



## The New Ranch Handbook: A Guide to Restoring Western Rangelands

by **Nathan Sayre**

**Editor's Note:** *The New Ranch Handbook: A Guide to Restoring Western Rangelands* profiles six ranches where ecological and economic improvement have been achieved through creative, progressive management—places the Quivira Coalition refers to as New Ranches. Three practice short duration grazing, and three utilize rest-rotation systems. *The Handbook* situates these ranchers' practices in a larger discussion of current scientific knowledge and theories about arid and semiarid rangelands. Principles for sustainable, more profitable ranching are developed, along with guidance for applying the principles on the ground. What follows is a highly condensed summary of the scientific argument.

Arid and semiarid rangelands (receiving less than 10 or 20 inches of rain per year, on average, respectively) defy some of the central assumptions of classical ecology and conventional range management. They are highly variable over time

and space, making fixed measurements of carrying capacity or “the right” stocking rate questionable. And they do not necessarily revert to a single, “climax” vegetation community when released from grazing.



In recent decades, scientists have begun to develop models to explain and explore these complex dynamics. There is a need to update the tools and concepts of range management to reflect the improved scientific understanding emerging from this work.

While much remains to be understood about these ecosystems, several fundamental processes affecting vegetation have been described. Grazing is one of several types of natural disturbance to which many range plants are adapted; its effects depend—like those of other disturbances—on timing, intensity, and frequency, and it can be managed in these terms. Vegetation is highly

sensitive to variations in available water and nutrients, both of which cycle through the ecosystem in ways that can be indirectly influenced by management. The New Ranch demonstrates that management tailored to these processes, and attuned to variability, can conserve rangeland resources and help restore areas that have been degraded in the past—while simultaneously producing greater returns for the ranch. Indeed, profitable ranching *needs* ecologically healthy and functioning rangelands, because the same processes that support wildlife habitat, watershed functioning, and biodiversity also produce more and better forage for livestock.

### **Ranching as Sustainable Agriculture**

To be sustainable, ranching must convert natural forage into livestock in such a way that the forage remains vital year after year. This is possible because grasses are resilient to grazing—that they can

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## Press Conference, January 22, 2001

### *Of Land and Culture: Environmental Justice and Public Lands Ranching in Northern New Mexico*

A crowd of about 35 joined us at the State Capitol as we announced the publication of *Of Land and Culture: Environmental Justice and Public Lands Ranching in Northern New Mexico*, a Joint Report by the Quivira Coalition and the Santa Fe Group of the Sierra Club.



Courtney, Virgil, and Ernie. (Photos courtesy of Gene Peach.)

Those present, including several reporters, heard author Ernest Atencio, Courtney White, Executive Director of the Quivira Coalition, Cliff Larsen, Conservation Chair of the Santa Fe Group of the Sierra Club, and Virgil Trujillo, Manager of Rangelands at Ghost Ranch, speak about the report and its importance.



The Rotunda during the Press Conference.

As the Sierra Club faces a referendum on “no grazing on public land,” this report addresses the consequences of such a policy for ranchers in northern New Mexico. According to the report:

“Without access to public lands, it’s clear that an age-old tradition, and an essential local economic pursuit, would probably be over. . . losing all access to centuries-old traditional grazing lands would be the final blow.

Not only would the rich fabric of social, cultural, and economic continuity begin to fray, but local ranchers who are barely staying afloat as it is in a floundering local economy would find themselves in worse condition, struggling to provide even the basic comforts, food, and education for their families.”

**This report is free. But call soon as quantities are limited.**

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March 2001

It was a little over two years ago when Board members Jim Winder and Kris Havstad proposed that we publish a book.

Each felt that the time had come to articulate the science behind progressive ranch management, and to do so in a comprehensive, and yet easy-to-read, publication.

Over the years, Jim had collected a stack of articles on ecology and range science that measured two feet high. Kris had been researching and writing on the topic for most of his adult life. Surely, they thought, we can synthesize this material into a 100-page book, right?

Right.

We had the good fortune to know, and hire, Nathan Sayre to do the job. Nathan had just completed a Ph.D. in Anthropology at the University of Chicago. His dissertation focused on the management of a federal wildlife refuge south of Tucson and the ranching community that surrounded it. He was well-versed in the historical, cultural, and ecological issues at play in the region. And he jumped at the opportunity to work for us.

With a generous grant from the Thaw Charitable Trust and the National Fish and Wildlife Foundation, we were able to send Nathan into the field.

Two years later, we are very happy to announce the publication of ***The New Ranch Handbook: A Guide to Restoring Western Rangelands***.

As we wrote in the Preface, its goals are: 1) To describe management practices that have suc-

ceeded in improving both the conservation values and the economic sustainability of a handful of ranches in the Southwest.

2) To situate these management practices in a framework of scientific research that helps to explain their success.

3) To offer a common vocabulary and set of concepts for ranchers, scientists, agency officials, and environmentalists to use in addressing rangeland issues.

And 4) To increase awareness of the complexity and difficulty of managing rangelands well.

Concerning the subtitle, Nathan writes, "Restoring Western Rangelands refers to conserving, restoring, and/or enhancing the basic ecological processes and functions that support rangeland health: soil stability, watershed function, nutrient and energy flows, and resistance and resilience to disturbance."

Did we succeed in our aims? According to Bill McDonald, fifth generation rancher, Executive Director of the Malpai Borderlands Group, and MacArthur Fellowship recipient, "This book should be required reading for everyone who has an interest in natural resource management in the West, especially those concerned with livestock grazing."

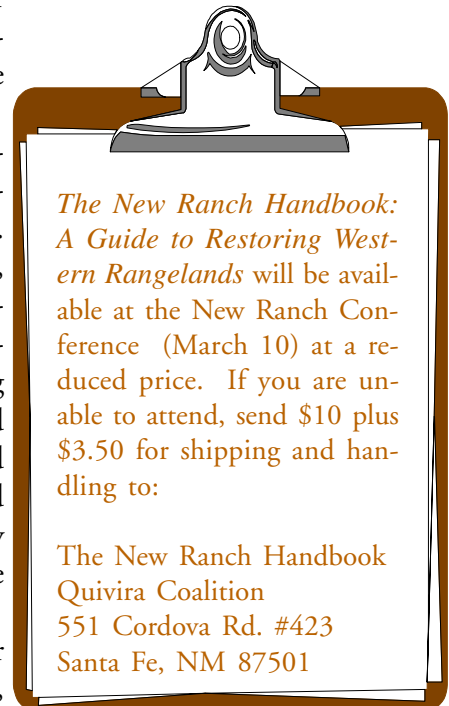
Prof. George Ruyle, Chair of the Rangeland and Forest Resources Program at the University of Arizona says, "The New Ranch Handbook promises much in title and delivers more in substance."

