of salt cedar, but only 2 affect the rivers of the western United States. These species are *T. chinensis* and *T. parviflora*. All but one of these species are considered weedy plants. It is estimated that an average 8-foot tree can use anywhere from 60–100 gallons of water a day.

Currently New Mexico has 5 different methods being used to control salt cedar: manual removal, fire, mechanical removal, biocontrol, and aerial control.

Manual removal of salt cedar.

Manual removal is very good because the kill rate is 85%–90%. The downside to this type of control is that it is very labor intensive and expensive. Once the target species is removed and the slash is removed, the stumps are treated with a mixture of Garlon and vegetable oil. Garlon inhibits protein synthesis and cell growth within the plant is terminated.

Fire is not a very effective treatment. This is because salt cedar is a fire-adapted plant. This means that salt cedar is able to outcompete native vegetation after burning. However, fire is effective for clearing standing stumps and brush.

Mechanical removal is very expensive, and the kill rate is anywhere from 70%–85%. Normally bulldozers or extractors are used. The good thing about extractors is that they are able to pull the roots straight up, which allows native vegetation to remain relatively undisturbed.

Biocontrol uses either goats or Chinese leaf beetles. This management is fairly new and experiments are ongoing. The beetles eat the foliage on the plant, but the tree resprouts new foliage. The goats eat accessible foliage. Scientists have found that this type of control works best as a pre- or post-treatment along with implementation of other control techniques.

Aerial control is one of the most popular types of control in New Mexico and the western United States. This is because the mortality rate achieved is 87%–98%. Arsenal is the herbicide used; it was researched and found to be the most environmentally safe, effective, and economically advantageous herbicide. Isopropylamine salt of imazapyr is the active ingredient in Arsenal. Imazapyr targets 3 amino acids that are essential to plant growth. The herbicide is applied to the foliage of plants by helicopter. Arsenal can also be sprayed from a truck or backpack sprayer.

Salt cedar can grow very rapidly. It has been shown that when a tree is cut down in early spring, by August of the same year it can grow as much as 9–12 feet. That is about 1.5 feet per month. This plant also produces up to 50,000 seeds per year, and is also able to grow vegetatively.

Management of salt cedar is a large undertaking and the cost is reflective of this. In 2003, Sierra and Socorro counties in New Mexico alone spent 1.2 million dollars on aerial treatment. This is approximately $270 per acre. This funding treated about 4,500 acres. For manual treatment of salt cedar the average cost is approximately $1,500 per acre.

Salt cedar does not support much wildlife but there are some wildlife species that are able to live in dense stands of salt cedar. Two species of birds are being protected. The 1st is the **Southwestern Willow Flycatcher.** This species of flycatcher is on the endangered species list. The other bird is

Mechanical removal of salt cedar.

the **Yellow-billed Cuckoo**. This species of cuckoo is on the threatened list. There are not very many nesting groups in the salt cedar, so the same precautions are being taken as with the flycatcher. Except for these species, most wildlife doesn't find salt cedar to be a good habitat because the plant makes it harder for the animals to get to water compared with native trees.

Photos show before and after views of a treatment area. You can see that in the summer of 2003 there were large amounts of salt cedar growing along the banks of the Rio Grande River. The winter of 2003 photo shows the same area after a cut-stump crew had gone through and removed the salt cedar. In the winter of 2004 photo, you can see there is new grass that had started to grow the previous growing session, as well as new vegetation, which is good for this riparian ecosystem. ◆

Youth Forum

Stockpiled Forage vs Hay as Winter Supplement

By Mallory Williams

Editor's Note: This paper is the 4th Place winner of the High School Youth Forum contest at the Society for Range Management Annual Meeting, February 2005, Fort Worth, Texas.

If at all possible, wouldn't any rancher like to drastically reduce hay supplement needs by managing their forage in such a way to meet most, if not all, of their livestock needs during the winter months? In the summer of 2004, I was interviewing for the FFA State Star Chapter Farmer award and the question most often asked was, "Why don't you show any costs for hay in your records?" I explained that if you properly manage and maintain your rangeland, hay is often not needed.

How do we manage a resource if we don't measure or quantify it? Each of us has a distinctively different ability or inability to accomplish the ultimate goal of no or very little hay supplementation. Some factors involved in that determination would be climate, terrain, soil type, stocking rate, type of livestock, and individual skill to manage the grass resources.

You might begin by asking yourself some basic questions.

- What forage do I have?
- What am I going to do with it?
- How do I get maximum utilization from my forage?

Some of you may have the experience and skill to make a visual assessment of forage quality and quantity. Some of you may need to learn what grasses are important to the health of your range and the nutrition of your livestock. Only when you know what you have, can you evaluate your forage.

The establishment of forage surveys will aid you in making proper assessments. In Texas we would normally do these in June, November, and March.

The following steps will aid you in setting up your survey:

1. Calculate your grazeable acres per range site and pasture.
2. Select representative areas.
3. Use a plot frame.
4. Use a representative photo guide.
5. Collect samples from each representative area.
6. Calculate the forage supply.
7. Calculate how many animal unit days of grazing you have.

Photo points are an excellent tool for monitoring the range. Construct a 3 × 3-foot frame from PVC pipe to place on representative areas of your ranchland. Vertical and landscape photos are necessary for good results. Vertical photos will show the amount of plant coverage, any bare ground, and litter within the frame. Landscape pictures will show terrain, brush, and grasses in the area near the frame.

Monitoring with step transects will give you a percentage of grasses found on an established line across portions of your ranch. Technical assistance may be necessary to identify all

the plants plotted on the line transect. A good transect will need a minimum of 100 plants plotted on the line. The percentage can be calculated like this: If you record 10 sideoats grama plants per 100 plants recorded, then sideoats would be 10% of the grasses observed.

An ungrazed plant will have an extensive root system and large quantity of leaves. A moderately grazed plant will have approximately 50% of its leaf growth removed. An overgrazed plant is stressed by its reduced leaf and root system. This plant will be slower to recover. We should bear in mind that improvement of range condition is related to amount of periodic rest from grazing that grass species get. It is possible to have all 3 of these plant conditions in the same pasture and even in the same observation point.

The area of Texas where my family's ranch is located is known as the Cross Timbers and Prairies region. Some grasses of this area include big bluestem, little bluestem, Indiangrass, switchgrass, sideoats grama, buffalograss, hairy tridens, Texas grama, and threeawns. This area is approximately 75% range and pasture land.

Each of us uses a system of some sort in planning our livestocks' use of available forages. You may not be using the right one to best suit your situation. We can overwhelm even the best system and it will not be able to compensate for overstocking.

Some common grazing systems used in this area of Texas include **continuous, Merrill deferred rotation,** and **short-duration** grazing.

Management commitment, financial resources, terrain, and type of livestock are just a few of the things to consider when selecting a grazing system. Correct stocking rate is a key point in the success or failure of any grazing plan or system.

A **continuous** grazing method has little or no flexibility and will require destocking as the only way to reduce demand on the forage. You are simply at the mercy of annual precipitation and herd nutritional demands.

The **Merrill deferred rotation** system requires 4 grazing areas and 3 herds. Three pastures are grazed, while a 4th is rested. By rotating herds every 4 months a new pasture is rested. This system employs light to moderate grazing pressure and little movement of livestock.

Short-duration grazing systems utilize numerous pastures or paddocks and a single herd. Grazing occurs for short periods based on the number of paddocks, rest period desired, time of year, and stocking rate of pastures. Care needs to be taken to insure monitoring of the paddocks, which will determine when the herd should move. This method, properly done, will improve quality of your forage, perhaps increase stocking rates, and allow the herd to be more efficient in harvesting the forage available.

We must plan or manage in such a way as to have adequate leaf growth in the fall. This will be very beneficial to insulating the soil during winter months and getting grass growth off to a good start in the spring. This remaining forage is our stockpile for winter.

How do you evaluate the forage you have managed so hard to stockpile? **Forage quantity** and **forage quality** are key factors in our evaluation.

Forage quantity will determine how many grazing days you have with the current stocking rate.

Forage quality will determine animal performance on the available forage (Table 1).

Table 1. Nutritional values of various qualities of forage.*

Forage quality	Crude protein	Total digestible nutrients
Low	6%–7%	<50%
Medium	7%–11%	50%–57%
High	12%–14%	57%

* Based on data from L-5354 Factors and Feeds for Supplementing Beef Cows, Stephen P. Hammock and Ronald J. Gill, Extension Beef Cattle Specialist and Extension Livestock Specialist, The Texas A&M University System.

Low quality forage limits how much forage my cows can eat. **Medium quality** forage requires little or no supplementation. **High quality** forage is consumable in large amounts and likely to not require any supplementation.

On my family's ranch we are assessing nutrient requirements using a monitoring program called Nutritional Balance Analyzer (NUTBAL). This program uses near-infrared reflectance spectroscopy (NIRS) to analyze livestock fecal samples. The analysis determines the protein and energy value for the actual forage consumed by the animal.

With the NUTBAL analysis of our livestock we know the following about our cattle and forage:

- Whether the nutrition plane is positive or negative.

Author collecting fecal sample for analysis.

- Whether livestock body condition is being maintained, increasing or declining.
- Whether nutrients (protein or energy) are limiting animal performance.
- What our most cost effective supplement would be.
- How much supplement should be fed.
- How much forage the animals are consuming.

We are able to make informed decisions about rotation of herds, what supplement is needed (such as protein or energy), when to begin supplementation, how much to feed, and what feed is the most cost effective.

The Richards Ranch is a 15,000 acre cattle operation neighboring my family's ranch. It is managed and operated by Mr. John Hackley and his son Brent. John and Brent represent the 5th and 6th generations of the Richards family to ranch this land. I sat down recently with John and discussed some key elements of their ranch management. They began using rotational grazing in 1980. Previously, the stocking rate had been 1 animal unit per 20 acres. Currently it is 1 animal unit per 10 acres. This change in stocking rate doubled the ranch gross income. The cattle receive a 32% liquid feed supplement, which has cut input costs. The NUTBAL evaluation has been used on the ranch and it confirmed that the supplement amounts were correct.

Mr. Hackley estimated the savings from reduced hay supplementation to be approximately $30,000, based on the fact that they previously fed 6,000 bales of New Mexico alfalfa per year.

The ranch also has modified its cow production cycle. Cows are bred for 60 days, from September 15 to November 15, and cows calve from June 25 to August 25. The ranch maintains a pregnancy rate of 90%–93%.

In order to reduce hay supplementation you must be able to evaluate your current forage, choose a grazing system that meets your operation's needs, and choose a method of forage evaluation.

And it wouldn't hurt to look over the fence, because you never know what you can learn from a neighbor. We sure did. ◆

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Youth Forum

To Burn or Not to Burn…That Is the Question

By Kelly Haile

Editor's Note: This paper is the 5th Place winner of the High School Youth Forum contest at the Society for Range Management Annual Meeting, February 2005, Fort Worth, Texas.

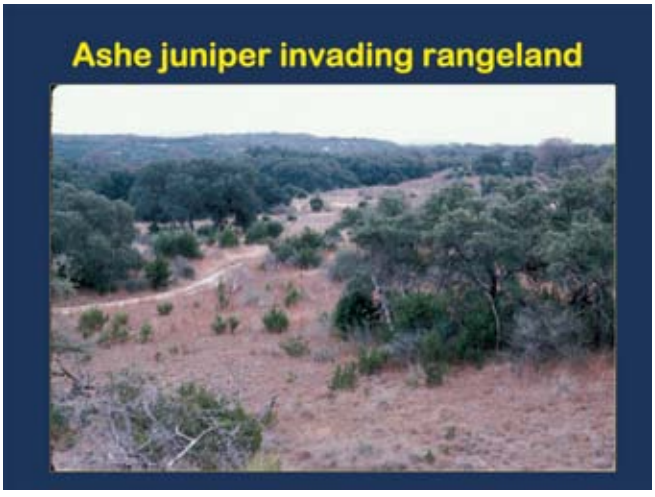
In presettlement times in North America fire was as much a part of the landscape as rainfall, snow, grazing, and insects. Fire was a natural occurrence caused by lightning strikes. These naturally set fires were common in the summer when it was hot and dry.

Under these conditions the fuel was easily ignited. Native Americans also deliberately set fires to reduce ground cover for the ease of traveling and hunting. This could be considered a prescribed burn. A modern definition of a prescribed burn is the application of fire to a vegetated site in a predetermined area under specific fuel load and weather conditions in accordance with a written prescription plan. The Native Americans did not have a written prescription but they did have a plan.

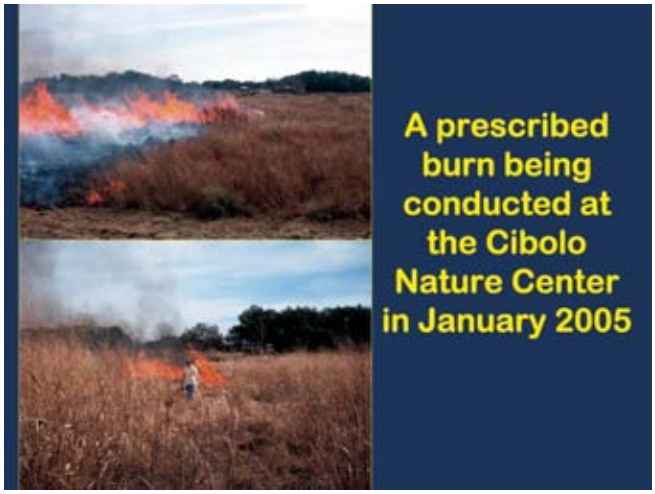
Burning is one of the oldest rangeland management practices. It has been known for years that prescribed burns have many benefits. Following are 3 benefits: 1) burning helps control brush and invading grasses to improve rangeland condition and wildlife habitat, 2) burning helps prevent wildfires, and 3) burning helps improves seed germination and seedling establishment.

In the Edwards Plateau where I live we have several invading brush species. We use prescribed burning to increase the production of native grasses and forbs while reducing the growth of unwanted brush species.

For instance, Ashe juniper, also known as cedar, is one of the main invading brush species. It can take over the rangeland in a relatively short period of time. If left unchecked it can get so dense that the production of grasses and forbs are reduced to a minimum amount. Further study shows that a rain of less than 1 inch can be caught in its thick canopy, keeping the rain from reaching the soil underneath. However, Ashe juniper can be controlled by fire because it does not resprout after being burned for the right amount of time and at a high enough temperature.



Although not all brush species are killed by fire like Ashe juniper, their growth is suppressed, which makes the rangeland more accessible for



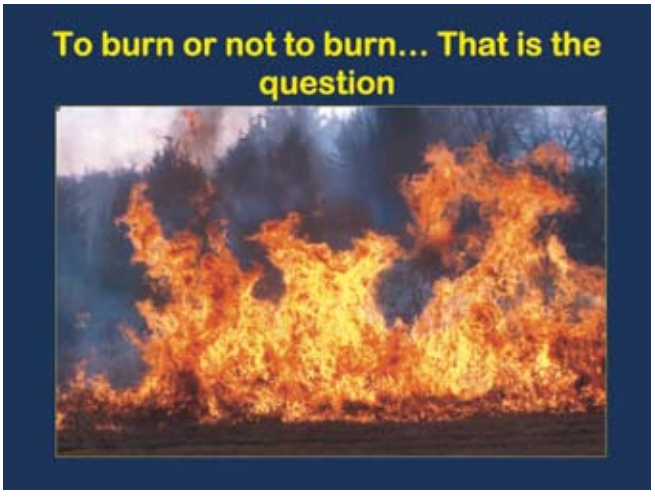
wildlife and livestock and increases the nutritional value and production of grasses and forbs which are a significant part of the animals' diet. Similarly to controlling brush, you can use fire to control introduced invasive grasses. Native grasses generally respond more favorably to fire, while less desirable introduced grasses do not, allowing your native grasses to be the predominant grass on your rangeland.

The Cibolo Nature Center is located along Cibolo Creek in Kendall County. At this site there has not been any livestock grazing for at least 15 years. The predominant grass is switch grass, which makes up about 55% of the grass cover. They conduct prescribed burns on it every other year to reduce the amount of plant litter and to try to reduce the amount of the introduced grass, King Ranch bluestem, and to keep new sprouts of Ashe juniper from sprouting. One of their main goals is to increase the amount of native grasses. For the past 5 years I have volunteered at the Cibolo Nature Center conducting vegetation composition transect lines in the spring and fall to see if the prescribed burns are meeting the established goals of reducing the amount of King Ranch bluestem and promoting the growth of native plants. These are some examples of how prescribed burns help control brush and invasive grasses to improve rangeland condition and wildlife habitat.

We have all heard the saying "Only you can prevent wildfires!!!" Though it may seem strange that you can use fire to prevent fires, it has been shown that a program of prescribed burning does not eliminate wildfires, but it does reduce the number of fires and the acres burned during a wildfire. The traditional method of preventing wildfires was to eliminate all fires. Without fire, fuel loads increase because they have not been burned in years which can cause an increase in the number and intensity of wildfires. The general public often has a view that all fires are bad because of Smokey Bear and other fire prevention campaigns. While this is a prevention method that has worked in the short term, over the years it has not eliminated or prevented the threat of wildfires. What it actually does is create a greater fire potential. Fuel loads increase due to the accumulation of dead trees, carpets of pine needles, and other plant litter. These and other accumulations have the possibility of causing a devastating wildfire. Also, the temperature and intensity of the flames during a wildfire can kill the understory vegetation and do some harm to the taller, more mature trees. Even though the land may look barren and lifeless after a prescribed burn, in a short period of time after the fire (under the right weather conditions) the vegetation on the rangeland is better than it was before the burn. Preventing wildfires with prescribed burns has an economic benefit as well. According to G. G. Martin in the 1988 Fuels Treatment Assessment, for every dollar you spend on a prescribed burn, $1.76 is saved by not having to pay to extinguish the fires and damages that they might cause.

I attended the Wildlife Conservation Camp this past summer. It was held in Huntsville, Texas, and while there we did a prescribed burn in the Sam Houston National Forest. The objectives of the burn were to reduce the amount of fuel load and the amount of understory brush. Using prescribed burning to remove the fuel load at the right time of year and under the right weather conditions, prescribed fire can be a great asset in controlling wildfires. It also educates the public that not all fires are bad, just the uncontrolled ones.