But don't take our word for it. Order a copy for yourself. Let us know what you think.

And tell a friend.

# From the Founders

**Jim Winder**  
**Courtney White**  
**Barbara Johnson**



March 2001

# Announcing Cibola Services Environmental Monitoring

by Courtney White

The Quivira Coalition has decided to start a contract monitoring and assessment business.

We call it Cibola Services. Its mission is to provide scientifically credible, nonpartisan, quantitative and qualitative data to public and private landowners on the environmental conditions of their land through a combination of assessment and long-term monitoring.

As everyone reading this newsletter probably knows, the need for reliable, nonpartisan information on the conditions and trends of public and private lands in the West is huge—and growing.

Increasingly, the public is demanding accurate data on the environmental health of its rangelands, forest, and riparian areas. At the same time, expanding workloads and decreasing budgets have severely limited the ability of federal and state land managers to conduct long-term monitoring projects to meet this demand. Many private landowners are in a similar bind.

A lack of trust among individuals, interest groups, and land owners complicates the picture. Data collected by ranchers may not be accepted by environmental organizations; information gathered by federal employees may not be trusted by the agricultural community; and so on.

By creating impasses and inhibiting good decision-making, this climate of distrust has had deleterious effects on environmental health. Assessment and monitoring, however, by an organization perceived as “third-party” and credible by most individuals and

organizations could resolve this conflict.

## *Why Monitor?*

The primary purpose of monitoring is to detect CHANGE over time. Detecting change in riparian and upland environments is the best way to provide answers to questions that will help landowner/managers make informed decisions about the future of the land under their care. On public land, it is the best way to inform citizens of the current conditions and trends of their land, and to build trust.

Additionally, independently gathered, scientifically credible monitoring data will fill in the “blank spots” in the often contentious debate about the effects of cattle grazing in the West. Too much of this debate is being argued without reliable data, with many sides relying on testimonials or hearsay to make their point.

Fortunately, a consensus is emerging among the scientific community about what to monitor, how, and where.

In 1994, The National Academy of Sciences, in a publication entitled *Rangeland Health*, defined rangeland health as “the degree to which the integrity of the soil and ecological processes of rangeland ecosystems are maintained.”

Their monitoring objective is to quantify over time the effects of management treatments in a variety of habitats. This means, principally, quantifying ecosystem function, resistance to degradation,

(con't on page 5)



and capacity to recover following degradation. Monitoring measurements are used to generate a suite of basic indicators which are directly related to three fundamental attributes of ecosystem function:

- **soil/site stability:** the ability to resist erosion by wind and water;

- **hydrology:** the ability to capture, store, and safely release water from rain or run-off; and

- **biotic integrity:** the ability to support functional communities and resist disturbance.

The point is a simple, but significant, one: before a piece of land can have VALUE, i.e., before it can support wildlife or recreation or livestock production, it must be in properly functioning condition. If it is not healthy, then measures should be taken to restore it.

Assessing and monitoring soil, water, and grass condition over time will enable all interested parties to examine and manage land for rangeland health. This is the key, we believe, to long-term sustainable use of public and private land.

### **What is Cibola Services?**

We will deliver voluntary, collaborative, non-partisan monitoring and assessment services to individuals, organizations, and agencies that request it. We will only work where we are wanted and where we believe we can be genuinely helpful. We will only hire Designers, Crew Chiefs, and Crew Members who are professional, skillful, enthusiastic, and committed to the collaborative process. At the same time, we are com-

mitted to running Cibola Services in a business-like manner.

For assessments we will follow the guidelines put forward in a multi-agency document entitled *Interpreting Indicators of Rangeland Health* (Technical Reference 1734-6, 2000). Using knowledgeable people, this approach: 1) helps land managers identify areas that are at risk for degradation; 2) helps select monitoring sites; and 3) helps communicate rangeland health issues to a wide variety of audiences.

Assessments are both a separate service and a part of the monitoring program.

For monitoring, we will use a new protocol developed by the scientists at the USDA's Jornada Experimental Range. At each monitoring site, which consists of a center post with three transects in equidistant spokes leading away from the center post, four basic measurements are taken: *photo points*, *line point intercepts* for vegetation cover and composition, *continuous line intercepts* for size of intercanopy gaps, and *soil stability* for integrity of soil structure and erosion resistance. Additional measurements may be developed or added according to the monitoring goals.

**Photo points.** A photo is taken of each transect while the tape is still lying on the ground along the transect. The picture is taken from directly above the center post with the long axis of the camera parallel to the ground.

**Line-point intercept.** This measurement provides quan-

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## **Cibola Services**

(con't from page 4)

### **The Board of Directors**

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**\* For informational purposes only**



March 2001

## Cibola Services (con't from page 5)

titative indicators of biotic integrity including species composition, community and canopy structure,

**Soil stability.** This measurement provides indicators of soil structural development and erosion resistance.



Monitoring at the Jornada Experimental Range. (Photo courtesy of Kris Havstad.)

and surface structure. Dropping a pin flag so that it falls vertically and touches the near side of the tape, the recorder notes every live leaf or stem touching the pin, or the vertical line drawn by the pin, from the sky down to the soil or ground surface. Litter, rock, lichen, moss, crust, or bare soil are recorded if they occur. Dead trees, grasses, forbs, or shrubs are recorded. This data provides a means of comparing data collected at different locations and at different times. As a result, trends in time for each of the indicators will be evident.

**Continuous line intercept.** This data is also quantitative and provides a measure for comparing the number of canopy gaps per site, the mean gap size per site, and the relative distribution of gap sizes at each site. Each of these gap features is indicative of system structure and function, particularly with respect to potential for erosion.

### Putting It To Work

With regard to monitoring, Cibola Services uses a two-step program. The first step consists of a collaboration between the landowner, or permittee and federal overseer, and the Designer of a monitoring plan. This is important because the critical step in designing a monitoring program is deciding where to place the monitoring sites—a decision that must be made with ecological **and** management objectives in mind. Therefore, a constructive dialogue between the landowner and the Designer is an essential first step to implementing a monitoring program.

Designers are individuals who have extensive knowledge and training in ecological processes, quantitative and qualitative monitoring protocols, “real world” experience in local landscapes, and a significant understanding of the ranching industry, including the variety of ranch management strategies. Designers, along with Crew Chiefs and Crew Members, will be on contract to the Quivira Coalition through Cibola Services.

Working together, the landowner and the Designer will create a long-range monitoring plan that fits the nature of the physical terrain, specific objectives of management, and the long-term “vision” of the landowner, including any future desired conditions.