Another benefit of prescribed burning is to encourage the germination of seeds. Research has revealed that some seeds depend on smoke and heat to get them to germinate. According to studies done by Daubnmire in 1968 and Sampson in 1944, grass seeds can tolerate temperatures of 180° to 240° F for 5 minutes. Not only do seeds tolerate heat, fire can trigger germination of seeds. Grass seeds can lay dormant for as long as 100 years under the right environmental conditions. If you think about it, it is a divine plan for the seed. Smoke comes from fire, and fire means that the plant residue has been burned off and there is less competition for new seedlings. Fertile ash will be available for the establishment of seedlings and their future growth. On the Edwards Plateau the Flameleaf sumac is stimulated to germinate from the heat of the fire. Along with the heat influenc-



ing germination, smoke has been proven to enhance seed germination. The exact triggering agents in smoke are not yet known, but nitrogen dioxide and/or butenolide are two possible agents contained in the smoke. However, not all seeds are influenced by smoke and heat to germinate.

So the question is to burn or not to burn.

I hope you have seen the advantages that prescribed burning offers. When fire is used properly as a tool it is very beneficial in controlling brush and invasive grasses to improve rangeland condition and wildlife habitat, it helps prevent wildfires, and it improves seed germination and seedling establishment. ◆

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Career Opportunities in Rangeland Ecology

By Wayne C. Leininger and Melissa Johnson

Important questions that are being asked at this time of the year by students entering college include: Will there be any jobs when I graduate with my bachelor's degree in rangeland ecology/management? Who employs range graduates? What do graduates with a range degree do anyway? If these questions are not asked by the students, most likely their parents ask them. This article gives some insight into these important questions and others.

Changing Career Opportunities

Careers for graduates with bachelor degrees in rangeland ecology/management have changed dramatically since the first students with these degrees graduated in the early 1900s. During this time, livestock grazing issues (eg, lowered grazing capacity, increased soil erosion, etc) on both public and private lands were of great concern. Range careers typically involved working for a federal land-management agency, such as the Forest Service, monitoring livestock numbers, enforcing grazing regulations, and installing range structures (fences, water developments, etc). Over the next several decades, rangeland conservationists shifted more of their responsibilities toward improving the rangeland resource that had been subjected to land abuse from overgrazing and drought. Rangeland specialists developed grazing systems, implemented rangeland improvements, such as reseedings and brush control, and evaluated and monitored rangeland condition.

The 1960s and 1970s were characterized by considerable change in the philosophy of range management. With the passage of several legislative acts (eg, Multiple Use Act [1960], National Environmental Policy Act [1969], Federal Lands Policy and Management Act [1976]), the focus of range management on public lands changed from only livestock grazing toward multiple uses, such as grazing, recreation, wildlife habitat, watershed management, etc.[1] During this era, student numbers in range programs in the United States increased considerably and employment opportunities for graduates with a range degree were plentiful.

The 1980s and 1990s saw changes in national priorities, budget deficits, and subsequent reductions in federal work forces within many governmental agencies. This was also a time when graduates with range degrees often looked toward the private sector and nongovernmental organizations (NGOs), such as the Nature Conservancy, for employment. It was also an era when undergraduate enrollment in natural resource programs declined dramatically.[2]

A Bright Future

Career opportunities for graduates with range degrees in the 2000s appear very bright. Much of this has to do with the impending wave of retirements in all environmental and natural resource agencies and the concern by agencies relative to loss of institutional memory and maintaining their managerial competencies.[2] For example, over 40% of the government workforce is over the age of 50, approximately 23% have more than 25 years of service, and only 6% are under the age of 30. The workforce in the natural resource agencies mirrors these statistics with the length of service slightly longer.

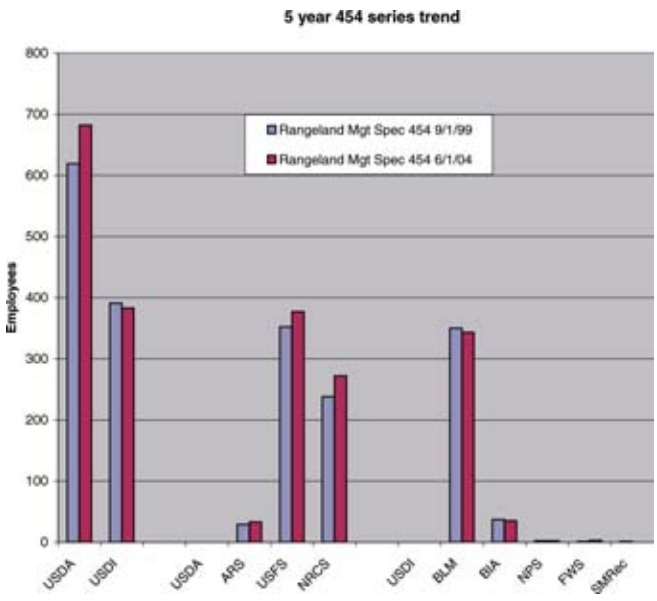

Figure 1. Numbers of rangeland management specialists in the various land management agencies September 1, 1999, compared with June 1, 2004. Note that SMRec = surface-mining and reclamation.

Forty-six percent of the Forest Service's permanent workforce is projected to turn over between 2003 and 2007.[2] Similarly, the Natural Resources Conservation Service projects that it will potentially lose one-third to one-half of their employees over the next 5–10 years. In Colorado, there are 40 range-trained employees, and 40% of them are eligible to retire in the next 5 years (L. Jolley, personal communication, 2005). As noted in Figures 1 and 2, the number of range employees within the federal agencies increased between

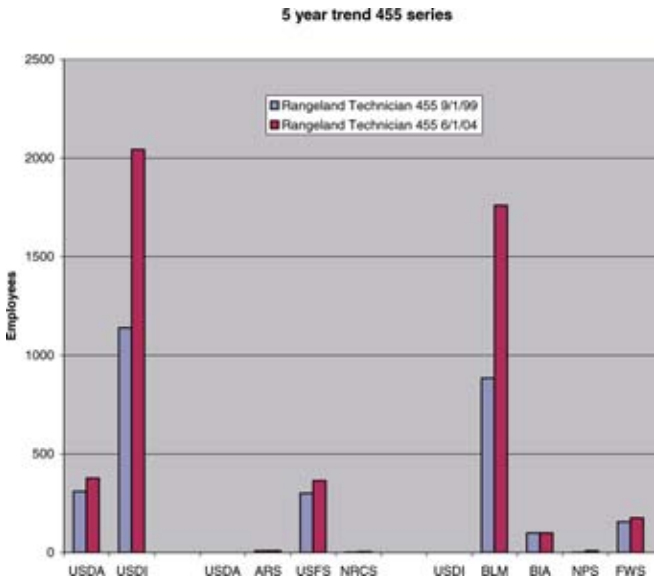

Figure 2. Number of rangeland technicians in the various land management agencies September 1, 1999, compared with June 1, 2004.

1999 and 2004 (see www.fedscope.opm.gov for data on employee numbers). Hopefully, this is the start of a new wave of hiring not seen since the 1970s.

Placement of students with range degrees has been very good. Summer positions generally outnumber the available range students and many summer range positions are filled with students in a closely aligned discipline, such as natural resources management. At Colorado State University, the placement of rangeland ecology undergraduates has been the highest of the eight majors in the College of Natural Resources (Table 1).

What Do Graduates With a Range Degree Do?

Graduates with a bachelor of science degree in rangeland ecology/management have a wide variety of employment opportunities. Many choose to work for the federal agencies

Table 1. Job placement at the time of graduation for College of Natural Resources Undergraduates, 1999–2004. Percentages include students employed or attending graduate school

Major	Percentage
Fishery biology	62
Forestry	61
Geology	48
Natural resources management	52
Natural resources recreation and tourism	66
Rangeland ecology	75
Watershed science	57
Wildlife biology	59

as rangeland-management specialists. Generally, these individuals are involved in monitoring rangeland condition/health, monitoring and controlling invasive plants, developing allotment management plans, implementing habitat improvements, placing natural processes, such as fire, into the ecosystem, etc. A high percentage of the undergraduates with a range degree in the new millennium seek employment with NGOs. Much of their time is directed toward managing rangelands to enhance biodiversity, seeking ways to preserve open space, etc. Ranches frequently hire graduates from range programs to be ranch managers. These individuals are responsible for the day-to-day operation of the ranch, including stewardship of the animal and rangeland resources.

Colorado State has placed a considerable number of range-trained graduates with city and county open-space programs. Typically, these employees are charged with balancing

Figure 3. Restoration ecologists cutting willows for a riparian restoration project.

Figure 4. Riparian specialists assessing the ecological health of a riparian zone.

recreational demands with ecosystem sustainability. In some cases, open-space managers focus their attention on maintaining traditional uses of rangelands, such as livestock grazing. Over the past 20 years, private industry, such as mining companies, have employed a large number of graduates in range management to help in the restoration of drastically disturbed sites. These challenging positions involve the integration of biology, soils, and economics in developing cost-effective ways to put natural plants and ecosystem processes into a restored site. Environmental consulting companies have always been a major employer of range-trained graduates. Employees of these companies typically work in diverse areas such as wetland delineation and mitigation, threatened and endangered plant and animal surveys, etc.

Summary

Employment opportunities for range graduates look very promising in the coming decade. This is largely brought about by the retirement of a large body of graduates who were hired during the environmental movement of the 1970s. Graduates in range management generally find their career to be very rewarding and appreciate the diversity of opportunities a range degree offers. Many students who pursue a range degree want to work in the outdoors. Presently, a growing number of students are taking the opportunity to integrate resource-management skills with technological tools, such as geographical information systems and remote sensing. The unknown factor in employment opportunities, however, is the growing federal deficit and its effect on the ability of federal agencies to fill vacancies. Only time will tell how this plays out.

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The authors would like to acknowledge Leonard Jolley, who supplied much of the data on federal employment for this paper.

Student Activities–The Future of SRM

By Jennifer Pluhar

The mood in the committee meeting was serious. The action on the table could mean big changes for the Student Activities Committee and SRM. The discussion went on for at least an hour, with committee members voicing strong and passionate opinions. The proposal that lay before the committee would create a new contest for students, the Undergraduate Range Management Exam, or URME. Some feared this would be the "kiss of death" for the only individual competition at the Annual Meetings, the Plant Identification Contest, a long-standing tradition that began in 1951. Others argued that range management was more than Plant ID and that more activities for students were entirely appropriate and would result in more student members becoming "regular" and even active members upon graduation. The vote was close, but a new opportunity for students was launched.

Although that meeting seems ages ago, it was in the early 1980s. The first URME took place in 1984 at the Rapid City, South Dakota, Annual Meeting, joining the Plant Identification Contest as a competitive opportunity for student members attending the SRM Annual Meeting. These days it is possible for students to attend the Annual Meeting and compete in not only Plant ID and URME, but in public speaking and graduate student paper and poster contests. They can also strive to win cash with the prestigious "Combined Award." Those not interested in competitive events can present papers in the Undergraduate Paper Session, have their resumes reviewed, or attend a workshop with tips for job hunting. No other professional organization offers so much for their student membership. Student members typically make up 25% of the attendance at our Annual Meetings.

The Student Activities Committee, formerly known as Student Affairs, is a shining example of SRM member involvement and interest. The committee was the first to utilize an "open membership" type of structure. This was not because of any concerted effort; rather, the large, open membership of this committee grew out of necessity. The committee offers everything from 8 competitive activities for students as well as a significant scholarship, 5 days' worth of activities for high school students from many SRM Sections, and workshops on perfecting a resume and finding a job, to a paper session and the ever popular "Tapping the Top" student–professional interaction. All of these activities demand dedicated volunteers to plan, carry out, compute scores, and solicit donors for awards.

Flashback to 1989. The scene is the Student Affairs Committee meeting in Billings, Montana. Looking back, it is easy to see that this tense meeting of the committee was a turning point for not only Student Activities, but the SRM committee structure in general. The committee consisted of 9 "regular" members, 3 appointed annually, serving for 3-year terms. Additionally, there were "subcommittee chairs" for the various activities, including the Plant ID Contest, High School Youth Forum, and University Chapter Display Contest. Section Student or Youth Activities Chairs were also invited as "ad hoc" committee members. The committee was deep in discussion again. Should the subcommittee chairs be allowed to vote on items before the committee? Some felt the vote should be restricted to those members appointed by the SRM President while others felt the subcommittee chairs represented continuity on the committee and knew the activities better than the appointed members. Fortunately, subcommittee chairs were granted voting rights.

Those discussions seem as distant as the early days of our government when Aaron Burr and Alexander Hamilton, Vice President and Secretary of the Treasury of the United States, settled their differences with a duel! The Student Activities Committee no longer has the luxury of dwelling on such minute matters as who can vote. The direction today is keeping the many activities and opportunities on the path of excellence. The number of activities and opportunities available to student members attending an Annual Meeting has grown by leaps and bounds. Committee members consist of the various subcommittee chairs as well as others who are attracted to the energy and infectious enthusiasm of the students and their functions. Many subcommittee chairs are young SRM members in the early years of their careers. Their dedication to SRM and Student Activities is extraordinary. They are often at SRM meetings "on their own dime" and are juggling commitments to young families to be able to participate. Those members pushing strollers and chasing toddlers at Annual Meetings are likely involved in student activities, many "giving back" to the activities that boosted their educational and professional experiences.

The Student Activities Committee became the place within SRM to which new college graduates who wanted to become involved in SRM activities gravitated. They brought new ideas and many new activities were born. More student activities at the Annual Meetings meant the committee

needed more subcommittee chairs and members to plan and carry out these activities. The committee grew quickly beyond the "traditional" structure. Subcommittee chairs recruited more members for their activities. SRM leaders including Past President Jack Bohning let the committee control its own destiny. Past President Rod Heitschmidt directed the committee to continue with what had become a very open membership structure. He further pointed to the successes of the Student Activities Committee and encouraged other committees to open their memberships as well.

The growth and success of the Student Activities Committee would not have been possible without the continued support of the SRM Officers and Directors. By giving the committee the reins and stepping out of the way, they facilitated the explosion of opportunities available for our student members. Several quiet donors have enhanced activities when financial support was needed as well. Although some SRM discussions in recent years have focused on a "doom and gloom" prophecy for SRM and the profession of range management, working with the youth of SRM has been inspiring. The future of SRM is in capable hands.

Author is a past Chair of the SRM Student Activities Committee.

Masonic Range Science Scholarship

By Jennifer Pluhar

"A group of SRM members who are Masons want to give a scholarship to a student studying range science," said Lorenz Brademeier after he approached me in the Trade Show at the 1989 SRM Annual Meeting in Billings, Montana. Before I could react, he handed me a check for $5,000 and said, "We plan to raise more for the scholarship fund." As Chair of the Student Affairs (now Student Activities) Committee, nothing had prepared me for his generous offering. I certainly wasn't going to dissuade his interest and quickly said something about how happy the committee would be to hear this news and that we would begin working on a means of awarding the scholarship immediately.

Initial guidelines provided by Mr Brademeier, as developed by the original donors, included plans to offer the award to "a high school graduate with an interest in range management and a desire to attend college." Further, the donors wanted to focus on a student who had demonstrated "leadership qualities and high moral standards" and had financial need. With these basic guidelines, the Student Affairs Committee worked with Pete Jackson, then SRM Executive Vice President, to hammer out criteria and a method for making our first Masonic Range Science Scholarship award at the 1990 Annual Meeting. Although the committee had one scholarship in its history, the K.S. "Boots" Adams Scholarship, we struggled to develop a firm foundation upon which to build the Masonic Range Science Scholarship. The Boots Adams Scholarship was more of an internship for a range student, and involved spending the summer on a ranch getting some "hands-on" experience.

We had a dual purpose: to develop a means to award the Masonic Range Science Scholarship and a means to raise donations to the corpus of the scholarship fund. The guidance of several wise Masons led to the scholarship being advertised through the National Association of Conservation Districts and the Soil and Water Conservation Society, as well as through SRM. An applicant could be "sponsored" by a member of any of the 3 organizations.

We finally settled upon offering the scholarship to a high school senior, developed a basic application form, and asked applicants to submit 3 reference letters and a letter stating why they wanted to study range science. Sections were encouraged to urge their best and brightest youths to apply.

I cannot recall how many applications we received that first year. I do, however, vividly recall awarding the tidy sum of $346 to the first Masonic Range Science Scholar, Shelly Susanne Smith of El Paso, Texas. Shelly planned to study range science at New Mexico State University. I had the pleasure of awarding this scholarship to Shelly in front of her class at NMSU. She was thrilled with the award.

Our fund gradually grew. In 1993, we were able to award a larger sum of money. We realized it was necessary to develop a more structured application and judging process. Each section of today's scholarship applications is scored. As many as 15 judges review the applications and score each applicant, following the same guidelines. After the high and low scores are dropped for each applicant, the scores are tallied and a recipient selected.

The Masonic Range Science Scholarship has been in the $6,000–$8,000 range annually for several years now. Significant growth from $346 only 15 years ago! The committee and donors have toyed with the idea of making more than one award, but have decided to stick with one significant award at this time. Masonic Range Science Scholars receive their funds through their colleges, spread out over 6 or 8 semesters, the remainder of their college careers. They must maintain a 3.0 grade point average and continue to major in range science or a closely related discipline. As of 2005, over $56,000 has been awarded.

Robin Morris, Masonic Range Science Scholar (2003), a junior at Texas Tech majoring in range science, has enthusiastically tackled her chosen major, participating on the plant identification team and in other activities available to students at the Annual Meetings. Robin lists the Masonic Range Science Scholarship as one of her proudest accomplishments. Certainly the Masonic Range Science Scholarship is recognized as a significant award for a student studying range science or a closely related field. It is the dream of the donors and the committee to have many more students wear the prestigious label of "SRM Masonic Range Science Scholar" in the years to come.

Author is Cochair of the SRM Student Activities Committee's Masonic Range Science Scholarship Subcommittee.

Editor's Note: The 2005 Masonic Range Science Scholarship winner is Shiloh Long. See photo in Youth Awards, p 55.

Managing Chinese Grasslands

Adversities of individual lease.

By Suman K. Rai

Individual leases of large parcels of resources, like grasslands, can adversely impact the livelihoods of traditional pastoral groups. A typical example is the Chinese policy of parceling grasslands into individual leases. The rationale offered for leasing to individuals is that communal management of grasslands in China has led to their haphazard exploitation. The policy makers argue that this has resulted in the degradation of grasslands. The lease policy assumes that individuals will introduce effective management practices to counter grassland degradation.