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## Cibola Services

(con't from page 6)

Monitoring design, including the number of sites necessary, the use of control sites, the length of transects and the particular measurements to be used, will be developed in collaboration with the ranchers and land managers, according to the specific monitoring goals established for each ranch. Participating ranches will be evaluated before treatment for soil type, slope and aspect, the presence or absence of water, and variation in dominant vegetation. Monitoring sites should be representative of the soil, topographic, and floral variation occurring across the whole monitored area.

The second step involves implementation of the approved monitoring plan. A team of two to three trained monitoring professionals, led by a Crew Chief, would visit the monitoring sites and conduct the first round of work. Then, depending on the details of the plan, the crew would return to the sites on a periodic basis (preferably with the same people), probably annually, to continue the monitoring work.

The Crew Chief is responsible for organizing the crew, overseeing the work, interacting with the landowner, and writing the final report. The Crew Chief will likely work with the landowner and the Designer in the latter stages of creating a monitoring program.

Other details, such as an Oversight Panel, which will ensure the scientific credibility and objec-

(con't on page 18)

## New Ranch Conference

Saturday, March 10, 2001, 8:30am-5pm

Farm and Ranch Museum

Las Cruces

This **FREE** one-day event is for anyone interested in new approaches to ranch management on private and public land.

Speakers include:

**Roger Bowe**, *Rafter F Cattle Co.*

**Dave Bradford**, *U.S.F.S.*

**Mac Donaldson**, *Empire Ranch*

**Sid Goodloe**, *Carrizo Valley Ranch*

**Dr. Kris Havstad**, *Jornada Exp. Range*

**Bill McDonald**, *Malpai Borderlands Group*

**Sam Montoya**, *Pueblo of Sandia*

**David Ogilvie**, *U Bar Ranch*

**Scott Stoleson**, *Rocky Mtn. Research Station*

**Virgil Trujillo**, *Ghost Ranch*

**Jim Winder**, *Double Lightning Ranch*

Topics to be covered include: proper ecological stewardship of watersheds; herding; how to make a profit in ranching; holistic planning; ranching and endangered species protection; the best science; how to make public lands ranching work in the new millenium; collaboration; and monitoring.

The Quivira Coalition will also **DEBUT** a major publication at this conference! It's called

***The New Ranch<sup>SM</sup> Handbook:***

***A Guide to Restoring Western Rangelands,***

authored by Dr. Nathan Sayre

It is a comprehensive guide to the issues surrounding science and progressive management in the Southwest.

Bill McDonald calls the handbook "required reading for anyone interested in natural resource issues" in the region. George Ruyle says it "may serve both as a textbook and as a reference manual."

This conference is **FREE**, but please RSVP so we can get an accurate head count for lunch.

<sup>SM</sup>The New Ranch is a service mark of the Quivira Coalition.

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March 2001

*Profile of Good  
Stewardship:*  
**The Rafter  
F Cattle  
Company**

Roger Bowe heard the whistle of change long before the train ever appeared on the tracks.

For three generations, the Bowe family managed the private, 14,000-acre Rafter F as a traditional cattle ranch. That meant continuous grazing year round at a stocking rate that was commensurate with the ranch's location on the high, windy plains of the New Mexico-Texas state line, near In-

of subdivisions moving in around here either," says Roger with a chuckle.

In the early 1980s, Roger and his family, including his brother, faced the possibility that they would be the next to leave. The ranch suffered from a slow, but steady ecological decline. His cattle, though distributed evenly across the ranch, were impacting the land unevenly. They were overgrazing the blue grama and buffalo grasses on the flat mesa tops while underutilizing the tobosa bottomlands.

The cattle didn't mind this arrangement much, but the land did. Roger began to observe a distinct lack of vigor in the plant community across the ranch. The grasses on the mesatops were never allowed to set seed, and the tobosa grass looked gray and sickly. "I knew the land was unhealthy," says Roger in his quiet plains accent, "but I didn't know why."

That's when Roger distinctly heard the whistle of change for the first time.



Roger Bowe. (Photo courtesy of Roger Bowe.)

terstate 40.

Change is no stranger to the area, however. Thirty years after Roger's grandfather homesteaded the ranch in the early 1900s, the Bowe family watched with dismay as a sizeable farming community in the area was literally blown away in the Dust Bowl. In the decades since, families have continued to drift away one at a time. Roger thinks the population has dropped by two-thirds since he was a boy—a trend he believes will likely continue into the future.

"There's not much threat

**HRM**

In 1983, looking for answers to their dilemma, Roger, his brother, and, eventually, his father enrolled in a course on Holistic Resource Management (HRM) taught by Allan Savory where they learned a life-changing lesson: overgrazing had more to do with timing than with numbers of cattle.

Recovery was the key. A grazed plant needed sufficient time to recover, and become vigorous once more, before being grazed

*(con't on page 9)*



again. Sending the cattle back into a pasture too soon would cause overgrazing. The numbers of cattle involved, or stocking rate, had very little to do with anything.

Roger and his family came away from the HRM courses convinced that if ranchers were to succeed in a rapidly changing world, they had to start learning the principles of ecosystem function. The words “water cycle, mineral cycle, energy flow, and succession” became the words we used to describe the landscape,” says Roger. “This is like a foreign language to most ranchers and it is sure not what I was taught in school. This has been a big problem in trying to relate what we were doing to other ranchers.

“My dad and I were very excited about what we had learned,” continues Roger, “but we made the mistake of building a lot of fences and doubling the stocking rate right off.

“Thank goodness we were also monitoring what was happening on the ground.”

The plants, Roger noticed, were not recovering quickly enough. He responded by reducing the size of his herd and creating longer periods of recovery for the plants.

It took three years to work the kinks out of the system, but monitoring data showed significant improvements. Bare ground on the ranch decreased by one-third; litter cover increased by over 10%; basal cover doubled. The average distance between plants declined by two-thirds and snakeweed declined by 90%.

Roger raised the water

table, too. “We had an old well that ran dry in the ’50s, but now it has 10 feet of water in it,” he says. “My dad had never seen water stay there. He had seen it dry from 1950 to 1990.” Roger credits the short-duration grazing management for the new water; by growing more grass he increased the rate of water infiltration on the ranch.

“Growing water” is just one of a number of wonders Roger has experienced since 1985. “I’ve seen tremendous things happening,” he says. “We have many new grass species showing up—bluestem, western wheat grass, Canadian wild rye, Indian grass and a 50 to 60% increase in ground cover from new plants and litter.”

The key, says Roger, is a willingness to keep learning from the land. “After 15 years of this, I’m still a student,” he says with a smile.

**Profit**

Almost as a bonus, Roger’s ecological success on his ranch translated into economic success

(con’t on page 10)

*Good Stewardship:*  
**The Rafter F Cattle Company**

(con’t from page 8)

**MONITORING RESULTS - BOWE RANCH**  
SAN JON, NEW MEXICO USA

NORTH CELL	1984	1986	1990	1991	1992	1993
% BARE GROUND	46	54	25	26	39	30
% LITTER	44	39	57	62	49	54
% BASAL COVER	8	7	18	17	17	16
% MATURE CAPPING	42	22	2	2	5	2
AVG. PLANT DISTANCE	1.8	0.86	.96	.70	.95	.69
SPECIES PERENNIAL GRASS	6	NA	17	17	17	18
LBS. BEEF PER ACRE	14	23	29	31	31	26
NET INCOME PER ACRE	5.84	8.00	19.4	18.4	22.5	NA
% BROOM SNAKEWEED	11	NA	1	1	1	1



*Good Stewardship:*  
**The Rafter F Cattle  
 Company**  
*(con't from page 9)*

as well. Even though he more than doubled the size of his herd, Roger managed to cut the production costs per pound of beef in half while raising production. “We went from 15 pounds per acre to 32,” says Roger. And his profits went up correspondingly.

**BOWE RANCH RESULTS  
 COST PER POUND OF BEEF**

ITEM:	1983	1990
FEED	.14	.09
REPAIRS	.02	.002
INTEREST	.07	.03
SUPPLIES	.03	.01
CHEMICALS	.01	0
VET & MED.	.02	.007
GAS & OIL	.02	.006
TAXES & INS	.02	.007
UTILITIES	.006	.003
LAND RTRN 3%	.25	.10
<b>TOTAL</b>	<b>\$.60</b>	<b>\$.26</b>

Roger’s labor costs were reduced as well. For example, winter feeding, once an eight-hour job, now only takes two hours because the cows are grouped together as a herd. Of course, the initial labor of building the paddocks and establishing new water sources was expensive, but Roger figures the return on that investment has now surpassed 1000%.

The ranch’s rise in profitability was not an accident, however. It was part of a carefully considered plan. “HRM is more than just a grazing system,” explains Roger, “it helps you attain your goals for your total operation.” Roger and his family were required to sit down

and come up with long-range plans. What did they want the ranch ecology to look like? What sort of quality of life did they want to achieve? What were their production goals? “It was the hardest thing I’ve ever done,” he says. But it paid off handsomely.

“Success requires vision, observes Roger, “but it also requires flexibility. Don’t cast your goals in stone, or you won’t reach them.” That flexibility includes the grazing system itself, notes Roger, which must be adapted to

the specific economic and ecological needs of each ranch. The principles are always the same—rest, recovery, timing, intensity, frequency—but how they are expressed can vary tremendously.

In 1993, Roger’s success paid an unexpected dividend when he was selected as one of seven regional winners of the National Cattleman’s Association’s Environmental Stewardship Award. As the Southwest representative, Roger was recognized by the Selection Committee of the NCA for showing that good conservation practices and good business go hand in hand. He also got a free trip to the annual convention in Reno, Nevada.

Roger made the newspapers and was quoted as saying, “With a little investment in capital, a lot of hard work, and a big change in the way I manage resources, we have made good progress in sustaining our land for the next generation.”

***Frustration***

If there is a dark cloud to Roger’s tale of success, however, it might be the frustration he feels at the slow response of his fellow ranchers to his example.

“When neighbors come on the ranch, they always look sideways, either at the horizon or at my cattle,” says Roger. “They only want to talk about the weather or performance. They almost never look at the ground.”

And talking about the land, Roger believes, is the key to the future of ranching.

*(con't on page 11)*



Over the years Roger has worked hard to share his story with other ranchers. He has written and lectured extensively, and even taught a class on holistic management at the community college in Tucumcari. "I even tell people that I've dropped my golf handicap from 12 to six since switching to HRM, which is true," says Roger, with a smile.

It hasn't worked. It's not just his neighbors either; Roger has encountered everything from skepticism to outright hostility from ranchers across the region. To a meat-and-potatoes rancher like Roger, who does not consider himself a radical at all, it is a perplexing, and distressing, situation.

The reasons for resistance by ranchers are varied, but Roger singles out one in particular: pride. "The quickest way to end a conversation is to say I'm here to educate you," he says, "especially if the topic involves the environment. Most ranchers equate any discussion about ecology with environmental activists from the city," he says.

It is an irony that causes Roger some pain. "What environmentalists say is what ranchers believe too," he says. "There should be a lot of common ground, but there hasn't so far."

Doubly frustrating is the denial maintained by ranchers in the face of rapid change taking place all around them. Roger hears the whistle of change loud and clear on the tracks, aimed directly at the ranching community. "It's coming," says Roger, referring to pressure from cities and other glo-

bal forces, "and every rancher should pay attention."

Roger has worked hard to stay ahead of that whistle. That more ranchers have not chosen voluntarily to join him has discouraged him somewhat, but not to the point of despair.

Like most ranchers, Roger remains stubbornly optimistic.

*Good Stewardship:*  
**The Rafter F Cattle Company**  
*(con't from page 10)*



Healing riparian area on the Rafter F.  
(Photo courtesy of Roger Bowe.)

"Doing things differently can really pull you down sometimes," says Roger. "Peer pressure can be overwhelming to the point you want to say why bother? When this happens I saddle up my trusty quarterhorse and ride the range looking at the creeks that have healed up with grass, I ride by the ponds that are clear and full of life again, I look at the grass plants that are thriving due to proper rest, and finally I go back home and look at my goals and smile, knowing that I'll never go back."

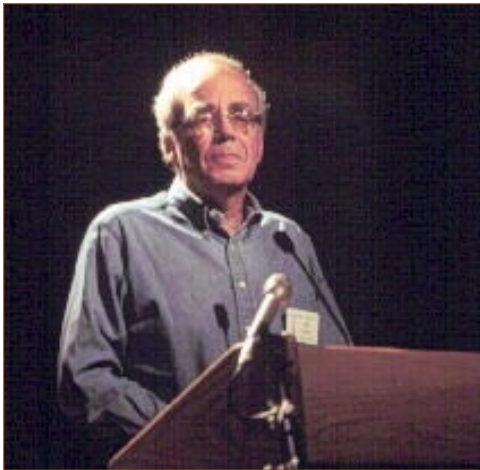


# November 17-18, 2000

## The Grassbank Conference, Santa Fe



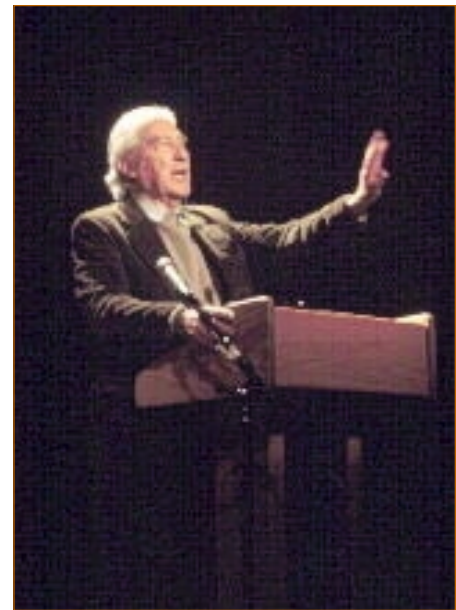
(Top) Nearly 200 people crowding into the lunch area. (Bottom) Drum Hadley.