A Brief History of Chinese Grassland Management Policy

The Communist Party's victory in 1949 was a key turning point in the overall history of China. Following this, grazing areas became more restricted as grasslands were increasingly the target of development for crop agriculture. In 1956, with the introduction of the People's Communes, there was a radical change in the management of grasslands. All grassland was nationalized as collective property. The ownership of grasslands was brought under the production teams (equivalent to the current natural village) of the communes (equivalent to the current township level of administration which comprises many natural villages).

During the years following the introduction of communes, livestock numbers dramatically increased. This was mainly because communal policy encouraged production teams to increase livestock through reward systems. For instance, in Aksai County in Gansu Province, research conducted by Bedunah and Harris[1] reported that livestock numbers increased from 20,000 in 1953 to more than 120,000 in 1965. Increasing livestock numbers, combined with development of grassland into cropland, created an unprecedented pressure on the grasslands. The exploitation of grassland in this way was largely perceived to have adversely affected the capacity of grasslands to self-regenerate. There is little doubt that land use changes during this period resulted in the degradation of grasslands.

While grassland degradation continued, between 1950 and 1961 an estimated 30 million people died due to a large-

A persistent problem is that of farmers trying to convert arid grasslands into cropland. Photo courtesy of Michael R. Frisina, Xinjiang, 1990.

Pastoralism persists in many parts of China, as it does on these lush grasslands in northeast China near Russia. Photo courtesy of Michael R. Frisina, Chen Bar, 1993.

scale famine. This led the government to encourage smaller collectives, which lasted until the late 1970s. By 1978 a process of decollectivization had begun and by the mid-1980s China had introduced what is known as the Household Responsibility System, which allowed greater individual autonomy with respect to farm management. The early success of this rural reform soon found its way into the management of grasslands.

To start with, livestock held in the communes were distributed for ownership to households. However, a general attitude soon developed among policy makers that privately owned livestock grazing on public land was exacerbating grassland degradation. With the adoption of the Grassland Law of 1985 a significant turnaround took place in the future management of grasslands. The Grassland Law of 1985 stated "Grasslands under ownership of the whole people, those under collective ownership, and those under ownership by the whole people that are assigned to collectives for long-term use may be contracted by collectives or individuals…."

The De Facto Management of Chinese Grasslands Since 1985

According to official statistics, the contracting of grassland user rights to individual households is almost complete in most of the major pastoral provinces in China. Despite the claim by Chinese officials that contracting of grasslands has been widespread, there are several reports of the existence of communal pastures and the persistence of pastoral herding communities. What is evident is that the official data on the proportion of grassland contracted need to be treated with caution as the data may not be accurate.

Pastoralism persists in many parts of China, especially in Tibet and Inner Mongolia. According to Dan Miller,[2] who has worked for several years on Chinese grasslands, one reason Tibetan pastoralism has flourished is that they have not had to compete with farmers trying to convert grasslands into croplands. This is contrary to the understanding of the policy makers that grassland reclamation for cropland was a widespread phenomenon. Also, pastoralism has the tendency to persist in prairie and desert conditions where precipitation is low and productivity of pastures modest. Parceling of grasslands, especially in dry areas where precipitation is low, may not sustain livestock herds. This compels pastoral communities to continue with their traditional pastoral grazing practices.

Despite attempts to allocate grasslands through individual leases, collective and group tenure arrangements continue to persist across most of the region. In many parts of China de facto arrangements are such that summer pastures are used in common by the whole administrative village, whereas winter pastures are used in common by only the smaller natural village unit. Overall, the trend has been to allocate summer and summer–autumn pastures to groups whereas winter and winter–spring pastures are allocated to individual households. In some cases the later migrants are known to have been awarded the least-preferred grasslands whereas early migrants received the more prized spring ranges in the lowest elevations.

Impacts of the Household Responsibility System for Grasslands

The Household Responsibility System for grasslands means that grassland parcels are allocated on an individual basis. However, fair allocation on an individual basis is a complex process. Resource quality and productivity varies significantly across grasslands. The quality of a parceled patch may be very different than that of another patch of grassland. There have been disputes over resources and lease boundaries. Cases of breaking down fences meant to exclude other users are not uncommon. The contracts issued also do not specify the precise location of pasture land. Because of such ambiguities, herder communities are reluctant to parcel out grasslands into individual leases.

Poor livestock management practices are responsible for the degradation of the grassland resource over large areas. Photo courtesy of Michael R. Frisina, Inner Mongolia, 1990.

Some grasslands are deferred from grazing until late summer, when the current year's growth is harvested as hay for winter livestock feed. Photo courtesy of Michael R. Frisina, Chen Bar, 1990.

On the other hand, according to the reallocation grassland policy, 40% of the grassland was reallocated to households according to their number of animals. The policy actually helped the households with large animal holdings get more grassland than the poorer households with smaller animal holdings. Richer households with large animal holdings have appropriated larger pastures and there is no provision to compensate poorer households whose animal holdings are smaller.

The parceling of grasslands has not only meant unfair distribution of grasslands but has also affected access to and distribution of other types of resources. One of the important changes is access to water. In mountainous areas water is generally found either at the extreme top (in the form of snow and glaciers) or in deep valley bottoms, while most settlements are in between the mountain tops and valleys and have no regular water supply systems. The grasslands of China are no different, and water is often scarce and poorly distributed. Water that was available to grassland pastures previously under communes fell into privately leased holdings and thus restricted access to other community members.

In mountainous areas, animal husbandry is a significant part of local economies. Photo courtesy of Michael R. Frisina, Tian Shan, 1990.

In mountainous areas, especially in highlands, animal husbandry is a significant part of local economies. The dependence on natural resources like grasslands is generally high and the implications of grassland degradation are more severe on poorer households. Further, the curtailment of access is more serious in the case of grasslands because they have, by nature, relatively low productivity per unit of area. Changes in management of grasslands are more likely to adversely impact the poorer members of the community.

Contrary to the expectation that individual leases would improve grassland quality in China there is evidence that the opposite might be true. Bedunah and Harris, during their research in 2002, found that Aksai County officials and herders in Gansu Province believe that grassland conditions have actually deteriorated under the individual lease policy. This feeling prevailed despite the fact that in the Jianshe Township of Aksai County, where Bedunah and Harris conducted their fieldwork, out-migration had taken place because the majority of the Kazakh herders migrated back to Kazakhstan following its independence in 1991. Further, researchers like Elinor Ostrom[3] from the Indian University have convincingly argued that both government ownership and privatization of large blocks of natural resources, like grasslands, can be associated with greater degradation compared to their management by communities together as common property.

The Grassland Law of 2003

The new Grassland Law of 2003 went into effect in March 2003. One of the key lessons from the past which the new law has dealt with is the ambiguity of contracted grassland boundaries. Article 14 states that contracted grassland "shall include both parties' rights and duties, the exact area and the boundary lines, grade of grassland…." In the past, boundary problems were a major source of conflict. Additionally, the new law places more emphasis on water resource planning and improved access to water. The grassland administrative department is also charged with assessing grassland quality and making scientifically based allocations. Further, a Grassland Statistical Data System will be developed to provide data concerning the size, grades of grasslands, grass production, grazing capacity, and number of livestock on a regular basis to improve management of grasslands.

On the whole the Grassland Law of 2003 continues to maintain a socialist market approach to contracting grasslands, as did the 1985 law. Although fences are a costly option, when necessary they will be used to prevent trespass onto individual leases. Government officials have indicated that due to lack of funds it is not possible to continue fencing the individually contracted grasslands. Article 28 of the new law states that "The people's government of the county level shall support and advocate and guide the farmers to fence grassland, store forage grass, confine livestock, and

build other living and production facilities for settlement of herders." The law further advocates for private or organizational investment to develop the grasslands. It clearly bases the policy on the perspective that "those who make investments shall enjoy benefits."

Conclusion

China's policy perspective in the management of grassland is based on the premise that private ownership leads to improvement of the quality of grassland. While on the one hand grassland degradation continues, on the other, the complexity of fair allocation of grassland has introduced several factors that have adversely affected the livelihoods of pastoral communities. There is a need to understand existing traditional practices of managing grasslands so as to strengthen and build on them. Where changes have already taken place through individual lease, adaptations will need to be made to introduce aspects of group management practices. While doing this, the participation of minority groups like Mongols, Kazakhs, and Tibetans (who are the traditional pastoral communities) in policy making forums will need to be ensured. The perspectives of policy makers assume that sociocultural systems are separate from natural ecosystems, and clearly the latter has received more attention than the former. There is an urgent need to strongly integrate sociocultural systems into the perspectives guiding the management of China's grasslands.

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Riparian Grazing Ideas and Alternatives

When cattle graze in riparian areas, creek fencing should be the last choice.

By Chuck Perry

Management of riparian areas and stream channel features to maintain their development, diversity, and condition has become the focus of much attention. Minimizing livestock grazing impacts to these areas challenges many ranchers and becomes critical when dealing with wildlife or fish habitat and water quality issues. The most commonly suggested alternative, stream fencing, may not be either feasible or the best alternative in many cases. The list below discusses some grazing management ideas that do not always include permanently fencing out the stream and riparian area. These ideas are based on my observations of ranchers' innovations during the past 30 years.

Grazing in stream bottoms does not have to be destructive. But it does need to be carefully managed to maintain or improve riparian features. Note dense vigorous herbaceous vegetation in the floodplain and developing woody vegetation along the stream channel. File photo courtesy of Wayne Leininger.

Structural Improvements

1. Fencing must remain as a possible alternative. However, **it should be the last choice,** after every other management option has been considered. If you choose fencing, it should not be built just outside the riparian area. This will lead to additional problems and costs. Build it as topography dictates, but well out of bottoms and away from any area that may be flooded in spring. This will protect the fence and reduce maintenance. Consider using smooth wire to ease construction and reduce maintenance. Temporary fences will sometimes work for short grazing periods or to protect specific sites.

   Fence to create riparian pastures that can be specifically managed and possibly used for short periods when stream damage will probably not occur, for example in early spring (see below). The fence will protect stream and riparian features most of the time, but will also allow some managed grazing use for rancher benefit and site enhancement.
2. Develop off-stream livestock water in as many places as possible within each pasture with a riparian and stream damage concern. Make these sites easy for animals to use:

moderate or gentle slopes leading into the watering site, a flat gravel or nonmuddy area around water, and a tank or other water handler that keeps water clean; for example, possibly provide a shade structure near the tank. Make off-stream watering sites more convenient, attractive, and easier to use than stream water.

3. On streams with steep or open dirt banks, which are vulnerable to livestock damage during muddy conditions, create a "hardened crossing." Develop a gentle slope down to the stream on both sides. Dump rock on these stream approaches and across the stream. Use large enough material that high water will not move it in spring, but small enough that it makes a good surface for animals to walk on. This will do several things: ease livestock access to the stream at that point, keep the water clean, prevent silt and erosion, allow good animal footing to drink or cross, and minimize bank trampling in other areas. When putting rock into a stream, **do not create a fish passage problem or restrict water flow.** It's usually better to **keep the stream bottom elevation the same.** Build "hardened crossings" at sites animals currently use to water or cross a stream. Space them at about one-fourth- to one-half-mile intervals. **Get proper permits!** If a stream channel has rocky shores that currently limit animal access, "hardened crossings" may not work. However, if watering sites are muddy, some rock may improve both water quality and livestock preference. In the right situation, "hardened crossings" are usually low cost, result in improved riparian vegetation, and help keep animals away from vulnerable stream banks in other areas, without fencing.
4. The reverse of hardened crossings uses a culvert to bridge a stream and thus reduce siltation and erosion. This may need to be combined with off-stream water. Providing an easy way for cattle to cross a stream without needing to negotiate steep banks or mud can result in protecting the stream and riparian vegetation. Use a large enough culvert to handle spring flows. Permits for this action may be required.
5. On wooded, semiwooded, or densely brushed streams, a mechanical barrier may work in places where animals are causing damage. Trees or logs felled along a stream must be large enough that animals cannot easily step across them and overlapped enough that the animals cannot just go around the barrier. They must be situated to prevent animals from walking along the stream bank. If a stream has spring floods, these barriers will probably move or change, so they may not be a permanent arrangement.

Planning

1. Pastures with creeks and riparian areas susceptible to livestock damage should be grazed in the spring. Early spring is usually better than late spring. Upland forage in the pasture has high palatability in early spring, days are cooler, animals require minimum water, shade is not a factor, and insect populations are low. When early use is combined with riding it may be fairly easy to keep animals away from streams. Winter use may also work well. Leave enough stubble height to trap sediments during high spring flows. Practice fairly rapid rotation through pasture systems with streams. Try to prevent long, concentrated grazing use near streams at any time. Develop a management strategy that results in higher plant vigor, rapid plant regrowth, and higher forage production in upland areas also.
2. Develop a plan that provides for grazing streams and riparian pastures in early spring, and grazing pastures with other water sources in late spring and summer. If this is not possible, then try planning for short grazing use periods in units with susceptible riparian areas. Animals are very difficult to keep away from stream or riparian sites in summer or a dry fall. Short grazing periods will result in adequate stubble height in riparian areas and allow strong, rapid forage regrowth. If necessary, rearrange pasture fencing or use temporary fencing to allow some type of rapid rotation management.
3. Locate both salt and nutrient blocks well away from a stream. Ideally these should be put in areas of high quality and plentiful forage and not too distant from an off-stream water source. Try to create conditions that are desirable for livestock so they will want to go there. However, don't leave animals in one location for long periods. This will overgraze the site, reduce plant vigor, slow regrowth, and result in less total forage. Move nutrient blocks and salt on a regular basis to encourage upland grazing, protect site forage production potential, and keep animals gaining. Provide hay or some alternative food source when forage is low and palatability is poor. At times this may be impractical. However, in certain situations and when resources are available, this may encourage animals to remain longer at a site that meets their needs in summer and not move back to riparian areas as quickly.

Animal Management

1. Riding, to move animals away from water, works in many cases. However, it's more than just moving animals away. They must be moved to areas with abundant and palatable ungrazed or regrown forage that is more attractive than sites near water. It also helps to have off-stream water available. If every time a rider moves animals they go to good forage sites, they will learn to seek out these upland areas. Riding does little good if animals are moved only a short distance away from water and they don't find desirable conditions. In this situation, they will be back to the stream very quickly. Riding must be done often to be effective, depending on conditions. It may take several years, but animals can be conditioned to seek good upland forage areas.
2. Burn, mow, intensively graze (many animals for short time), or in some other way remove some old, ungrazed forage on suitable sites away from streams. This will make palatable regrowth more accessible and desirable for livestock and attract their use. Do not allow continual overuse of areas away from a stream that you want animals to select.

Overgrazing will reduce plant vigor and slow regrowth, even into the following year. Plants grazed lightly to moderately will produce rapid regrowth and more total forage.

3. Fertilizer applied in fall or early spring may increase the production, nutrition, and palatability of forage plants and extend their green period later into spring or early summer. These effects could attract animals away from streams, even when other upland forage begins to mature. Treat the best areas; they need good soil, high forage production potential, good perennial forage plant cover, minimal weed problems, and enough precipitation or soil moisture for plant growth and they must be easily accessible to livestock.
4. Consider using animal selection as a tool. Remove individuals that constantly hang around the creek and keep those that tend to graze the uplands more readily. This may be a slow process but it can work over time and may result, long term, in much less effort in managing livestock to minimize riparian impacts.
5. Consider keeping some older animals with each herd. These animals know where off-stream forage and water sites are located, and will tend to lead the rest out to upland areas they have used before. Also, if yearlings are part of a ranch program, try using these younger animals in pastures with riparian zones. Their ability and inclination to move around and cover the whole pasture may avoid some concentration problems. These animals may also be easier to train, by herding, to seek out high-quality forage away from streams.

Watch and Learn

The best method of all is to carefully **observe conditions and think.** How are current grazing practices affecting stream and riparian conditions? If animals concentrate along streams and are causing stream bank damage problems, what might be done to change this? Carefully lay out goals for pastures with stream and vulnerable riparian areas. Then inventory the current situation, the factors at work, and the resources available to make changes. This will define where you want to go and what there is to work with. Consider traditional cattle management methods, but don't be constrained by them. Also, consider the ideas listed above and other innovative possibilities no matter how impractical they appear at first. Try management practices separately and in various combinations that seem to fit your conditions, and that might keep animals from concentrating along a stream. Monitor the results; annual photos are an easy way to objectively follow changes. Use this information to make additional changes or adjustments that may work better. Keep asking yourself if your management practices are working and how they can be made more effective to meet your goals. These lists are only a starting point to stimulate thinking. Ranch managers trying their own grazing management alternatives will add many ideas and practices to these suggestions.

Within the context of site features, conditions, resources, and time, what works best to accomplish both business and natural resource objectives will probably differ from site to site. Select actions that fit individual criteria and develop productive pasture conditions that result in other multiple benefits. Learn about other ranchers' experiences and discuss ideas or possibilities with knowledgeable people; a positive approach to the problem may emerge. However, in order to have a high probability of success, the final decision to implement practices needs to be made by the individual rancher. Monitor management action results and be ready to adjust, when necessary, to move toward your goals.

Editor's Note: Chuck Perry is an SRM Certified Range Management professional who has worked for the Washington Department of Fish and Wildlife and is now in private rangeland consulting. The information in the manuscript was obtained from ranchers and observations over 35+ years.

Cattle and Wooded Draws: A Second Look

Vegetation monitoring shows that healthy woodlands and cattle can coexist.

By Susan E. Boettcher and W. Carter Johnson

Wooded draws or "coulees" in the western Dakotas are associated with the steeper portions of large river valleys such as the Missouri, Cheyenne, and White and their main tributaries. These woodlands are a mixture of green ash, hackberry, American elm, cottonwood, and Rocky Mountain juniper. All but juniper also dominate nearby riparian habitats. Shrub species usually outnumber tree species and are dominated by chokecherry, Saskatoon serviceberry, wild plum, buffalo currant, fragrant sumac, and western snowberry.

The naturally occurring wooded draws of western South Dakota were decimated during homesteading. The combination of heavy woodcutting, severe overgrazing, cultivation of steep land, and the 1930s drought left a deforested, eroded, and ecologically impoverished landscape.