(Top) Ed Marston of *High Country News*. (Bottom) Stewart Udall.

On November 17 and 18, 2000, almost 200 ranchers, conservationists, government officials, scientists, and other interested individuals gathered in Santa Fe for a “conference of ideas and experiences” related to grassbanks. The term “grassbank”—coined during the early 1990s by New Mexico rancher/poet Drum Hadley and trademarked by the Malpai Borderlands Group with which he is affiliated—refers to the use, through formal agreements, of carefully managed and monitored grasslands as a renewable resource for grazing livestock while the land where that stock is ordinarily grazed is rested and rehabilitated.

Participants in the conference included many key players, such as Hadley, who are pioneering the use of grassbanks as a rancher-friendly conservation tool in the American West, particularly in New Mexico.



Principal organizers of the event were the Conservation Fund, which runs the Valle Grande Grass Bank on Rowe Mesa near Santa Fe, and the Quivira Coalition. Sponsors included the Conservation Fund, Quivira, the Northern New Mexico Stockman’s Association, the Cooperative Extension Service of New Mexico State University, U.S. Forest Service, and

*(con’t on page 13)*





## The Grassbank Conference

(con't from page 12)

(Left) There were many intense conversations among participants during the breaks. (Below) Craig Allen of the USGS at Bandelier, Bill de Buys of the Conservation Fund and Conference Moderator, Bill Miller of the Malpai Borderlands Group, and Bruce Runnels of the Nature Conservancy prepare for their panel discussion on ***What Conditions Suggest a Grassbank and How Do You Design One?***

the Malpai Borderlands Group. The Santa Fe Community Foundation, the McCune Charitable Foundation, the Turner Foundation, and the State of New Mexico Surface Water Quality Bureau/U.S. Environmental Protection Agency provided funding.

The Conservation Fund and Quivira will be publishing a summary proceedings from the conference in April. If you would like to receive one, call Quivira.



Owen Lopez of the McCune Charitable Foundation, Palemon Martinez of the Northern New Mexico Stockman's Association, Bart McGuire of the City of Tucson, Gerald Chacon of the NMSU Extension Service, and Bill de Buys during their panel discussion on ***How Do You Organize a Grassbank?***

(The pictures on these two pages are courtesy of Don Usner.)



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# The Far Horizon

by Courtney White

*“What goes around,  
comes around; and it’s all  
coming back to me now.”*

—Blues song

For all of the contradictions and prejudices of the modern environmental movement, one of its principal achievements must be taken seriously by ranchers, federal land managers, and anyone else involved with grazing—that the bar of environmental standards has been raised high for legitimate reasons and is supported by a large majority of Americans.

Moreover, this bar will not be coming down, at least not very far, any time soon. As a result, it is in everyone’s interest to get ahead of this bar, and stay there.

Rising environmental standards are being borne by city and rural dweller alike—by rancher, logger, construction worker, and commuter. City folk face “No Burn” nights, water restrictions, smog stations, no-smoking zones, rolling black-outs, land-use covenants, and hundreds of other regulations.

The rising tide of restrictions cannot be blamed on environmental extremists, who are, truthfully, too few in number to affect significant change, or on callous government bureaucrats, because government is almost always reactive to circumstance (expressed in the common lament, “Why does someone have to die before the government does something?”).

Instead, the bar is being pushed up voluntarily by many hands—by soccer moms and work-at-home dads, by bankers and insurance company executives, by teachers and scientists, by lawyers, farmers, musicians, hairdressers, couch potatoes, and tour guides.

By us. And the reasons for

change are easy to catalogue.

Remember DDT? And asbestos? And exploding rivers? Remember Love Canal and the Exxon Valdez? Remember the Passenger Pigeon and the Dodo bird? Remember Glen Canyon, and Dinosaur, and Hetch Hetchy (you do remember them, don’t you)?

Remember Upton Sinclair’s novel *The Jungle*? Published in 1906, it chronicled the appalling conditions inside Chicago’s meat-packing industry in such shocking, and stomach-churning, detail that an outraged citizenry provoked Congress into passing the *U.S. Pure Food and Drugs Act of 1906*. By placing significant restrictions on the food industry, it became the first important food safety law in U.S. history.

A law, by the way, enacted without the involvement of a single environmental activist.

## Looking Back

“If we forget history,” someone famous once said, “we are condemned to repeat it.” This is especially true for the American West, which has been struggling with the lessons of its history ever since it had one. Through forest fires, floods, droughts, gold fevers, land grants, land rushes, genocide, heroism, tragedy, lawlessness, cooperation, and countless cycles of boom-and-bust, the West has tried, and mostly failed, to come to grips with the highs and lows of the human behavior it inspires.

One mechanism invented to grapple with the West’s turbu-

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lent history is the much-discussed Old West / New West dichotomy. For example, in the last five years there has been a great deal of talk about how the “Old West,” dominated by the extractive industries of logging, mining, and ranching—the “Lords of Yesterday” according to one critic—is being replaced by a “New West” dominated by the extractive industries of recreation, subdivision, and globalization.

This debate has become a rumble, with “custom and culture” advocates struggling in the courts and at the ballot box against “newcomers” awash in new economy money and a depleted sense of history. Old vs. New, Us vs. Them.

Unfortunately for the brawlers, according to noted western historian Alvin Josephy, Jr., this Old West/New West conflict does not actually exist. Or, more precisely, it has always existed. An Old West has been continually replaced by a New West since there has been a West at all.

In his memoir, *A Walk Toward Oregon* (Knopf, 2000), Josephy notes that, in 1902, the western artist Frederic Remington despaired at the passing of the One True West. “I knew the wild riders and the vacant land were about to vanish forever,” wrote the famous painter. “I saw the living, breathing end of three American centuries of smoke and dust and sweat, and now I see quite another thing where it all took place, but does not appeal to me.”

“I knew what Remington had meant,” Josephy writes, “but as a historian of the American West,

I also knew that, before and after Remington, each generation in the West had lamented in its own way the passing of its Old West.”

Indians were replaced by explorers, who were replaced by mountain men and missionaries, who were replaced by miners and soldiers, who were replaced by settlers and sheriffs, followed by cowboys, painters, movie stars, oil men, automobiles, tourists, backpackers, bureaucrats, environmentalists, real estate speculators, latte, Land Rovers.