Consolidation of the many failed small farms into large ranches initiated the healing process. For example, a 10,000-acre parcel of land farmed by 37 families in 1890 was consolidated into one ranch (the Mortenson Ranch) by the 1950s (Fig. 1). Cultivation ceased except on flat tablelands, grazing intensity was reduced, and trees began to reappear in the draws.

The ranch's riparian forest along the lower Cheyenne River was permanently flooded and destroyed by Oahe Reservoir (Missouri River) in the 1960s. The loss of this forest for overwintering cattle and sheltering of spring calves redirected attention to the restoration of wooded draws as replacement protective habitat. An expansion of trees and shrubs followed management changes, which included cross-fencing, adoption of a rest–rotation grazing system, and rapid movement of cattle through about 20 pastures averaging 500 acres each. Riparian areas and wooded draws have been utilized primarily as wintering and calving areas during the nongrowing season.

Figure 1. Location of the Mortenson Ranch (▲) in South Dakota.

Permanent photo points and vegetation transects at the Mortenson Ranch were established in the early 1990s and revisited in 2000 to assess the vigor and rate of spread of vegetation in wooded draws. This paper reports those findings.

Site and Data

The Mortenson Ranch is located in Stanley County, South Dakota, near the confluence of the Cheyenne and Missouri rivers. The long and deep, east–west running Todd's Draw transects the property.

Vegetation transects and photo points were established in 5 draws (Fig. 2). Four of these were in Todd's Draw, 1 on a southern exposure and 3 on northern exposures, and a 5th was adjacent to the Cheyenne River floodplain with a western exposure. Three sampling transects were established in each draw. Each was placed perpendicular to the main drainage channel. Transects were extended to or beyond the upslope limit of woody vegetation.

Trees (ie, stems > 2.4 inches in diameter at breast height [dbh]) and saplings (ie, stems of tree species < 2.4 inches dbh and > 3.3 feet tall) were sampled on belt transects. Shrub cover (%) was estimated along the belt transect centerline.

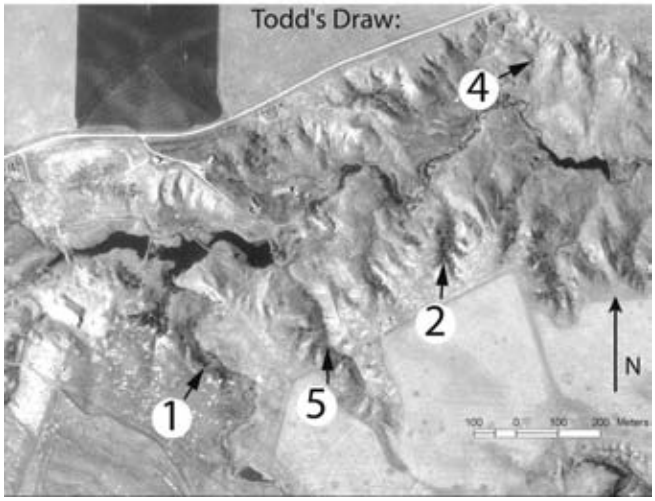

Figure 2. Location of 5 study sites at the Mortenson Ranch in west-central South Dakota.

Figure 3. Six years of woody regrowth at site 3.

Transects were established and trees were sampled in 1992. Saplings and shrubs were first sampled in 1993 and 1994. All sites were resampled in 2000 using the original protocol. Thus, the time interval between measurements ranged from 8 years for trees to 6–7 years for saplings and shrubs.

Big Changes in a Short Period of Time

Green ash dominated the draws at both sampling periods, making up about two-thirds of the basal area and three-quarters of the stem density. The other tree species (hackberry, peachleaf willow, cottonwood, Rocky Mountain juniper) were found in only 1 or 2 of the 5 draws, although juniper basal area did exceed that of ash in the west-facing draw.

Although tree composition changed little during the 8-year sample interval, the size and number of trees changed dramatically. Increases in basal area and in density were posted at all sites. The average increase in basal area across sites was a remarkable 82%, while the average density of trees increased more modestly, by 40% (Table 1).

Other woody species increased as well. Sapling numbers, dominated by green ash, increased by 56%, and shrub cover, contributed by 14 species, increased by nearly 40% (Table 1). Eighty percent of the shrub density was contributed by 4 species: wild plum, fragrant sumac, western snowberry, and

Table 1. Average changes in wooded draws at the Mortenson Ranch

Measure	Early 1990s	2000	% change
Tree basal area (foot^2/acre)	17	31	+82
Tree density (no./acre)	130	182	+40
Sapling density (no./acre)	326	510	+56
Shrub cover (%)	42	59	+40
Span of woodland (feet)	62	72	+16

chokecherry. Woodland expanded upslope along nearly all transects by an average of 16%. Woodland herbs also occur in wooded draws, but these were not sampled.

Impact

Recovery of wooded draws at the Mortenson Ranch occurred in 2 phases: 1st with land consolidation and halting of most woodcutting and farming beginning in the 1930s, followed by cessation of season-long summer grazing in wooded draws beginning in the 1970s. The new remeasurement data show that trees and shrubs are growing rapidly and more densely, and are expanding their coverage in draws (Fig. 3).

The current vegetation of these draws is similar to that described by explorers and surveyors in the 1800s before significant cutting and cultivation began. All woody species present in samples are native to South Dakota.

Use of these woodlands to overwinter cattle and for spring calving has not curtailed their growth and expansion. Slower expansion should be expected in the future as woody plants migrating upslope meet increasing moisture limitations. Droughts, such as the one currently in progress in western South Dakota, may thin out woody cover. Future remeasurement of the permanent transects at the Mortenson Ranch can identify when wooded draws have fully recovered from settlement and can detect expansion or retreat in woodland extent caused by weather extremes.

Authors are Research Associate and Professor of Ecology, South Dakota State University, Brookings, SD 57007. *Funding was provided by the South Dakota Agricultural Experiment Station (Project SD00048-MS) at South Dakota State University.*

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59th Society for Range Management Annual Meeting and Trade Show

Rangelands to Rain Forests: A Journey Through British Columbia

By Greg Tegart and John Buckhouse

In keeping with our theme, Rangelands to Rain Forests, we are offering a glimpse of some of the extraordinary ecosystems, regions, vistas, wildlife, and ecological zones that are found in the Pacific Northwest and specifically in British Columbia.

More information concerning these meetings can be found on the SRM Web site, in the monthly updates of the Member's Resource News (monthly since March 2005), and in *Rangelands* (each issue since June 2005).

The Pacific Northwest Section of the Society for Range Management is composed of the states of Washington and Oregon and the Canadian province of British Columbia. The 59th Annual Meeting will be held February 11–17, 2006, in Vancouver, which is in southwestern British Columbia.

Atop the Rocky Mountains lies the Continental Divide—the southern portion of the border between Alberta and British Columbia. The Canadian Rockies are known for their deep valleys, high peaks, and glaciated landforms. On their western edge is the East Kootenay trench, sometimes referred to as the Serengeti of the north, as beautiful as it is diverse.

The wonderful grasslands of the Nicola, Kamloops, and Cariboo regions may be experienced as one travels west. These marvelous grasslands are headquarters to numerous ranches and include the world famous Douglas Lake Cattle Company and Gang Ranch.

In the higher elevations, grasslands and timber merge, forming attractive and productive forested grasslands.

The SRM meeting logo features the trail boss and an outline map of the Pacific Northwest Section.

Management issues of encroaching Douglas fir, lodgepole pine, and ponderosa pine into certain grasslands brings up thoughts of fire ecology, disturbance ecosystems, and pyric subclimax plant communities.

Farther west, one gets into more mesic and utic systems, which are currently home to much of the dairy, nursery, and greenhouse agricultural industries of British Columbia.

High-elevation lake near Commander Glacier.

Relay Creek.

East Kootenay Trench, Columbia Lake.

Nicola grassland near Merritt.

As one approaches the coast of the Pacific Ocean, one enters zones of temperate rain forests. Huge trees, a variety of ferns, high rates of precipitation, and cool temperatures bring one into a world that only a small minority of the world's population has had the privilege to explore.

To the north, each of these systems blends toward the boreal forests, which extend north toward the boundary of British Columbia and Northwest Territories.

Throughout it all, the area teams with wildlife. Wild trout and salmon, bald and golden eagles, bighorn sheep, deer, elk, mountain goats, and caribou have established their niches and thrive.

British Columbia's license plates boast the phrase "Beautiful British Columbia." This is not an exaggeration!

The Pacific Northwest Section of the Society for Range Management is proud and pleased to sponsor our 59th Annual Meeting. We have a marvelous meeting planned in an extraordinary setting. This is one meeting you will not want to miss—in fact you will want to bring your family as well!

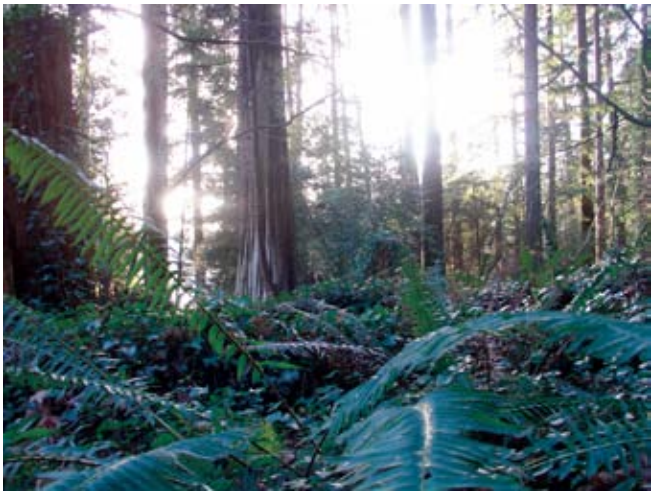
Gang Ranch.

Tatla Lake.

Fraser River west of 100 Mile House.

Hamilton Commonage.

Douglas fir and pine grass.



Temperate rain forest.

Bighorn sheep herd, East Kootenays.

Moose with babies, Moyie River.

VIEWPoints

Sagebrush, Common and Uncommon, Palatable and Unpalatable

By E. Durant McArthur

I read with interest Jim Brunner's recent view point article[1] where he briefly traced the recognition of palatable forms of sagebrush. Jim's keen sense of differences in sagebrush taxa were first published more than 3 decades ago.[2] Jim's comments stimulated some thoughts of my own about the recognition, distribution, and palatability of sagebrush taxa. I'm sharing some of those thoughts here.

Sagebrush is an icon of the American West.[3] However, it is a symbol that stirs a range of emotions among rangeland managers.[4–7] An appreciation for the values of sagebrush ecosystems has been a long time coming and, unfortunately, is juxtaposed with a fragmentation of that resource over much of its historic range.[4,5] That is not to say that there are areas that may not need management, including reduction of sagebrush density, but more often, in my opinion, the weightier need is for restoration and enhancement.

Sagebrush ecosystems are varied and rich in indigenous and multitudinous forms of life. Some forms are obligate to their sagebrush habitat, eg, greater sage-grouse, Gunnison sage-grouse, pygmy rabbits, sage thrasher, and sage sparrow.[4,5]

Brunner[1] pointed out that sagebrush is diverse in form and in its acceptance as forage for animals (palatability). Some taxa are common; others are not. Big sagebrush is the central and most important species to the group that forms its own portion of the large genus *Artemisia*—the subgenus *Tridentatae* (Table 1). This group is composed of wholly western North American endemics, although *Artemisia* in general, through representation of its other subgenera, occurs widely around the world. I believe there are 6 kinds (subspecies) of big sagebrush. Three of these are common throughout the distributional range of the subgenus and species, which is nearly the same. The geographic range of the subgenus is only slightly larger than that of big sagebrush itself, to the northeast by silver sagebrush (*Artemisia cana*) and to the southeast by Bigelow sagebrush (*A. bigelovii*).[8] The common subspecies are basin, mountain, and Wyoming big sagebrushes, respectively, the subspecies *tridentata*, *vaseyana,* and *wyomingensis*. These subspecies each have distinctive morphological differences and habitat preferences but can be distributed in close proximity.[9] The distribution of basin big sagebrush in particular is highly fragmented because the deep, well-drained soils that it prefers are prime agricultural and urban lands. Mountain big sagebrush is sometimes divided into 2 varieties based on the number of flowers per head. The common mountain big sagebrush east of the Cascade–Sierra axis is sometimes termed variety *pauciflora* to contrast it with the plants with larger flower heads that occur at higher elevations and latitudes (variety *vaseyana* of ssp. *vaseyana*). Both are quite similar, and I am comfortable in calling both "mountain big sagebrush." The recognition of Wyoming big sagebrush has expanded widely during my career. It was not described until 1965.[10] I well remember my introduction to bona fide Wyoming big sagebrush. It was at the field trip of the 1973 Wyoming Shrub Ecology Workshop held in Pinedale. Alan Beetle, who with his student Alvin Young had described the subspecies, led the field trip to the type location. Before that time, my experience with what I thought was Wyoming big sagebrush had been with what has subsequently been formally described as Lahontan low sagebrush (*A. arbuscula* ssp. *longicaulis*).[11] My mentor Perry Plummer had many accessions of sagebrush growing at the Snow Field Station in Ephraim, Utah, among which were accessions of Lahontan low sagebrush, which had been collected as seedling transplants from northwestern Nevada as "widelobe" with the sobriquet "an ecotype of Wyoming big sagebrush" from Alan Beetle through Jim Brunner. After I had learned what typical Wyoming big sagebrush was really like at the Wyoming Shrub Ecology Workshop, I saw that it was widely distributed, but previously unrecognized, in many locations. Others have recognized this wide distribution as well; published studies recognize it in 11 states.[12,13] It is always tetraploid (has 4 sets of chromosomes), whereas basin and mountain big sagebrush are usu-

Table 1. Sagebrush (subgenus Tridentatae) taxa (species and subspecies) with their general distributions and site adaptation

Species	Subspecies	Distribution and site adaptation
Low sagebrush (*Artemesia arbuscula*)	Low sagebrush (*arbuscula*)	W WY to S central WA and N CA on dry sterile, rocky, shallow, alkaline, clay soils
	Cleftleaf sagebrush (*thermopola*)	W WY, N UT, and E ID on spring-flooded, summer-dry soils
	Lahontan low sagebrush (*longicaulis*)	NW NV extending into adjacent CA, OR, and ID on soils of low water-holding capacity and shallow depth usually around and above the old shoreline of Lake Lahontan
Coaltown sagebrush (*A. argillosa*)		Jackson County, CO on alkaline spoil material
Bigelow sagebrush (*A. bigelovii*)		Four-corners area extending to NE UT, SE CA, and W TX on rocky, sandy soils
Silver sagebrush (*A. cana*)	Bolander silver sagebrush (*bolanderi*)	E OR, W NV, and N CA in alkaline basins
	Plains silver sagebrush (*cana*)	Generally E of Continental Divide, Alberta, and Manitoba to CO on loamy to sandy soils of river and stream bottoms
	Mountain silver sagebrush (*viscidula*)	Generally W of Continental Divide, MT, and OR to AZ and NM in mountain areas along streams and in areas of heavy snowpack
Alkali sagebrush (*A. longiloba*)		SW MT, NW CO, W WY, N UT, S ID, N NV, and E OR on heavy soils derived from alkaline shales or on lighter, limey soils
Black sagebrush (*A. nova*)	Black sagebrush (*nova*)	SE OR and S central MT to S CA and NW NM on dry, shallow, stony soils with some affinity for calcareous conditions
	Duchesne black sagebrush (*duchesnicola*)[†]	NE UT on reddish clay soils of Duchesne River Formation
Pygmy sagebrush (*A. pygmaea*)		Central NV and NE UT to N AZ on calcareous desert soils
Stiff sagebrush (*A. rigida*)		E OR, W central ID, and E WA on rocky scablands
Rothrock sagebrush (*A. rothrockii*)		E CA and W NV on deep soils along forest and meadow margins in Sierra Nevada and outlying mountain ranges
Big sagebrush (*A. tridentata*)	Parish big sagebrush (*parishii*)	Los Angeles basin area on deep soils in chaparral and saltbush habitats
	Snowbank big sagebrush (*spiciformis*)	WY, ID, CO, and UT in high mountains associated with A. cana ssp. viscidula but in slightly drier areas
	Basin big sagebrush (*tridentata*)	BC and MT to NM and Baja CA in dry, deep, well-drained soils on foothills and mountains
	Mountain big sagebrush (*vaseyana*)	BC and MT to S CA and N NM in deep, well-drained soils on foothills and mountains
	Wyoming big sagebrush (*wyomingensis*)	ND and WA to AZ and NM on shallower well-drained soils often underlain by a caliche or silica layer in valleys and on foothills
	Xeric big sagebrush (*xericensis*)	W central ID on basaltic and granitic soils

Table 1. Continued

Species	Subspecies	Distribution and site adaptation
Threetip sagebrush (*A. tripartita*)	Wyoming threetip sagebrush (*rupicola*)	W and S WY on rocky knolls
	Tall threetip sagebrush (*tripartita*)	E WA and W MT to N NV and N UT on moderate-to-deep well-drained soils

†Duchesne black sagebrush has been described at the variety level, but its rank is parallel to the subspecies of this treatment.
Sources: Modified from McArthur 1994[34] and Mahalovich and McArthur 2004[8] and references cited therein.

ally diploid.[12] Subsequent work in collaboration with Alma Winward led us to formally describe the wide-lobe taxon as *Artemisia arbuscula* ssp. *longicaulis*,[11] which is likely a stabilized hybrid between typical Wyoming big sagebrush and typical low sagebrush. It, *A. arbuscula* ssp. *longicaulis* or Lahontan low sagebrush, combines morphological, chemical, and cytological features of the 2 putative parents (the flowers of low sagebrush, the vegetative characteristics of Wyoming big sagebrush, and a combined hexaploid genome or chromosome complement).[11] Lahontan low sagebrush is a palatable taxon. It is often hedged. It has a relatively limited distribution—northwestern Nevada spilling into adjacent California and Oregon.[11]

The 3 other subspecies of big sagebrush that I recognize are of limited distribution. These are spicate or snowbank big sagebrush, ssp. *spiciformis*; xeric big sagebrush, ssp. *xericensis*; and Parish big sagebrush, ssp. *parishii*. Spicate big sagebrush is a high-elevation taxon of the Intermountain area, of probable hybrid ancestry (mountain big sagebrush × mountain silver sagebrush) that was formerly confused with Rothrock sagebrush.[14] Rothrock sagebrush (*A. rothrockii*) is also a high-elevation taxon but is limited to the Sierra Nevada and its outlier mountains and is a high polyploid, with hexaploid and octoploid populations, whereas spicate big sagebrush is diploid and tetraploid.[12] Xeric big sagebrush is limited in its distribution to west central Idaho; it is a tetraploid taxon derived from putative diploid ancestors, basin (*A. tridentata* ssp. *tridentata*) and mountain (*A. tridentata* ssp. *vaseyana*)[12,15] big sagebrush. In other places, basin big sagebrush and mountain big sagebrush have formed hybrid swarms without stabilizing into new polyploid taxa as they apparently did in the case of xeric big sagebrush.[16] Parish big sagebrush is a narrow endemic that occurs only in the Los Angles basin area of southern California. I had been inclined not to recognize it as a distinct taxon because it is similar to basin big sagebrush. However, I recently examined several natural populations. Its populations have distinctive, bimodal phenotypes with upright and droopy inflorescences and soft, pliable vegetative branches as opposed to the stiffer ones of the basin big sagebrush. In addition, these large, robust plants are tetraploid, whereas the large-basin big sagebrush are diploid.[12,17,18] The suggestion by Beetle[19] and Brunner[1] that Parish big sagebrush is widespread beyond the Los Angeles basin is, I believe, erroneous. Table 1 lists the general distributions and adaptation of sagebrush taxa.

Individual taxa have become established over geological time as populations filled niches made available through climatic, edaphic, and other environmental variables. These taxa were able to differentiate, I believe, through the processes of isolation and selection with new combinations made possible through hybridization and polyploidy, both of which are important in the *Tridentatae*.[12,16,20] Several extant *Tridentatae* taxa are thought to be of hybrid origin.[11,16,20] In many places, different taxa occur sympatrically or very close to one another. Hybridization can occur in these areas, although strong selection and ploidy (chromosome number) differences usually preclude speciation.[16] Winward[21] has suggested a rather widespread set of populations that he calls informally *A. tridentata* hybrid B (Bonneville big sagebrush), which occupy habitats between mountain and Wyoming big sagebrush and which might, in fact, be a distinct taxon. I and some colleagues[12,16,22] have argued that these populations might best be viewed as Wyoming big sagebrush that have been introgressed by mountain big sagebrush. All of these populations that have been examined cytologically share the tetraploid condition of Wyoming big sagebrush.[12,18]

As landscape-dominant plants, sagebrushes are important as the host organism and as habitat for many associated species, including species of special concern such as sage grouse, pygmy rabbit, sage thrasher, sage sparrow, Brewer's sparrow, and raptor species.[4,5,23] The relative palatability of sagebrush species to domestic livestock and wild ungulates generates much of the contrasting judgment by rangeland managers of its value on landscapes. Whereas it is not eaten much by cattle; mule deer, elk, domestic sheep, and antelope consume large quantities of sagebrush.[4,24–28] Individual populations, subspecies, and species have been shown to be preferred by different consuming animal species under both natural and controlled conditions. For example, studies have shown that:

- Mule deer prefer mountain big sagebrush and low sagebrush to basin and Wyoming big sagebrush and black sagebrush.[25,27,28]

- Greater sage-grouse prefer mountain big sagebrush to basin and Wyoming big sagebrush.[29]
- Domestic sheep preferred Wyoming big sagebrush to mountain and basin big sagebrush in one study[26] but preferred low sagebrush and black sagebrush to other taxa in another study.[28]
- Lahontan low sagebrush is a preferred taxon by browsing animals.[1,2,30]
- Black sagebrush (*A. nova*) is palatable in many circumstances to domestic sheep, antelope, and mule deer although often less palatable than big sagebrush.[27,28,31–33]

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SRM Section News

Watershed/Riparian Committee Contributes to 2005 SRM National Meeting

The SRM Watershed/Riparian Committee strives to develop symposia and technical sessions on state-of-the-art watershed and riparian topics for SRM Annual Meetings. For the 2005 Annual Meeting, the committee representatives decided to focus their efforts on interacting with the national High School Youth Forum (HSYF) delegates. Twenty-four high school youths from 12 states participated at the 2005 convention. Carol Engle spoke at the HSYF Professional Interaction Program on Monday night. Ms Engle spoke on careers available within the Forest Service and Bureau of Land Management, the kind of education needed, and her range background and motivation to work in resource management. After 6 speakers, a roundtable was conducted with the students asking probing questions of each of the speakers on different areas of resource interests.

During the Wednesday HSYF meeting, a 2-hour riparian workshop was conducted by Wayne Elmore, Janice Staats, and Jimmy Eisner. Wayne Elmore, retired team leader for the Interagency National Riparian Service Team, spoke at the beginning and end of the presentation. Wayne used the Bear Creek riparian recovery example and several other "before and after" slide sets to talk about important attributes and processes needed for riparian–wetland function. He engaged the students by asking them to predict what the "after" slide would look like, on the basis of seeing the "before" slide and hearing what grazing management changes had occurred. Jim Eisner, fisheries biologist for the Deschutes Resource Area–Prineville District BLM and a member of the National Riparian Service Team, discussed the multiple uses of riparian areas by people and wildlife. Janice Staats, hydrologist on the National Riparian Service Team, used the definition of Proper Functioning Condition to build the awareness that there are different types of streams, and that adequate vegetation, landform, or large woody material is needed to dissipate stream energy. The students interacted with the speakers by offering comments and questions throughout the presentations. Slides allowed the students to see riparian areas in several forms of proper functioning and functional-at-risk conditions and gave them the ability to discuss the various management practices that benefit riparian areas. The students' questions centered on information presented by the group; these questions indicated that the students were thinking into the future and beyond the presentation. Each of the speakers felt that both the students and the presenters had benefited by their interactions.

The SRM Watershed/Riparian Committee is active and engaged. If you are interested in participating we invite you to join us at our annual committee meeting held on Sunday at the SRM Annual Meeting. The 2006 SRM gathering will be held in Vancouver, British Columbia.

Prepared by Tamzen Stringham.

SRM Wildlife Habitat Committee

During the past year the SRM Wildlife Habitat Committee (WHC) has produced 3 newsletter issues. These and past issues are now available on the web (thanks to help from Ann Tanaka) at www.rangelands.org/wildlifehabitat/ (click on "newsletters").

For the 2004 SRM Annual Meeting in Salt Lake City, Utah, 3 symposia were planned, developed, and chaired on the following topics:

- Home on the range: aquatic conservation on working rangelands
- Invasives in riparian systems
- Managing landscapes to meet wildlife needs

At the 2005 SRM Annual Meeting in Fort Worth, Texas, 3 symposia were planned, developed, and chaired on the following topics:

- Using the farm bill for wildlife
- Energy development impacts on wildlife
- Safe harbor: helping landowners help endangered species

Over the past few years the WHC has been instrumental in generating ideas that led to 3 publications in 2004:

- Vermeire, L. T., R. K. Heidtschmidt, P. S. Johnson, and B.K. Sowell. 2004. The prairie dog story: do we have it right? *Bioscience* 54:689–695.
- Crawford, J. A., R. A. Olson, N. E. West, J. C. Mosley, M. A. Schroeder, T. D. Whitson, R. F. Miller, M. A. Gregg, and C. S. Boyd. 2004. Synthesis paper—ecology and management of sage grouse and sage grouse habitat. *Journal of Range Management* 57(1):2–19.
- McAdoo, J. K., L. T. Vermeire, and W. Gilgert. 2004. The other grazers—the interactions of "non-charismatic microfauna" in rangelands. *Rangelands* 26(3):30–37.

We would like to thank the entire WHC, but especially the following, for all their hard work in 2004: Terry Bidwell, Chad Boyd, Wendell Gilgert, Roy Roath, Ted Toombs, and Dale Weisbrot. The WHC remains very active, with plans to develop several symposia for the upcoming annual meetings in Vancouver and Reno. We welcome participation by any and all that would like to help!

2005 Wildlife Habitat Committee Officers

Chair—Jeremy Maestas
Chair-elect—Roy Roath
Communications Director/Newsletter Editor—Lance Vermeire

Prepared by Kent McAdoo (2004 Chair), Jeremy Maestas, and Lance Vermeire

Ask The Expert

QUESTION:

What are some of the advantages of being a rangeland manager, and what are some ways for the younger generation to become involved in the proper management of our nation's natural resources?

RESPONSE:

Advantages:

Being a rangeland manager involves a way of life that is extraordinarily fulfilling for people who love living and working outdoors. A career as a rangeland manager is challenging and rewarding as well. As a rangeland manager you work with real opportunities on the land. When you do your job right, you can see the benefit of the hard work that goes into helping natural resources improve in condition and provide for the needs of our society. Usually the rangeland manager works in cooperation with people of different expertise and as a member of a resource management team. You help integrate knowledge from other disciplines into solutions that resolve complicated natural resources issues. Where we live and work, the rangeland manager is usually trying to find sustainable approaches to provide forage for livestock, habitat for wildlife and fish, management for wildfires, restoration of depleted rangelands, and income for families on the ranches using the range. When all these concerns and other issues are integrated, a sustainable approach to natural resources management is the outcome. Without the knowledge and wisdom of the rangeland manager, problems are often not resolved.

The fringe benefit is that you work in the most beautiful areas of the world. The normal day in the field includes the sights of the stars on a clear night, the evening sunsets, the deer on the horizon, cattle grazing a vibrant meadow, the delicate beauty of a wildflower, the energy of a sprinting antelope, and the peaceful quiet of the wide open spaces. And then, you get paid for it. As a rangeland manager you make a good income that allows you to raise a family and enjoy the life of a professional in our society. In the 1960s President Kennedy told us, "Ask not what your country can do for you; ask what you can do for your country." We can think of no better way to meet this challenge from President Kennedy than the life of a rangeland manager. Done right you will leave the land better than it was when you began your career.

Ways to get involved:

The first step we see is to get an education. To work at the professional level, a BS degree in range science is the minimum. Graduates with a rangeland degree from an SRM-accredited university have the scientific, social, practical, and technical skills to do the work required of successful rangeland managers. Other approaches and degrees can also provide a base but each needs to be carefully examined to be sure the education is adequate for the job you are pursuing. Accreditation by SRM ensures you that the minimum requirements to perform and acquire a rangeland manager job have been met. When you select a university, check out the curriculum, availability of field trips and internships, and hands-on activities that are part of the degree. Most universities have a range club and other ways to socialize with students with a like interest. This can add both fun and diverse knowledge to your education.

Not everyone can move to a college town to study and universities are increasingly offering distance education where courses can be taken and degrees earned while living, and usually working, away from the university town. Students that elect this approach to education should be sure to participate in field trips, internships, and other methods to acquire hands-on experience when they can.

Mentoring from experienced rangeland managers is an important way to develop skills and judgment as a land manager. This usually occurs on the job but often the best mentoring comes from fellow professionals in our professional society, the Society for Range Management. Once you graduate, be sure to stay up to date by participating in the local chapter and section of the SRM. Read the journals, participate in the meetings, and get to know your colleagues. Most of the time, those folks active in SRM know whom to call when they need questions answered. Fortunately, SRM has a wide diversity of specialists and by participating with this diverse group, you get a good continuing education as a fringe benefit.

Rangeland management is an exciting and rewarding career. You can work in the finest areas and with great people. You know you are doing good for the land and the people that live on the land. Most of the time we can't believe we get paid to do what we enjoy the most—being rangeland managers.

William C. Krueger and John C. Buckhouse, Professors, Department of Rangeland Ecology and Management, Oregon State University, Corvallis, OR 97331.

Youth Awards

SRM Annual Meeting, Fort Worth, Texas, February 9, 2005

Masonic Scholarship: Shiloh Long, Texas Section.

High School Youth Forum, 2nd Place: Zachary Anderson, Utah Section.

High School Youth Forum, 1st Place: Naomi Cox, Northern Great Plains Section.

High School Youth Forum, 3rd Place: Adam Powell, New Mexico Section.

High School Youth Forum, 4th Place: Mallory Williams, Texas Section.

Undergraduate Range Management Exam (URME) Individuals, 1st Place: Dean Hystad, University of Alberta, with Janette Kaiser, US Forest Service.

High School Youth Forum, 5th Place: Kelly Haile, Texas Section.

URME Individuals, 2nd Place: Austin Sewell, Oklahoma State University.

Note: Award recipients pictured with outgoing SRM President Mort Kothmann. Names in group photos do not reflect the order of those pictured.

URME Individuals, 3rd Place: Bob Wesley, Montana State University.

URME Individuals, 5th Place: Liz Wertz, Colorado State University.

URME Individuals, 4th Place: Jeremiah Armstrong, Brigham Young University.

URME Teams, 1st Place: University of Alberta. Rae Hoddow, Marilyn Germaine, Jill Kaufmann, Angela Pfeiffer, Kurtis Fouquette, Cody Nahirniak, Brenda Shaugnessy, Marc Obert, and Dean Hystad.

URME Teams, 2nd Place: Brigham Young University. Debbie Hobart, Jordan Hennefer, Jeremiah Armstrong, Daniel Olson, Lexie Carroll, Jennifer Coleman, Eve Richards, Luke Marchant, Jay Howard, F. Leland Roberts, and Eric Gardner.

URME Teams, 4th Place: Oklahoma State University. Aaron Perkins, Austin Sewell, Lesley Carson, Lauren Wilkerson, Erin Arnall, John W. Story II, and Jesse Vap.

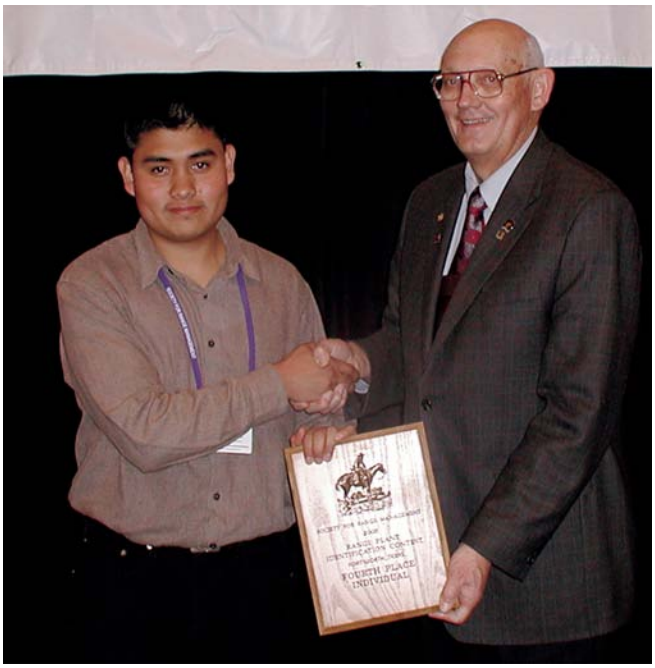
URME Teams, 3rd Place: Montana State University. Jody Fossum, Leah Compton, Erika Belsby, Bob Wesley, Kirstin Mehl, Chaley Paulson, Celeste Cusack, Molly Ryan, Joylynn Kauffman, Jenny McCabe, Amanda Wright, Cindy Hogemark, Joshua Bradshaw, Joe Klempel, Jonathan Haynie, Dan Bergstrom, Eric Wickens, Jamie Pugh, Raylee St. Onge, Kyle Butcher, Ryan Meccage, Jake Powell, Jake Stewart, Pete Wolff, Tyler Traeger, Jan Marie Klover, Ryan Melin, and Melissa Richert.

URME Teams, 5th Place: Colorado State University. Joe Schroeder, Jesse Dillon, Cece Dahlstrom, Liza Slusser, and Austin Krcmank.

Range Plant Identification, Individuals, 1st Place: Eduardo Ponce Castro, Universidad Antonio Narro, with Bob Bolton, Bureau of Land Management.

Range Plant Identification, Individuals, 3rd Place: Miguel Angel Grageda García, Universidad Antonio Narro.

Range Plant Identification, Individuals, 2nd Place: Pascual Gallegos Ayala, Universidad Antonio Narro.



Range Plant Identification, Individuals, 4th Place: José Luis Guerrero Soto, Universidad Antonio Narro.

Range Plant Identification, Individuals, 5th Place: Marilyn Germaine, University of Alberta.

Range Plant Identification, Teams, 2nd Place: University of Alberta. Rae Haddow, Marilyn Germaine, Jill Kaufmann, Angela Pfeiffer, Marc Obert, Cody Nahirniak, Brenda Shaughnessy, Kurtis Fouquette, and Dean Hystad.

Range Plant Identification, Teams, 1st Place: Universidad Antonio Narro. Maria Guadalupe Báez Cervantes, Oseos Gòmez Cruz, Pascual Gallegos Ayala, Ignacio Velasco Vite, Raul Jimenez Tirado, Eduardo Ponce Castro, Felicisimo Salazar Hernandez, Francisco Javier Díaz M., Fernando Martinez Garcia, Jose Luis Guerrero Soto, and Miguel Angel Grageda Garcia.

Range Plant Identification, Teams, 3rd Place: Brigham Young University. Jordan Hennefer, Daniel Olson, Debbie Hobart, Lexie Carroll, Tina Ward, Jay Howard, Eric Gardner, Luke Marchant, Eve Richards, Jennifer Coleman, and Rachel Fugal.

Range Plant Identification, Teams, 4th Place: Utah Valley State College. Yvonne Eele, Melissa Monk, John Monk, Ally Bench, Aprille Bennett, Wendy Yates, Aaron Pate, Chris Balzotti, and Brad Johnson.

High Combined (Plant Identification and Undergraduate Range Management Exam), 1st Place: Dean Hystad, University of Alberta, with Diane Gelburd, Natural Resources Conservation Service.

Range Plant Identification, Teams, 5th Place: Texas A&M University. Aminda Gallardo, Joanna Bowen, Kimberly Haile, Preston Ingram, Rixey Jenkins, and Meghan Paclik.

High Combined, 2nd Place: Marilyn Germaine, University of Alberta.

High Combined, 3rd Place: Rae Haddow, University of Alberta.

High Combined, 5th Place (Tie): Eric Gardner, Brigham Young University.

High Combined, 4th Place: Nicole Hansen, South Dakota State University.