Every Old West has inevitably and inexorably been replaced by a New West.

At 85 years of age, it happened to Josephy as well. “The Old West that I had experienced was now gone too,” he writes, “changed by industrial and military centers, interstate highways, recreation developments, trophy ranches and urban sprawl, conformity, high-tech pop culture, television, and economically stressed cattle and lumber operations struggling to survive against global competitors.”

And the rising bar of environmental standards.

“Components,” Josephy adds, “that will become someone else’s Old West.”

Resistance, he implies, is not only futile, it is unhistorical. Right or wrong, good or bad, change happens, and it happens more quickly than anyone cares to admit, or can do anything to stop.

### **The Next West**

In October 2000, the

*(con’t on page 16)*

## **The Far Horizon**

*(con’t from page 14)*

*“An Old West has been continually replaced by a New West since there has been a West at all.”*

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## The Far Horizon (con't from page 15)

*“History tells us that custom and culture have never been static; they constantly evolve, and for a variety of reasons. For ranchers, and people who care about the relationship between ranching and environmental values, the question is—will ranching evolve with direction and purpose, or will it fade away like the Dodo bird and the Pony Express?”*

Board of Directors of *People for the USA!* (formerly known as *People for the West!*) voted to go out of business. A national organization well-known as an aggressive advocate for states' rights, private property rights, and unrestrained development of natural resources, especially on public lands, *PFUSA!* led the charge against the environmental movement.

Whether they were condemning the Endangered Species Act, or fighting for relaxed government regulations, or stumping for the privatization of federal lands, the leaders of *PFUSA!* struggled mightily to slow, or reverse, the rising bar of environmental standards. They did so with gusto, fiery rhetoric, and flashes of humor.

And they failed.

In explaining why they voted to disband, the leaders of *PFUSA!* cited declining membership and a shortage of reliable funding (chiefly from corporations which profited by exploiting public lands). But there was another reason—they had become an anachronism in an age that no longer shared their values.

Jeff Harris, Executive Director of *PFUSA!*, admitted as much in a recent newsletter when he wrote, “Americans have embraced the environmental ethic; it is part of our value system like motherhood and apple pie.” (*High Country News*, 12/18/00)

This wasn't a triumph of environmental extremism either. Instead, it was an expression of mainstream values changing color, of the old giving way to the new.

This was not an isolated

incident. Laura Skaer, Executive Director of the 106-year old Northwest Mining Association, was quoted in a newspaper recently as saying, “The public's attitudes have changed, and our industry needs new approaches and new solutions if we are going to have a viable North American mining industry in the 21st century.” (*Albuquerque Journal*, 12/25/00)

There were other notable quotes from mining leaders in the article, including, “The public has the right to hold mining accountable,” and “Future legitimacy will rest on our contribution to sustainable development.”

Whatever THAT means.

Skepticism aside, the simple fact that industry leaders feel compelled to even use the term “sustainable mining” is significant. It is an acknowledgement that the environmental bar not only rests in a high place, but that it is not coming down. It is an admission that a new society, with new values, is firmly in place.

History tells us that custom and culture have never been static; they constantly evolve, and for a variety of reasons. For ranchers, and people who care about the relationship between ranching and environmental values, the question is—will ranching evolve with direction and purpose, or will it fade away like the Dodo bird and the Pony Express?

Or, as environmentalist Dan Dagget puts it, explaining why he works closely with ranchers, “I'm not trying to save ranching. I'm trying to help control what comes next.”

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## **Burden of Proof**

Ed Marston, publisher of *High Country News*, and self-titled obituary-writer for the Old West, proclaimed our time as the “Environmental Age” in a recent essay (1/15/01). By way of explanation, he writes, “We no longer reflexively choose to clear-cut and drill and graze wherever possible, just as we no longer light up on airplanes or assume that the only good wolf is a dead wolf. The burden of proof—making the case to mine or log—lies with natural resource industries.”

This is news. Thirty years ago, the burden of proof was on environmental activists to make their case in front of a skeptical jury. When the federal government proposed building two dams in the bottom of Grand Canyon National Park in the 1960s, or when the Disney corporation proposed constructing a new ski resort in a remote Sierra Nevada valley in the 1970s, the onus was on the environmental community to stop them.

And they did. In one landmark case after another, the activists triumphed, aided by major miscalculations on the other side (when the IRS cancelled the Sierra Club’s tax-exempt status during the Grand Canyon dam fight, in what many saw as an act of retaliation by the government, the Club’s membership shot through the roof).

Environmental groups were both shaping and responding to public opinion. That’s how we got the Wilderness Act, and NEPA, and the ESA, and the Clean Air and Clean Water Acts—not by

pressure applied by a handful of crazy zealots, but through a deliberate, and democratic, political process that weighed public opinion carefully. It is not a coincidence that most of these laws carry the signature of a Republican president.

The values of our time have shifted along with the demographics, and will continue to do so.

Now it is ranching’s turn. The environmental bar has been raised no less high for them than any other group at work in the West. And the burden of proof is becoming just as painful. Take the current round of litigation over grazing in national forests, for example. The issue of contention centers on monitoring, or, rather, the lack of monitoring data. The Forest Service, by its own admission, has not done a good job here.

Prior to the Environmental Age, monitoring was not a particularly important concern. Ranchers grazed pretty much wherever and however they wanted on their allotment, and their federal overseers made only cursory efforts at documenting the effects of grazing on the land, and then usually just to calculate utilization rates. The idea that monitoring would be a source of debate 20 years ago was unimaginable.

Not any longer.

Now, at nearly every meeting I attend the bulk of the discussion centers on monitoring. I also hear talk about inventoring, rangeland health, proper functioning condition, TMDLs, watershed restoration, riparian recovery, and so on.

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## **The Far Horizon**

*(con’t from page 16)*

*“Environmental groups were both shaping and responding to public opinion. That’s how we got the Wilderness Act, and NEPA, and the ESA, and the Clean Air and Clean Water Acts—not by pressure applied by a handful of crazy zealots, but through a deliberate, and democratic, political process that weighed public opinion carefully. It is not a coincidence that most of these laws carry the signature of a Republican president.”*

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## The Far Horizon

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*“For anyone interested in maintaining customs and cultures, protecting endangered species, restoring rangelands, protecting open space, making a profit, producing food, or resolving conflicts, the radical center is the logical place to embrace change, rather than fight it, or succumb to it.”*

To their credit, many ranchers, especially those on public lands, understand the need for monitoring and are willing to face increased scrutiny. At the same time, however, many ranchers dislike what they see as the constantly shifting sands under their feet. They want stability and uniformity in the regulations and standards. They need targets to aim at.

Unfortunately, the only constant in life is change. The Current West is already being replaced by the Next West; and the environmental bar continues to rise.