High Combined, 5th Place (Tie): Jennifer Coleman, Brigham Young University.

University Student Display Contest, 1st Place: Oklahoma State University. Aaron Perkins, Erin Arnall, Lesley Carson, Lauren Wilkerson, Michelle Bouziden, Austin Sewell, John W. Story II, Adam Gousley, and Jesse Vap.

University Student Display Contest, 3rd Place: Texas A & M University. Natalie Wolff and Meghan Paclik.

University Student Display Contest, 2nd Place: Oregon State University. Erica Ersch, Kristin Coons, Jimmie Hayes, David Gray, Kelly Smith, Hoot Paulson, Brooke Bays, Ed Rhodes, Jamie Wages, and Matt Deboodt.

Undergraduate Public Speaking Contest, 1st Place: Matt Deboodt, Oregon State University.

Undergraduate Public Speaking Contest, 2nd Place: Jordan Hennefer, Brigham Young University.

Undergraduate Public Speaking Contest, 4th Place: Erica Ersch, Oregon State University.

Undergraduate Public Speaking Contest, 3rd Place: Lexie Carroll, Brigham Young University.

Undergraduate Public Speaking Contest, 5th Place: Clint Sampson, Utah State University.

By Gary Frasier

Frasier's Philosophy

Time is ever fleeting. It waits for no one. I have been reflecting the past months on my association with the Society for Range Management. It was only yesterday (in reality, over 30 years ago) that a member of the Soil Conservation Service (now the Natural Resources Conservation Service) from the No Aqua Conservation District in New Mexico stopped in my office for some information on water harvesting. As he left he gave me a membership form for the Society for Range Management and said, "Join, it will be the best move you can ever make." How true, this statement. I was a young researcher not long out of college. I was one of the "young" members. SRM gave me a place to "hang my hat." There are still a great number of members remaining in SRM from 30 years ago. Many of them have been great mentors to me. I have learned a great deal from them on many topics, but the item that I cherish the most is the knowledge that "The youth of the present are the key to our (SRM's) future."

I felt great pleasure when "Youth" was selected as a theme for this issue of ***Rangelands***. Within this issue are some of the best articles you can ever find, written by our youth. We have the winning papers from the High School Youth Forum that were presented in Fort Worth, Texas, at the Annual SRM meeting in February 2005. We have photos of all the winning Student Activities at Fort Worth. We have articles written by young people who started in SRM Youth and now are active in various range management endeavors, some in other countries. We have an article written by a 13-year-old on her activities as a barrel racer and her aspirations as a rancher. We have articles on career opportunities in natural resource management for young people. We have articles describing some of the youth activities at the Annual SRM Meetings. We have articles describing the youth activity in natural resource summer camps.

Wow, what a great issue. My hat is off to the youth of SRM.

I wish to close by issuing a challenge to **all** "older" members of SRM going to the Annual Meeting in Vancouver in 2006. Take or sponsor a youth to attend. You will leave a legacy that will be remembered forever. Give some young person a chance to become as involved as you are (if you did not believe in SRM you would not be going to Vancouver).

In the article "My Life as a Ranch Cowgirl," I posed the question as to an unusual aspect of the photo. If you look closely you will see that the author does not have the reins in her hand. ◆

Thad Box

Youth, Sense of Place, and Land Care Professionals

Every culture, every society, celebrates its youth. Part of this is biologically driven. If the young do not succeed, genes will not be passed to the next generation. Our youth also form a social security account, protecting us, fighting our wars, and providing us care in our old age. Perhaps even more important, they are vessels that carry our societal values into the future.

Survival of our concepts of right and wrong, a better world, and what it means to be human depends on our young accepting and applying our principles, ideals, and values. Often how they apply those principles to things we think important may be very different from what we imagined. It is important that principles be stable. The world changes.

To insure that our land care profession is relevant in future generations, three things are especially important: First, our youth must understand science, the interaction of factors in the environment. Second, the science must be ethically applied. Third, the practitioners of our profession must know who they are and where they practice. They must be educated, not just trained.

Understanding of science and interconnectedness in our environment comes from education—both from formal learning and from our life stories. We accredit schools to assure they are teaching what our profession needs. Sharing life experiences is the responsibility of all of us.

Ethical application of principles comes primarily from working with ethical people. A Carnegie study showed that students taking ethics courses did not necessarily behave ethically, but doctors and ministers who studied under and worked with ethical professionals almost always performed ethically. Ethical performance in our profession, then, depends on our ethical practitioners taking our youth in tow and becoming mentors to them.

For young people in our land care profession to know who they are is largely determined by how well they relate to the land—a sense of place. The writer Wendell Berry said, "If you don't know where you are, you don't know who you are."

The thought that we must know our land intimately before we can know ourselves is really powerful. The idea that knowing our place, and ourselves, can be applied to land health, and thus to the welfare of future generations, is central to our profession. The concept is viewed in at least four broad categories.

One is a bioregional view embraced by ecologists, environmentalists, conservationists, and students of nature. Simply put, it argues that one must know all there is to know about the natural world in a bioregion—plants, animals, geology, watersheds, everything—to gain a sense of place. This sense of place, based on science, leads to an understanding of humans' role in nature. That understanding guides people to enlightened land use.

Another is a literary view put forward by writers, poets, artists, mystics, and philosophers. It says one gains a sense of place by inward explorations of self—what it means to be human. These inward explorations, leavened by words in great literature, develop a spiritual core that supports the individual physically and spiritually. That spirituality leads the individual to live an enlightened lifestyle compatible with the land.

A historical view among archeologists, historians, and folklorists says that one gains a sense of place by what happened at the place. Wallace Stegner, in his essay "Sense of Place," wrote, "No place is a place until things that happened in it are remembered in history, ballads, yarns, legends, monuments…it is made by slow accrual, like a coral reef." Exploration of that process of change leads to an understanding of why things happened. That understanding of the past can lead to visions of the future.

A minority view, mainly held by spiritualists, shamans, and some evolutionists, believes there is something innate in humans that causes them to identify with place. Some unknown power—past lives, genes, God's will—resides in people that make them bond with place. For instance, I was born and raised far from an ocean. But I am instantly at peace on a beach. Some claim the innate bonding creates a sense of responsibility that leads to enlightened decisions about land use.

The understanding of scientists, poets, philosophers, and historians are all important if a sense of place is to help our land care profession. Knowledge of the environment and an understanding of self must be linked to natural and human-caused events.

Stegner wrote, about Berry's statement, "…He is not talking about the kind of location that can be determined by looking at a map or a street sign. He is talking about the kind of knowing that involves the senses, the memory, the history of a family or tribe. He is talking about the knowledge of place that comes from working in it in all weathers, making a living from it, suffering from its catastrophes, loving its mornings or evenings or hot noons, valuing it for the profound investment of labor and feeling that you, your parents and grandparents, your all-but-unknown ancestors have put into it. He is talking about the knowing that poets specialize in."

That is the kind of sense of place that people close to the land—farmers, ranchers, pioneers—understand well. It is the kind of sense that guides a land care professional. It is passed on in cultural history—stories from those close to the land. But it is a sense that is not automatically available to our youth as they live their hectic, nomadic, technology-driven lives. Therein lies the challenge of relating our profession to a sustainable future.

Somehow, some way, the young must be led to know that what we now see as "natural" is a combination of natural and human-induced happenings on our land. In prehistory our place had low human population densities that changed the land only locally. Even the extractive exploits of the first white mountain men had minimal effects.

It was European domination that drastically changed western rangelands. In three decades the west went from wilderness to a thriving culture with a shortage of natural resources. Pioneers left mountains without trees, rangelands without grasses, and mud sliding down to cover towns and farms. Today different vegetation clothes those mountains, but they will never be the same.

To make our current lands sustainable, modern science must be applied by stewards who develop a personal land ethic. When people understand we are all essential parts of the land, we may be able to counter an ownership society that makes land a commodity.

How do we do that? Stegner suggested that, "No place, not even a wild place, is a place until it has had that human attention that at its highest reach we will call poetry…Neither the country nor the society we built on it can be healthy until we stop raiding and running, and learn to be quiet part of the time, and acquire the sense not of ownership but of belonging."

Maybe among our youth we will raise up a poet. Until she speaks for rangelands, let us contemplate Robert Frost's, "The Gift Outright."

The land was ours before we were the land's.
She was our land more than a hundred years
Before we were her people. She was ours
In Massachusetts, in Virginia,
But we were England's, still colonials,
Possessing what we still were unpossessed by,
Possessed by what we now no more possessed.
Something we were withholding made us weak
Until we found out that it was ourselves
We were withholding from our land of living,
And forthwith found salvation in surrender.
Such as we were we gave ourselves outright
(The deed of gift was many deeds of war)
To the land vaguely realizing westward,
But still unstoried, artless, unenhanced,
Such as she was, such as she would become.

Our professional efforts—in the home, K–12, college, writings, mass media, our life stories—must meld sense of place into a reality that land does not belong to us, we belong to the land. And this understanding has to be reached in rural areas, in towns, and in metropolitan areas with an economy based on world trade, consumption, and instant gratification. Bring on the poet. ◆

The Recipe Corner

Editor's Note: There are many "family" recipes that are passed from generation to generation and never seen by outsiders. Many of these recipes would be enjoyed by others. This column is being established to present some of these recipes so others can enjoy them. The following recipe was submitted by Jo Frasier, Loveland, Colorado.

Enchilada Pie

The basic components of this recipe were written down by a longtime friend, Betty Barnes, who I met when at college in Iowa over 50 years ago. When I moved to Tucson, Arizona, Betty was the one who made me feel "at home." Every time I make this, I think of Betty.

2 pounds lean ground beef
1 ½ medium onions, diced
1 ¾ teaspoons salt
2 teaspoons chili powder
1 14 ½-ounce can of tomato sauce
9 corn tortillas, buttered
3 cups of Colby longhorn cheese, grated
1 ⅓ cup water
1 small can sliced black olives
butter

Brown meat and onion with spices until cooked. Drain off fat. Stir in tomato sauce. Set this aside. In a buttered casserole dish (9 × 13 inches), place 4 1/2 tortillas to cover the entire bottom. Place meat on top of tortillas, then cheese, and another layer of tortillas. Now add remaining meat and cheese. Pour water slowly over the top. Garnish with sliced olives. Bake in a covered dish at 400° F for 20 to 30 minutes.

Ideal when served with a side of refried beans. This will serve 10 people or make great leftovers. ◆

Eighth in a Series: Insight From SRM's Charter Members

The Society for Range Management (SRM) History Committee has conducted interviews with many of the Society's charter members to capture their perspective of events leading to and subsequent to the formation of the American Society of Range Management in 1947–1948. Interviews from several of these individuals will be shared for today's SRM members to enjoy and learn from.

SRM Charter Member – Max E. Robinson

Editor's Note: Max Robinson was interviewed by Sam Rowley on January 6, 2003. Max can be reached at 570 W, 300 N, Richfield, UT 84701.

Max Edward Robinson, 84, was born January 10, 1919, in Kingsville, Wayne County, Utah, and grew up in Torrey, Utah, where he still owns the property of the family home and farm. His son, Douglas Max Robinson, recently retired from the Division of Wildlife Resources and will take over and manage the property. They have a few cattle there and he has some big ideas on how to handle it.

In 1948, when the ASRM was formed, I was at the University of Arizona, Tucson, employed as an assistant professor, teaching half-time and doing research at the State Experiment Station half-time. Most of the research at the time was range research, and I was also on the Interagency Committee, which included people from New Mexico. Art Conley was chairman; Ken Parker and J. O. Bridges were on the committee. This was the beginning of the ASRM.

Earlier in my career as a student I worked on the Western Range Survey, which at that time was conducted by all the various agencies (US Department of the Interior Division of Grazing, Forest Service, and Soil Conservation Service). We worked in the Strawberry Valley the 1st year in 1937.

I started teaching at the University of Arizona in the fall of 1941, but I went into the service as an ensign in the Navy in 1942. I married my wife during one of the leaves while in the service. After the war we had a daughter and son, Douglas. The University held the job open for me, so when I came back, I started work at the same institution. At that time, I had a lot of cooperative work with the Forest and Range Experiment Station people, including Ken Parker and Clark Martin. Clark at that time was working on a master's degree, and ended getting a PhD. I sat in on his master's exam, and in fact he took some classes from me. Both of these men were also charter members. I also worked with Harry Springfield, who was either a charter member, or joined shortly thereafter.

In addition to the Interagency Committee work, I did some range nutrition studies down in the Sonoita area. I had a pasture project, where we tested cattle on irrigated pasture when they came off the range. We measured utilization and gains. I later presented a paper up at Pullman on that pasture project.

The 1st time ASRM was discussed was in a meeting in Las Cruces, New Mexico, at the college there. Art Conley, who was chairman of the Interagency Committee, and Ken Parker and Dale Bridges and other interagency people discussed the possibility of the society to promote range management and present scientific papers. As I remember, Ken Parker was quite active in pushing the idea. That is where it really first started, in these meetings.

Sections were not proposed at the first. Joe Pechanec, Doc Stoddart, and Ken Parker were some of the original thinkers to establish the Society. They may have sent out inquiries to the various institutions. At the time I was teaching at the university, Dr Robert Darrow was teaching plant taxonomy and range ecology. I was in the Animal Husbandry Department and teaching straight range management, range survey methods, and range livestock production, and a general range management course similar to the one I took at

Utah State. As I recall, we didn't think about the sections until the later meetings.

The 1st section I belonged to was the Utah Section. It was later divided into chapters. Perry Plummer and I met with some other people in the Richfield forest office and it was decided that we should have a Southern Utah Chapter. The Utah Section was the only section I ever belonged to. While I was in Arizona, we didn't have a section.

I did attend that 1st meeting. I remember coming up from Tucson. That 1st organizational meeting was held in the Newhouse Hotel in December 1947, but it may have been January 1948. At the meeting I remember a discussion about restricting membership to professional range managers, that is, people involved in research and teaching, and possibly people in the agencies involved in range work. There was quite a difference of opinion. Some people that were of that opinion had belonged to the American Society of Foresters. At the time they were thinking of having a section in the Forestry Society for range people involved with research. The idea was to restrict membership to professionals. Some of us prevailed on the idea to be a little more inclusive and include people from the ranching communities who actually used the range. I remember the Boyce brothers in Arizona who I was acquainted with. Some of those people would benefit from the Society, but would also contribute considerately and strengthen the Range Society. I remember Henry and Frank Boyce and Harry Saxton, who were some of the big cattlemen down there, and some of their descendants have become quite active in the Society.

At the 1st meeting, we left the Forest and Range Experiment station with Ken Parker, Clark Martin, Fred Lebbins, George VanDane, and Hudson Reynolds; they were all working at the Forest and Range Experiment Station out of Tucson. They had an old Pontiac car and I joined them for a free ride. The University gave me $6 a day per diem. It was the only per diem I ever received attending any meeting.

I always felt it was a privilege to belong to an organization that considered managing ranges and rangeland, watersheds and forests. If you go back even to my childhood, I grew up where the range had been abused. Some of the floods that washed away my birthplace could be attributed to mismanagement of the ranges and overgrazing of the east end of the Boulder and Thousand Lake mountains. As a student in grade school, I met the forest ranger, Mr Binkley, out of Teasdale, and he greatly influenced me. It was in my blood you might say, to contribute by publishing scientific papers and other means of promoting range management. I used to give talks on how much a ranch was worth over the radio down at the university.

My expectations have been fulfilled in many respects. One of the things that appeared to me over time has been the lack of interest of the professionals in joining. For instance, in the Forest Service, there were many range managers, but they never joined. I felt they were missing out on some things. There is another thing that the agencies, for some reason or another, didn't have the excitement as when we first started. It seems like there has been a lack of interest for some reason.

I had some health problems in Arizona (hayfever real bad), so I had the opportunity to go to Utah State. I had done some teaching while at Oregon State where I got my master's degree. On January 21, 1951, I went to Utah State and I had about the same arrangement as far as teaching and research goes. Dr Stoddart, my main supervisor, encouraged us all to participate in the SRM meetings and I did while I was there. We went on one trip, along with Stoddart, Wayne Cook, and Dillard Gates, to San Jose, California.

I worked for Utah State and they promoted me and gave me a big raise of $600 to go to Cedar City to work with the range sheep project, which was a cooperative project with the Animal Husbandry Department. I worked 6½ years there before I finally took a foreign assignment. While I was at Cedar City, they had me teach plant taxonomy, range forage plants and a regular agronomy class. In addition to that, I worked with the sheep group. I was a little bit frustrated, and at times felt a little bit unhappy with the situation. The Animal Husbandry people dominated the study by using different breeds of sheep on the range, while the range took 2nd fiddle to the animal husbandry aspects of it. I did do some range work when the Atomic Energy Commission put some money into my salary.

Getting on to my foreign assignment, I was a little bit disgruntled, so I took an assignment to Pakistan as a range management specialist working on a soil and water conservation project in the upper regions of the Punji. They also had a range study up in Boluchistan. Art Conley was in charge up there and I went up and helped him with water spreading and fencing. While I was in Pakistan, I talked with people about how to make broad-based terraces and plant trees, and had 5 demonstration areas. We also advised them on sheep farms. I had purebred Rambouillets brought in by a plane from the Sealy's in Mt Pleasant. I worked all the time in range projects within the soil and water conservation program.

After I came back from Pakistan, I worked for the Forest Service for 12 years here at Richfield on the Fishlake Forest. What encouraged me here was they had a watershed project (Sheep Creek water evaluation project) that was very similar in design to what I wanted to get started at Cedar City, but was unable to get funding for it, even though I had the support of Dr Stoddart and Wayne Cook. When I came back, the Forest Service had an opening and I took it as a project staff officer. We did many studies on range and watershed activities for the 12 years I was there.

I took a 14-month leave from the Forest Service down in Argentina (they encouraged me to take it). When I came back, I spent 2 years finishing up the Sheep Creek project and was able to publish some of it. I took another assignment to develop a resource appropriation in Iran and spent 18 months there. When I came back, the Forest Service didn't

honor their agreement to give me a job; therefore I took another assignment in Cameroon. I met some of the people in the BLM and told them I was looking for a job. When I got back from Cameroon, Neil Tumms called me one day while I was living at Torrey and said they had a range management position here in Richfield, so I worked 7 years for the BLM before I retired.