### **The Radical Center**

One solution to this conundrum is to work in the “radical center,” a term coined by rancher Bill McDonald of the innovative Malpai Borderland Group. It refers to a meeting place where practical solutions can be discussed and implemented by reasonable people—a place where extremists on both sides are not invited.

For historian and conservationist Bill deBuys, who founded and directs the successful Valle Grande Grass Bank near Santa Fe, the radical center is the common ground where people with different backgrounds and values can work together collaboratively.

There is a catch, however.

He writes, “For ranchers this means accepting a higher standard of environmental performance; for environmentalists, it means approaching conservation by working constructively with the people who occupy and use the land; for bureaucrats, it means focusing on producing tangible re-

sults, not merely defending procedure, and for all it means the sharing of authority and responsibility.”

This is a very important paragraph, and I urge you to read it again. It is a roadmap to the Next West.

For anyone interested in maintaining customs and cultures, protecting endangered species, restoring rangelands, protecting open space, making a profit, producing food, or resolving conflicts, the radical center is the logical place to embrace change, rather than fight it, or succumb to it.

It is the only place where we will find what author Wallace Stegner once called the “native home of hope.”

## Cibola Services

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tivity of the monitoring work, have yet to be worked out.

Eventually, Cibola could provide other services, such as archaeological surveys, range consultation, and monitoring training.

But for now, we will concentrate on assessments and monitoring, and hope that by our work we will help fulfill the mission of the Quivira Coalition.

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## The New Ranch Handbook

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recover from it provided that the disturbance is not too great. The impacts of grazing are not limited to the plants that are eaten, however. There are other factors to consider: water, soils, nutrients, other plants, wildlife and a host of organisms that inter-relate with all of them. Livestock are only one piece of a much larger puzzle that must fit together if ranching is to be sustainable.

The difficulty is that arid and semiarid rangelands are highly variable over time and space. Which plants grow, and how much they grow, depends not only on how much rain falls but when and how quickly it falls, and on the weather that follows it. Rainfall is notoriously spotty. Droughts are a normal part of the climate. Until the twentieth century, fires were also normal. These are “disturbance-prone” ecosystems, adapted to withstand such extreme stresses. Because water and nutrients are scarce, plants survive much closer to their limits of tolerance than in other areas.

Therefore, plants must be able to withstand drought and take advantage of rain when it finally arrives. Different plants will grow depending on whether the rain arrives in summer or winter, in large quantities or small. Over thousands of years of evolution, the vegetation of these areas has adapted to reflect these circumstances. The effects of disturbances on the land depend on timing (when they happen), intensity (how severe they are), and frequency (how often they recur). Grazing is a disturbance that can be managed in these terms.

### ***Grazing as a Natural Process***

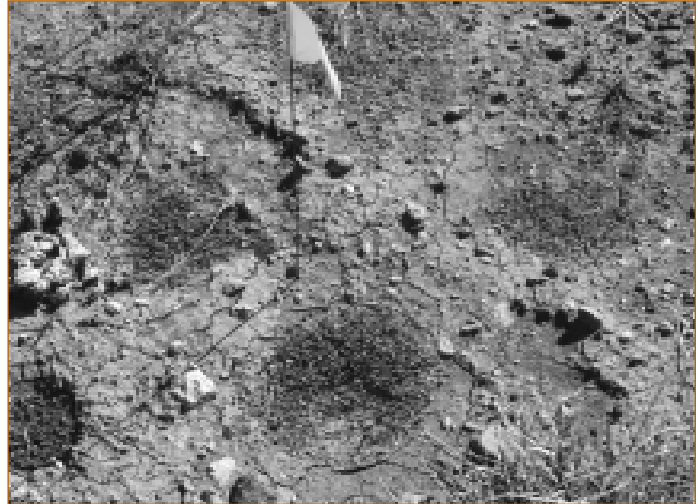
Grazing is a natural process which has been occurring for millions of years. From the fossil record it has been determined that grasses and grazers evolved together some 45 million years ago, and that both spread sig-

nificantly during the Miocene period. Having coevolved, grazers and grasses are adapted to each other. Grazing animals have developed the capacity to derive energy from plant material that humans and most other mammals cannot directly consume. Grasses have developed the capacity to recover from grazing (and other disturbances common to their environments, like fire).

What exactly makes these relationships mutually beneficial? Scientists have yet to answer this question conclusively. Some grasses appear to compensate for the tissue loss by growing more quickly afterwards. But a great deal depends on how much tissue is lost, when it is lost in the plants' life cycle, and whether defoliation occurs only once or multiple times. All of these variables make it difficult to generalize about the way animals graze plants. Science has not yet discovered how to control for them all in measuring the impacts of grazing.

Imagine a perennial grass plant over the course of a year. Whenever water or heat are insufficient, the plant is dormant. Grazing during the dormant season is unlikely to cause damage, because the leaves are not living tissue at this time. When moisture and temperature conditions reach certain levels (different for different species of grass), the plant enters a period of growth. Below ground, the plant's roots be-

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Grass growing in a cow hoof print.  
(Photo courtesy of Jim Winder.)



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# The New Ranch Handbook

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## The Goal: Rangeland Health

What are the goals of the New Ranch? How can we define the desired condition of rangelands? Until very recently, there was no comprehensive answer to these questions. For nearly a century, different agencies employed different standards and measures. Range scientists used their own criteria, while biologists used others.

In 1994, a committee of the National Academy of Sciences published *Rangeland Health: New Methods to Classify, Inventory, and Monitor Rangelands*. They concluded that rangeland health can and should be defined and measured in terms of three criteria:

- Degree of soil stability and watershed function.** Rangelands should not be eroding, and they should capture and retain water rather than shed it as run-off.

- Integrity of nutrient cycles and energy flows.** Rangelands should support plants that capture energy from the sun and cycle nutrients from the soil.

- Presence of functioning recovery mechanisms.** Rangelands should be resistant to extreme disturbances and resilient to change—that is, they should be capable of recovering from more ordinary disturbances.

These may seem rather simple or incomplete, but they are not. They were devised to provide a basis for consistent, national rangeland assessment, relevant and applicable to all present and future publics. This is their value. By understanding rangelands in terms of fundamental ecological processes, these criteria encompass virtually all others we might put forth: wildlife habitat, recreation, food and fiber production, scientific research, education, open space, etc.

portion of the old leaves regenerate, turning from brown to green.

Throughout the growing season, the plant responds to changing conditions of moisture and sunlight. If conditions permit, the plant continues photosynthesis through the growing season until temperatures drop again in the fall. It produces enough food to support growth in the roots and the leaves, as well as to develop tillers and/or seed stalks. It stores up energy for the upcoming dormant season. It flowers and sets seed. Eventually the plant returns to dormancy, its leaves

again turning brown. The health or vigor of the plant depends on its ability to produce enough food during the growing season to survive through the dormant season and resume growth when conditions are again favorable.