I have a BS degree from Utah State. Dr Stoddart was my major professor in the forest range option. I took mostly range work there. I did take meteorology, geology, and soil conservation and classes of that nature. I got a research fellowship at Oregon State, so we went up and spent 1 summer at the Eastern Oregon Livestock Experiment Station and collected data for my master's thesis. We then went down to Corvallis and finished up there in 1941 with a master's degree. After finishing up at Corvallis, I spent a summer at Squaw Butte, which at that time was run by the Grazing Service (which later became BLM) and the State of Oregon Experiment Station and each paid half my salary. We lived at the Squaw Butte Station and were able to do a little reseeding work.

My interest in range management dates back to when I was in grade school. My father was a teacher and was interested in conservation. The forest ranger, Willford Bently, came over to talk to us at Torrey. We kids used to take our horses out and camp out over on Pleasant Creek and fish and we would meet the ranger and visit with him. He was highly regarded in the community. When we got in high school, I entered a public-speaking contest in the Future Farmers of America and used forest conservation as my topic. I won the region and went on to the state contest where I won a $25 scholarship to Utah State. That's how I finally got into it.

I was secretary–treasurer of the Utah Section while I was at the college at Cedar City. At that time Robert Albertson, who was Forest Supervisor on the Dixie Forest, and I went to all the summer and winter meetings. I was on some of the other committees. While with the Forest Service here at Richfield, I was editor of the newsletter. At one time, I was chairman of the history committee, which was followed up by Art Smith. I was president of the Southern Utah Section one summer.

Since I have retired, I have tried to keep up professionally, and have been president of the Historical Society for 7 years. At the same time I have tried to participate in the summer and winter meetings. One of the things that appears to me that is happening, and I saw it while I was working with BLM, was that of adversarial relationship between disciplines. I thought range management was all-inclusive, including wildlife management and watershed management. When I got with BLM, and to some extent with the Forest Service, there was an adversarial relationship with the wildlife managers and recreation managers, and we got into some heated arguments. Some became very hostile and would come over to my desk to argue with me. I finally had to tell them to go away and leave me alone, because it was so distracting. I told them I wasn't against using range for wildlife. I took more classes in wildlife management than some of the guys advocating for it. One of the fellows in wildlife was from New Jersey. He was like a lot of other wildlifers, they wanted to get rid of all of the livestock. Before I was through with him (he transferred to Colorado) he said he never realized how little he knew, "You really enlightened me." When he was in Colorado, he called me every once in a while for advice on how these systems really work.

I am really puzzled in that most of the Forest Supervisor jobs and ranger jobs are being filled by general conservationists, which is fine, but maybe we should encourage them to be members and accept them in and educate them. The idea of range management, as I took it, is taking a back seat to some of the more recent conservation concepts. I hope that we don't say that we just don't want livestock grazing. I have been all over the world and livestock grazing has been going on. It is still one of the major uses of the land. We should be encouraging these so-called environmentalists, if they have a point, they need to join us and participate with us.

Following are some lasting impressions of SRM and what I would tell young people. Utah State and some other schools don't have range management departments anymore. They have consolidated forest, range, wildlife, and watershed in another department. Perhaps the things are still being taught at the university, but the emphasis is not on range as such. For young people going into the field (I have some grandsons at Utah State in fisheries and they did take some range courses), it is going to be difficult to encourage them to go into the field.

Tom Bedell is a member and former chairman of the SRM History Committee and a member of the Pacific Northwest Section living in Philomath, Oregon.

Jeff Mosley

Browsing the Literature

This section reviews new publications available about the art and science of rangeland management. Personal copies of these publications can be obtained by contacting the respective publishers or senior authors (addresses shown in parentheses). Suggestions are welcomed and encouraged for items to include in future issues of *Browsing the Literature*.

Animal Ecology

Disturbance by fire frequency and bison grazing modulate grasshopper assemblages in tallgrass prairie. A. Joern. 2005. *Ecology* 86:861–873. (Division of Biology, Kansas State Univ., Manhattan, KS 66506). Fire frequency (1-, 2-, or 4-year intervals and unburned) did not affect grasshopper species diversity. However, bison grazing increased grasshopper species diversity by increasing the heterogeneity in vegetation structure and plant species richness.

Habitat and nesting biology of mountain plovers in Wyoming. R. E. Plumb, S. H. Anderson, and F.L. Knopf. 2005. *Western North American Naturalist* 65:223–228. (Wyoming Cooperative Fish and Wildlife Research Unit, Univ. of Wyoming, 1000 E. University Ave., Laramie, WY 82071). Results substantiate claims that mountain plovers favor disturbed sites for nesting.

Home range and habitat use of coyotes in an area of native prairie, farmland and CRP fields. J. F. Kamler, W. B. Ballard, P. R. Lemons, R. L. Gilliland, and K. Mote. 2005. *American Midland Naturalist* 153:396–404. (W. Ballard, Dept. of Range, Wildlife and Fisheries Management, Texas Tech Univ., Lubbock, TX 79409). In a landscape interspersed with rangeland, cropland and Conservation Reserve Program (CRP) fields, the CRP fields provided foraging habitat for transient coyotes and denning habitat for resident coyotes.

North American grassland birds: an unfolding conservation crisis? L. A. Brennan and W. P. Kuvlesky. 2005. *Journal of Wildlife Management* 69:1–13. (Caesar Kleberg Wildlife Research Institute, Texas A&M Univ., Kingsville, TX 78363). "The current decline of grassland bird populations occurring on the rangelands of North America clearly can mostly be attributed to historic livestock grazing and the woody plant invasions that have resulted from these impacts of livestock on grassland ecosystems."

Variability in vegetation effects on density and nesting success of grassland birds. M. Winter, D. H. Johnson, and J. A. Shaffer. 2005. *Journal of Wildlife Management* 69:185–197. (Ornithology Lab, Cornell Univ., 159 Sapsucker Woods Rd., Ithaca, NY 14850). Few vegetation features influenced the densities of clay-colored sparrows, Savannah sparrows, and bobolinks, and each species responded differently to those vegetation variables. Land managers at all times need to provide grasslands with different types of vegetation structure.

Grazing Management

Contribution of goats to the sustainability of Edwards Plateau rangelands. C. A. Taylor, Jr. and S. D. Fuhlendorf. Undated. *Texas Agricultural Experiment Station Technical Report 03-01.* (Texas Agricultural Experiment Station, PO Box 918, Sonora, TX 76950). This 24-page

bulletin summarizes how goats should be managed to control woody plant encroachment in central Texas.

Hydrology/Riparian

Effects of managed impoundments and herbivory on wetland plant production and stand structure. L. A. J. Randall and A. L. Foote. 2005. *Wetlands* 25:38–50. (U.S. Geological Survey, National Wetlands Research Center, 700 Cajundome Blvd., Lafayete, LA 70506). Grazing by nutria "may facilitate marsh erosion and ultimately contribute to wetland loss."

Grassland bird use of riparian filter strips in southeast Iowa. J. C. Henningsen and L. B. Best. 2005. *Journal of Wildlife Management* 69:198–210. (L. Best, Dept. of Natural Resource Ecology and Management, Iowa State Univ., Ames, IA 50011). The most abundant species in filter strips were red-winged blackbirds, dickcissels, song sparrows, and common yellowthroats. Birds and nests were equally abundant in cool-season and warm-season planting mixtures.

Response of herbaceous riparian plants to rain and flooding on the San Pedro River, Arizona, USA. K. J. Bagstad, J. C. Stromberg, and S. J. Lite. 2005. *Wetlands* 25:210–223. (J. Stromberg, School of Life Sciences, Arizona State Univ., Tempe, AZ 85287). Herbaceous plant diversity was greatest with intermediate levels of flooding.

Measurements

Above-ground biomass and carbon and nitrogen content of woody species in a subtropical thornscrub parkland. B. K. Northup, S. F. Zitzer, S. Archer, C. R. McMurtry, and T. W. Boutton. 2005. *Journal of Arid Environments* 62:23–43. (USDA–ARS, Grazinglands Research Lab, 7207 W. Cheyenne St., El Reno, OK 73036). Regression equations were developed to predict above-ground biomass, carbon, and nitrogen content from stem and canopy dimensions for 10 shrub species of southern Texas.

Relationships among indices suggest that richness is an incomplete surrogate for grassland biodiversity. B. J. Wilsey, D. R. Chalcraft, C. M. Bowles, and M. R. Willig. 2005. *Ecology* 86:1178–1184. (Dept. of Ecology, Evolutionary and Organismal Biology, Iowa State Univ., Ames, IA 50011). Concludes that measures of species diversity should be based on combined measures of relative abundance and numbers of species.

Plant/Animal Interactions

Compatibility of delayed cutting regime with bird breeding and hay nutritional quality. J. J. Nocera, G. J. Parsons, G. R. Milton, and A. H. Fredeen. 2005. *Agriculture Ecosystems and Environment* 107:245–253. (Dept. of Biology, Univ. of New Brunswick, Fredericton, NB E3B 6E1, Canada). In Nova Scotia, postponing hay harvest 2.5 weeks (from June 20 until July 7) allowed maximum fledging rates for grassland birds while lowering the crude protein content of the hay 3.5%.

Influence of grassland type, nest type, and shrub encroachment on predation of artificial nests in Chihuahuan desert grasslands. L. C. Mason, M. J. Desmond, and M. S. Agudelo. 2005. *Western North American Naturalist* 65:196–201. (M. Desmond, Dept. of Fishery and Wildife Sci., New Mexico State Univ., Las Cruces, NM 88003). Shrub encroachment into tobosagrass and black grama grasslands of southern New Mexico leads to increased predation of grassland bird nests.

The measurement of chronic disturbance and its effects on the threatened cactus *Mammillaria pectinifera*. C. Martorell and E. M. Peters. 2005. *Biological Conservation* 124:199–207. (Dept. of Ecology and Recursos Nacional, Univ. de Nacional Autonoma Mexico, Mexico City 04510, DF, Mexico). Moderate livestock grazing creates the amount of disturbance required by a threatened species of cactus.

Plant Ecology

Repeat photography in the ancient Cross Timbers of Oklahoma, USA. R. D. Griffin, D. W. Stahle, and M. D. Therrell. 2005. *Natural Areas Journal* 25:176–182. (Tree Ring Lab, 113 Ozark Hall, Univ. of Arkansas, Fayetteville, AR 72701). In the ecotone between deciduous forests and grasslands in the southern Great Plains, repeat photography vividly illustrates that rangeland has been invaded by shrubs and trees during the 20th century.

Response of semi-desert grasslands invaded by non-native grasses to altered disturbance regimes. E. L. Geiger and G. R. McPherson. 2005. *Journal of Biogeography* 32:895–902. (School of Natural Resources, Univ. of Arizona, Tucson, AZ 85721). Reintroduction of fire and removal of livestock grazing have not increased native plant species diversity nor decreased Lehmann lovegrass or mesquite after 15 years in southern Arizona.

Rehabilitation/Restoration

Residual effects of NPK fertilization on shrub growth in a Yukon boreal forest. M. C. Melnychuk and C. J. Krebs. 2005. *Canadian Journal of Botany* 83:399–404. (Dept. of Zoology, Univ. of British Columbia, Vancouver, BC V6T 1Z4, Canada). Willow shrubs had greater growth rates and twigs had higher nitrogen content 4 to 8 years after fertilization had ceased.

Restoring biodiversity to pinon–juniper woodlands. S. Albert, N. Luna, R. Jensen, and L. Livingston. 2004. *Ecological Restoration* 22:18–23. (Parametrix, Inc., PO Box 1473, Zuni, NM 87327). In western New Mexico, mechanical thinning of pinon–juniper trees to a basal density of 30 square feet per acre benefited understory vegetation, deer, elk, small mammals, wild turkeys, and songbirds.

Simulation of vegetation dynamics and management strategies on South Texas, semi-arid rangeland. S. N. Glasscock, W. E. Grant, and D. L. Drawe. 2005. *Journal of Environmental Management* 75:379–397. (Welder Wildlife Foundation, PO Box 1400, Sinton, TX 78387). Prescribed burns in summer or winter are equally effective for removing brush canopy when precipitation is near the long-term average, but winter burns are more effective during periods of low precipitation.

Subalpine meadow restoration in Yosemite National Park. S. Eagan, P. Newman, S. Fritzke, and L. Johnson. 2004. *Ecological Restoration* 22:24–29. (US Forest Service, 2081 E. Sierra Avenue, Fresno, CA 93710). Where 30 years of trail closure had failed to reestablish vegetation, trail ruts were successfully restored by a 4-year project that used imported soil and transplanted vegetation.

The effects of prescribed burning on wet prairie lichen communities. E. A. Holt and P. M. Severns. 2005. *Natural Areas Journal* 25:130–136. (Dept. of Botany and Plant Pathology, Oregon State Univ., Corvallis, OR 97331). Prescribed burning to minimize woody plant encroachment and to benefit rare vascular plants is harmful to a boreal–arctic lichen growing in western Oregon.

Using historic data to assess effectiveness of shrub removal in southern New Mexico. A. Rango, L. Huenneke, M. Buonopane, J. E. Herrick, and K. M. Havstad. 2005. *Journal of Arid Environments* 62:75–91. (USDA–ARS, PO Box 30003, MSC 3JER, New Mexico State Univ., Las Cruces, NM 88003). Following grubbing treatments for shrub removal in the late 1930s, canopy of creosotebush and tarbush recovered in less than 65 years.

Woody plant encroachment and removal in mesic grassland: production and composition responses of herbaceous vegetation. M. S. Lett and A. K. Knapp. 2005. *American Midland Naturalist* 153:217–231. (A. Knapp, Dept. of Biology, Colorado State Univ., Fort Collins, CO 80523). Authors recommend frequent burning to prevent woody plant encroachment into tallgrass prairie ecosystems.

Socioeconomics

Why compensating wildlife damages may be bad for conservation. E. H. Bulte and D. Rondeau. 2005. *Journal of Wildlife Management* 69:14–19. (Dept. of Economics, Tilburg Univ., PO Box 90153, NL-5000 LE Tilburg, Netherlands). Authors conclude that incentive mechanisms (eg, payments based on the size of the wildlife population) should be considered instead of wildlife damage compensation payments.

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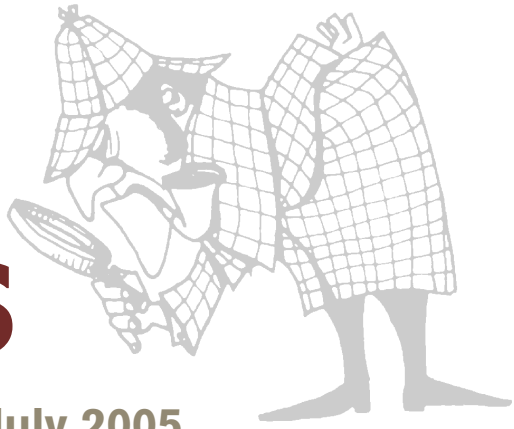


HIGHLIGHTS

Rangeland Ecology & Management, July 2005

Perceived Effectiveness of Livestock-Guarding Dogs Placed on Namibian Farms

Laurie L. Marker, Amy J. Dickman, and David W. Macdonald

Livestock depredation because of wild carnivores can be a substantial problem on farmland, with serious implications both for farmers and for carnivore conservation. We placed Anatolian Shepherd dogs on Namibian farms and surveyed the farmers to evaluate how effective the dogs were as livestock guardians. The farmers reported substantial declines in levels of livestock loss since acquiring a dog, and high levels of satisfaction with the scheme. The information gained during this survey will help guide future livestock-guarding dog projects, and it could have important benefits both for farmers and for large carnivore conservation.

Survivorship and Causes of Mortality for Livestock-Guarding Dogs on Namibian Rangeland

Laurie L. Marker, Amy J. Dickman, and David W. Macdonald

Using livestock-guarding dogs can be a valuable conflict resolution method, but its effectiveness depends substantially on the longevity of the dogs placed. We examined the survivorship of 143 guarding dogs placed on Namibian farms and assessed the causes of mortality and age at death. On average, dogs placed had a working lifespan of 4.3 years, and accidents were the most common cause of death. Although guarding dogs can be very effective, better care of the dogs and more education of the farmers would make it an even more cost-efficient and successful management tool.

Arizona Permittee and Land Management Agency Employee Attitudes Toward Rangeland Monitoring by Permittees

Maria E. Fernandez-Gimenez, Susan Jorstad McClaran, and George Ruyle

Land management agencies are increasingly enlisting permittees to monitor their grazing allotments, but little is known about permittee or agency views of this practice. We surveyed Arizona grazing permittees and land management agency employees to compare their attitudes toward permittee monitoring, Arizona rangeland conditions, government management of rangelands, and the credibility of information sources about rangelands. The 2 groups differed in most of their attitudes, but both agreed that permittees should participate in monitoring their allotments and that collaboration can be beneficial. Joint permittee–agency monitoring may help improve agency–permittee relationships and bridge the gap in attitudes and underlying values.

The Effects of Livestock on California Ground Squirrels (*Spermophilus beecheyii*)

Jeffrey S. Fehmi, Sabrina E. Russo, and James W. Bartolome

We examined the effects of moderate cattle grazing on the abundance of California ground squirrels (*Spermophilus beecheyii* Richardson) and the spatial distribution of active burrows within their colonies in grassland and blue oak (*Quercus douglasii* Hook. & Arn.) savanna habitats in the coastal range of California, USA. The spatial distribution of burrows did not differ significantly between grazed and ungrazed colonies or between habitats. Thus, low to moderate levels of cattle grazing did not appear to have a strong effect on the population dynamics of California ground squirrels, and grazing may be compatible with maintenance of ground squirrel populations.

Rainfall, Temperature, and Forage Dynamics Affect Nutritional Quality of Desert Mule Deer Forage

Jason P. Marshal, Paul R. Krausman, and Vernon C. Bleich

Forage quality affects physiological condition, population dynamics, habitat use, and distribution of ungulates. We studied how rainfall, temperature, forage biomass, and forage growth were related to water content, crude protein, and digestibility of some common forage species of mule deer in the Sonoran Desert, California. Percent water and protein were greater in forage from plants receiving more rainfall.

Digestibility was greater for forage from rapidly growing plants, and was also affected by temperature and rainfall. These findings suggest that the highest quality landscapes for deer are those with rapidly growing forage plants, where forage water, protein, and digestibility are greatest.

Elk and Mule Deer Diets in North-Central New Mexico

Leonard Sandoval, Jerry Holechek, James Biggs, Raul Valdez, and Dawn VanLeeuwen

Studies evaluating elk and mule deer food habits and competition on woodland rangelands in northern New Mexico are lacking. We determined seasonal diet botanical composition of elk and mule deer, dietary average, and diet variations on woodland rangeland in north-central New Mexico using microhistological analysis of fecal samples. Elk and mule deer shared 3 of the top 5 key forage species. Overall, dietary overlap between mule deer and elk was 64%. Elk are more dietarily adaptable to changing forage availability than mule deer. Our study indicated that mule deer and elk are not complementary on woodland rangelands in New Mexico.

Diets of Prairie Dogs, Goats, and Sheep on a Desert Rangeland

Miguel Mellado, Abundio Olvera, Adrián Quero, and Germán Mendoza

Better information on the foraging ecology and dietary interrelationships among sheep, goats, and prairie dogs would permit the design of better, more sustainable grazing programs. Diets of prairie dogs, goats, and sheep were examined using microhistological fecal analysis during 1 year in northern Mexico. The study showed little difference in diet botanical composition between sheep and prairie dogs, but the overlap in forage resource use between goats and prairie dogs and between goats and sheep was generally low. There appears to be a high potential for grazing goats, along with prairie dogs, to more efficiently harvest the available forage resources.

Consequences of Selecting Rambouillet Ewes for Mountain Big Sagebrush (*Artemisia tridentata* ssp. *vaseyana*) Dietary Preference

Steven S. Seefeldt

Dense sagebrush canopies (> 30%) suppress understory vegetation. Rambouillet ewes with a high or low dietary preference for mountain big sagebrush were tested for their ability to reduce cover of mountain big sagebrush. There was no difference in the reduction of sagebrush canopy between the high- and low-preference ewes; however, ewes with a high preference for mountain big sagebrush consumed more antelope bitterbrush, a desirable shrub, than did low-preference ewes. To help avoid undesirable outcomes from grazing, animals selected with a diet preference for one plant species must be screened to determine what other plants they will preferentially select.

Spring Growth and Use of Cool-Season Graminoids in the Nebraska Sandhills

Jerry D. Volesky, Walter H. Schacht, Patrick E. Reece, and Timothy J. Vaughn

Upland sites in the Nebraska Sandhills are dominated by warm-season grasses, although cool-season graminoids often produce 10%–40% of the total herbage. A 2-year study was conducted to characterize growth of cool-season species, and determine use and herbage production in response to spring grazing and stocking rates. Total herbage yield in mid-June (1130 $kg \cdot ha^{-1}$) and mid-August (1350 $kg \cdot ha^{-1}$) was greatest when paddocks were grazed in April, and declined by about 20% when grazed in May. Overall, upland grazing strategies that include a grazing period in early May will result in greater utilization of cool-season species, but summer yield will be reduced.

Interspecific Competition Interacts With the Spatial Distribution of a Palatable Grass to Reduce Its Recruitment

Pablo A. Cipriotti and Martín R. Aguiar

The possibility of restoring grazed rangelands depends, partially, on the ability of remaining desirable populations to recover. We studied the spatial distribution of remaining palatable grasses in fields with different grazing intensity and quantified the effect of interspecific competition with less palatable grasses on regeneration. The proportion of palatable grasses growing in protected places significantly increased with grazing intensity. But competition effects on regeneration depended on the year's rainfall and less palatable species. We suggest that management for recovering degraded rangelands may benefit from considering the spatial distribution of remaining palatable plants, interactions with less palatable species, and climatic variation.

Silver Sagebrush Community Associations in Southeastern Alberta, Canada

Paul F. Jones, Roy Penniket, Livio Fent, Joel Nicholson, and Barry Adams

Greater sage-grouse (*Centrocercus urophasianus*) habitat in southeastern Alberta, Canada, is limited by the distribution of silver sagebrush (*Artemisia cana* Pursh); however, the community associations of silver sagebrush with soil landscape types are not well understood. Using aerial photography, we classified polygons into 1 of 13 site classes based on soil type and landscape feature and then classified each based on silver sagebrush percent occupancy, density distribution, and height. Silver sagebrush attributes were not uniform between the 13 site

classes. Understanding community associations of silver sagebrush will assist in understanding the resource selection patterns and managing sage-grouse and their habitat in Alberta.

Remote Sensing Assessment of *Paspalum quadrifarium* Grasslands in the Flooding Pampa, Argentina

Lorena P. Herrera, Vanina Gómez Hermida, Gustavo A. Martínez, Pedro Laterra, and Néstor Maceira

The tall-tussock grassland dominated by *Paspalum quadrifarium* ("pajonal") represents the pristine physiognomy of the Flooding Pampa region of Argentina. Mapping remnant stands will aid their management and conservation. We compared 2 classification methods (supervised and unsupervised) using LANDSAT TM images to discriminate the pajonal from other grassland types and land-use patterns. Both classification methods provided very good overall accuracy, but producer's and user's accuracies were better for the unsupervised classification. The unsupervised classification seems a particularly suitable method for mapping complex vegetation units and should be an important tool for management and tracking of future changes.

Fall-Prescribed Burn and Spring-Applied Herbicide Effects on Canada Thistle Control and Soil Seedbank in a Northern Mixed-Grass Prairie

Andrea J. Travnicek, Rodney G. Lym, and Chad Prosser

Prescribed burns in Theodore Roosevelt National Park in North Dakota were thought to cause Canada thistle to increase more rapidly than in nonburned areas and perhaps reduce herbicide efficacy. This study showed that Canada thistle did emerge more rapidly in burned compared with nonburned areas, but the effect was short-lived, as indicated by similar weed densities the second season after the burn. Control with herbicides was similar regardless of whether an area was burned prior to application. Thus, current management practices can continue, but reseeding to desirable species is encouraged because more than 80% of seedbank in Canada thistle infestations consisted of undesirable species.

New Mexico Blue Grama Rangeland Response to Dairy Manure Application

Lanson J. Stavast, Terrell T. Baker, April L. Ulery, Robert P. Flynn, M. Karl Wood, and Douglas S. Cram

Dairy cattle produce large quantities of manure every year, resulting in disposal and recycling challenges. It has been suggested that excess dairy manure could be applied to rangelands as an organic fertilizer to increase soil fertility and herbaceous production. We applied light and heavy manure treatments to a blue grama–dominated rangeland in New Mexico to determine impacts on vegetation. Results indicated that a light manure application rate can increase forb and, in particular, grass standing crop on arid blue grama rangelands. Successful rangeland manure applications will depend on proper management to ensure that objectives are met while minimizing any hazard to the environment.

Research Note: Feeding Value of Singed Walkingstick Cholla

Rachel L. Endecott, Jason E. Sawyer, Clint A. Löest, and Mark K. Petersen

Walkingstick cholla cactus (*Opuntia imbricata* [Haw.] D.C.) has been used in New Mexico as an emergency feed during drought for over 100 years. Most reports present only chemical composition of walkingstick cholla, and limited data exist regarding its feeding value. Treatments consisted of 0%, 15%, and 20% walkingstick cholla in the diet on a dry matter (DM) basis. Dietary organic matter and crude protein digestibilities were similar for all treatments. Because of the poor feeding value and low DM content of walkingstick cholla, its use as an emergency feed should be carefully considered.

Technical Note: A Visual Obstruction Technique for Photo Monitoring of Willow Clumps

Chad S. Boyd and Tony J. Svejcar

At the time of this research, there were no repeatable and reliable techniques for measuring browsing impacts on willows, creating problems for both public and private land managers. We tested a photographic technique for estimating willow biomass and utilization that relied on computer-derived estimates of percent visual obstruction of a photoboard. Results suggest that this technique accurately estimated willow biomass and disappearance of biomass associated with simulated browsing, while minimizing sampling error. Our approach provides managers with a clearly defined tool for monitoring willow biomass and utilization that will be useful in developing grazing systems and adjusting stocking rates.

Technical Note: An Unmanned Aerial Vehicle for Rangeland Photography

Perry J. Hardin and Mark W. Jackson

Because of its perceived impracticality and expense, aerial photography from unmanned aerial vehicles (UAVs) remains virtually unused as a rangeland management tool. A remotely controlled UAV suitable for 35-mm photography was built in 56 hours at a cost of $1,480. In a 2-year test period, the UAV successfully completed 100+ sorties at elevations ranging from 10 m to 1,000 m above ground. Typical cruise speed during photograph acquisition is 13.8 m/s, resulting in 6.9 mm of blur from forward image motion. The UAV is an inexpensive tool for monitoring rangeland conditions from an aerial perspective. ◆

Letters to the Editor

To The Editor, *Rangelands*

The View Points article in the April 2005 *Rangelands* entitled "Range Readiness Is an Obsolete Management Tool" intrigued me. I have a few reservations about their thesis.

They infer the range readiness concept is outdated and without foundation in today's world. They claim that if there is enough forage to maintain animal condition and if soils are firm enough to adequately support consequent treading, we need not be concerned with vegetative readiness at all.

I have no problem dropping this rule of thumb on most rangelands in semiarid climates of western North America where we have had a century of learning experience and even some good supporting science. But when one considers other rangelands in today's world, like tropical and subtropical or alpine and subalpine ranges in third-world countries, it may not be a good recommendation. For example, in Tibet, Zambia, or Bolivia, where they still don't have fences, four-wheelers, or range management institutions, vegetative guidelines may still be of value in reaching herdsmen.

On another score, these authors made a point of saying early researchers who developed the readiness concept were only concerned with vegetative range readiness and had no understanding of soil conditions relative to range readiness. They cited A. W. Sampson and others. WHOA! In 1907, Dr Sampson set up grazing experiments in the high mountains of northeastern Oregon with weather stations for measuring soil moisture, evapotranspiration, humidity, and temperatures. The *Wallowa Sun* (Wallowa, Oregon) said on June 7, 1911, that Arthur Sampson had just arrived from Washington, D.C. and was soon to be joined by Mr [Dr Wm. O.] Dayton and Mr Baston, who would be studying soils of that high mountain sheep range.

In 1913, when Sampson wrote up his results in USDA Circular 169 "Range Improvement by Deferred and Rotation Grazing," he wasn't just considering vegetation development. The same year he initiated paired watersheds on the Wasatch Plateau to study infiltration and soil erosion. Therefore, to say early researchers did not consider soil conditions relative to range readiness is faulty.

Fredric Colville studied sheep grazing in the forests of the Cascade Mountains of Oregon in the late 1890s and discovered that if forage development was not far in excess of that needed to maintain animal condition, destructive grazing on conifer regeneration occurred. This is an example of the use of vegetative development practices as fitting today as it was over a century ago. Moreover, vegetative range readiness indicators are useful in establishing livestock "turn-on" dates for manipulating conservation status in critical wildlife habitats.

All this implies to me that total rejection of old concepts is problematical and should be tempered with moderation. I suggest we not throw the baby out with the bath water.

Jon M. Skovlin

BOOK REVIEW

Hell Creek, Montana. America's Key to the Prehistoric Past. By Lowell Dingus. 2004. St. Martin's Press, New York. 242 p. US$22.95 hardcover. ISBN 0-312-31393-4.

Growing up in the small town of Havillah, Washington, it seemed as though life would never change. Not a whole lot happened in a community that consisted of a modest Lutheran Church and 7 people. Sure, a cow would escape from the Kuhlman's pasture every once in awhile and create some excitement, but for an 18 year old, it was just not enough. Naturally, like most kids in the same predicament, I counted the days until I could escape from the unchanging monotony of small-town life and experience the real world.

My opinion remained the same until I returned home after spending 3 months away at college. I was shocked to find things were not exactly as I had left them. There was barley growing in the field across from the church instead of alfalfa, and Mrs. Kuhlman had a sparkling new white fence. Sadly, there was also a face missing from the normal crowd at church Sunday morning. Leonard had suffered a heart attack while plowing in his field and passed away. Suddenly, it became very clear that even life in Havillah was not in fact static and unchanging, but was constantly evolving and being modified. Being away from home gave me a whole new appreciation for the so-called simple life of the country.

The book *Hell Creek, Montana* similarly follows the process of evolution in the remote town of Jordan, Garfield County, Montana. Garfield County is about the same size as Connecticut, yet has a population of only 1,589. Even today, Jordan is Garfield County's only town. Yet despite its size, the area around Jordon, which includes a tributary of the Missouri River named Hell Creek, has experienced remarkable events.

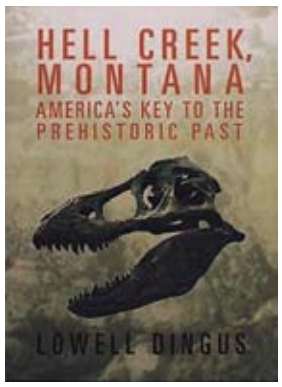
Lowell Dingus is a paleontologist who was drawn to the Hell Creek region around Jordan in the pursuit of dinosaur fossils. His main interest is telling the story of the discovery of the first ever *Tyrannosaurus rex* fossil, which was found in the area. But the countryside and the amazing people who live there also captivate him. As I do, Dingus realizes life is constantly evolving. In order to give his audience the full scope of the *Tyrannosaurus rex* discovery in the Hell Creek region, he reveals in his book a complete history of the area. In doing so, he creates a more compelling and captivating story, one that forces people to think beyond the simple events of the present.

The saga begins with a description of the area through geologic time. Sixty-five million years ago, the Hell Creek region was a lush, deciduous forest on the edge of an inland sea. It supported an array of dinosaurs, including the fearsome *Tyrannosaurs rex.*

Dingus then proceeds to describe the early exploration of the area in the beginning of the 19th century. Louis and Clark passed through the Hell Creek region on their journey up the Missouri River in May of 1805. He tells the story of a grizzly confrontation that occurred not far from Hell Creek region on May 14, 1805. Since then, grizzly bears have ceased to exist in this area of Montana.

Following his discussion of the Lewis and Clark expedition, Dingus reveals the plight of the Sioux Indians in the Hell Creek region. Many of the battles of the Great Sioux War of 1876–1877, including Custer's Last Stand at the Battle of Little Bighorn and Sitting Bull's flight to Canada, relate directly to the area around Jordan in central Montana. In fact, the Hell Creek region was Sitting Bull's favorite bison-hunting ground. Later, as bison numbers declined on the Great Plains, William T. Hornaday took specimens from canyon regions around Jordan for the Smithsonian Museum. When, in the late 1800s, bison were close to becoming extinct, the specimens taken by Hornaday became extremely valuable.

After surveying the history of the Hell Creek region, Dingus delves into his main subject of interest, the discovery of fossils and the *Tyrannosaurus rex.* He follows the efforts of legendary paleontologists, such as Barnum Brown and Harley Garbani, as they made landmark discoveries in the late 1800s and early 1900s. He then tracks the chain of fossil discoveries to the present day, noting the role sediment layers in the Hell Creek region have played in revealing history. Dingus weaves in interactions between the locals of Jordan and the fossil hunters, making the reality of the situation come alive in the mind of the reader.



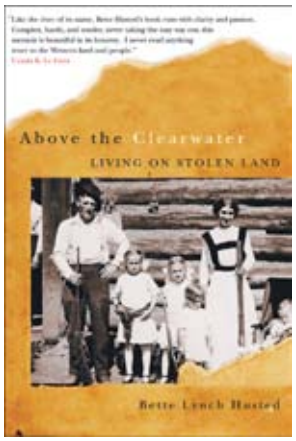
Dingus concludes his summary of the events surrounding the Hell Creek region of Montana by unfolding the latest colossal episode in the area. In 1996, a radical group called the Freemen had a standoff with the government on a compound near Jordan. As he tells the story of the town and how it was affected by the onslaught of media, the reader gets a feeling for the true lifestyle of rural farmers and ranchers.

In *Hell Creek, Montana*, Lowell Dingus tells more than the simple story of the first discovery of a *Tyrannosaurus rex.* Rather, he tells a complete history of one seemingly unimportant area in the middle of nowhere Montana and, in doing so, also reveals the true nature of rural life. In the

past, I have fallen into the trap of thinking small towns are boring, monotonous, and stationary. Yet, as I found out, and as Dingus describes in this book, even though the future is uncertain, the one thing that can be counted on is that everything will continue to evolve and change. So Dingus not only tells the tale of a dinosaur, he tells the tale of the continuous process in life that is inescapable, even in the remotest areas of our landscape.

Amber Morris, Washington State University, Pullman, WA. ◆

Above the Clearwater: Living on Stolen Land. By Bette Lynch Husted. 2004. Oregon State University Press, Corvallis, Oregon. 176 p. US$18.95 paper. ISBN 0-87071-0097.



Those captivated by the history of America's western lands and its people will find *Above the Clearwater: Living on Stolen Land,* a memoir by Bette Lynch Husted, both engaging and educational. Authored by a woman who lived to tell of her life experiences, the author reflects on her life and weaves brief history lessons throughout. It is as though we are climbing the author's family tree, investigating one branch at a time. Some branches are slowly pruned off and other branches grow in their place. The branches' leaves are the stories and life experiences of those family members. Among the stories, the book showcases family pictures, helping create a visual image of the friends and family members who contributed to her life's happenings.

The collections of stories are organized into 3 main categories: childhood, motherhood, and adulthood. Beginning her life on an Idaho homestead, she struggles with the idea of living on stolen land—land taken from the Nez Perce—the death of parents and loved ones, the challenges of motherhood, and the discovery of her passion in life, teaching.

The rich content of the book consists of personal stories, bits of poetry, and family photos, grouped into 3 main sections, each containing anywhere from 3 to 7 chapters. The stories are relatively short, sometimes only a few paragraphs, and seem random in arrangement. It is almost as though the leaves (stories) that fell from her family tree were raked into a pile, then randomly picked out. The subtitle however, is a bit misleading. Rarely does the author wrestle with the idea of living on stolen land but instead explores more of her life experiences, revealing her family's joys, tragedies, secrets, and unanswered questions.

Visually, this book is appealing to the eye. The black-and-white photographs reinforce the time period of the content. In retrospect, the tree as a whole captures the essence of times forgotten. Historians, naturists, poetry lovers, and women of all ages will find *Above the Clearwater: Living on Stolen Land* a captivating book for historical research or for pleasure.

Kelly L. Kolrud, Washington State University, Pullman, WA. ◆