In commencing to grow in the spring, the plant utilizes stored energy to produce new above ground growth. It thus takes a risk, so to speak, that the new leaves will be able to produce enough additional energy to replenish its supplies. At this early stage of growth, then, the plant is more vulnerable to leaf loss than it is later in the growing season.

Grazing disturbs the plant by removing leaf tissue. This can be good, bad, or indifferent for the plant as a whole. If very little leaf is removed, the effects of grazing may be negligible. A more severe, single grazing may slow growth in the roots, and/or accelerate the growth of leaves, but recovery is likely if grazing does not recur for one to two growing seasons. Repeated defoliations in the same growing season, however, can set the plant back for many years to come. These effects also depend on the plant species in question. In extreme conditions, a grazing animal may remove nearly all of the plant's above-ground growth, but normally this does not occur. Cattle can barely graze closer than an inch or two to the ground because of the shape of their mouths, and they will not defoliate a plant completely unless there is no other feed available. The majority of plant biomass in grasslands is actually below ground, completely beyond the reach of grazers.

Grasses have several traits that enable them to tolerate grazing, and in some circumstances to benefit from it. Most importantly, they produce more leaf area than is necessary for optimal photosynthesis

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sis, meaning that some leaf area can be removed without damage. Younger leaves photosynthesize more efficiently than older ones, and defoliation of older leaves can expose younger leaves to greater sunlight. Many grasses have growth points very close to ground level, where they are unlikely to be bitten off by large-mouthed grazers like cattle.

Until recently, it was believed that grazing caused grasses to direct energy stored in their roots up into leaf growth. More recent research suggests that this is not the case, although the precise mechanisms of recovery remain obscure. For now, the best conclusion is that the more leaf area that remains after grazing, the faster recovery occurs.

### ***The Spatial and Temporal Distribution of Water and Nutrients***

How plants respond to grazing also depends on larger conditions in the area: the other plants present, topography and soils, or whether it's a dry year or a wet one. Although these conditions can vary widely from year to year, and they can sometimes change abruptly, they generally develop over many years' time.

Two ecological processes strongly determine the vigor and composition of vegetation, especially in arid and semiarid rangelands: the flow or cycling of water and nutrients. Put simply, the plants on a range—what they are and how well they are growing—are a reflection of these underlying ecological processes. The goal is to develop means of managing grazing for improved water and nutrient availability.

Plants require water and nutrients for growth. These are not static quantities: they increase and decrease, sometimes rapidly, and they move around. The issue is not

simply how much moisture or nutrients there are, but whether they are available to plants when they need them. In arid and semiarid regions, small changes in the availability of water and nutrients can have dramatic effects on vegetation. The nutrients contained in a cow's dung can significantly increase germination rates, for example. A small relief feature can capture extra runoff and allow a different community of vegetation to develop. The sensitivity of vegetation to water and nutrient availability is both a caution and an opportunity to management. Mistakes can be grave in their consequences, but small improvements can also ramify through the landscape and have significant beneficial effects. No one can control the rain, but management decisions can affect how much of the rain that does fall will benefit the local ecosystem.

**The Water Cycle.** Moisture is scarce in arid and semiarid areas and precipitation is highly variable. The key issue is how much of the total precipitation is retained in the system and for how long, because this determines the effectiveness of the moisture: how much use it can be put to by plants. A second, related issue is erosion: where erosion is high, water retention tends to be low.

Vegetation strongly affects the distribution of water in space and time. In the absence of vegetation, water hits the ground surface at a high rate of speed. The impact dislodges fine soil particles, which then clog the pores of the soil, greatly reducing infiltration. This, in turn,

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An example of an area on Sandia Pueblo with a poor water cycle. (Photo courtesy of Kirk Gadzia.)



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accelerates erosional processes. Soil particles attach to the water molecules and are transported downhill in run-off, reducing the quality of the soil that remains. In extreme cases, a thin crusty surface ("cap-

less damaging, because the vegetation and soil will slow and diminish the overall amount of run-off. Droughts will be less damaging, because the water in the ground will prolong the life of plants during dry

periods. A properly functioning watershed can make the difference between plants surviving a drought or not.

The goal

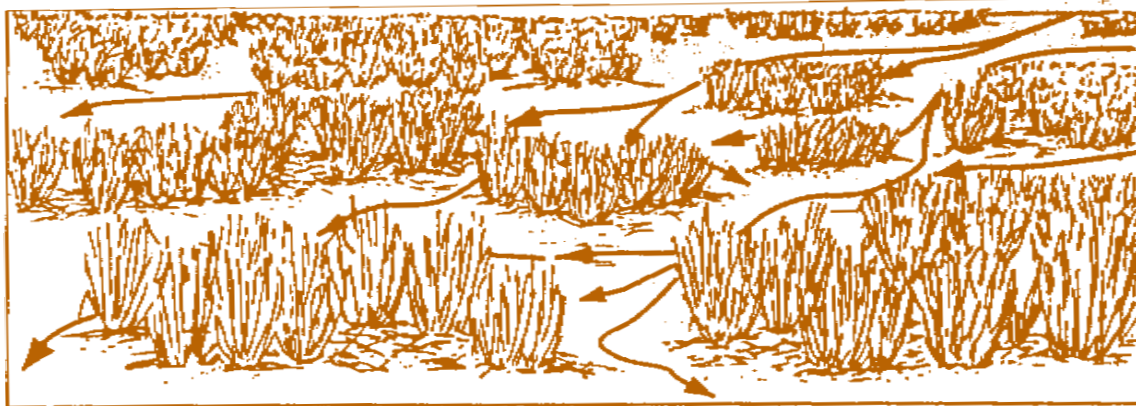
can be expressed simply: capture as much of the rain that falls as possible, retain that water in the soil, so that it can be safely released to plants and downstream areas over time.

The importance of water distribution is illustrated most dramatically by riparian areas. These are places where water runs in large quantities, concentrating its effectiveness in small areas. Generally speaking, riparian areas also receive nutrients from elsewhere, transported by the water. The combined effect of these processes is to make riparian areas significantly richer in the key factors for plant growth: water and nutrients. They are thus more dynamic, from an ecological point of view. Especially in the Southwest, riparian plant species are adapted to disturbance, particularly in the form of flooding. Taken together, these factors enable riparian areas to recover from disturbance more quickly than uplands, and to produce much larger volumes of forage. They are highly resilient, ecologically speaking. They are also key sites for range improvement.

ping") develops which encourages run-off and inhibits plant establishment, reinforcing the cycle of degradation.

If a raindrop hits plants or litter, on the other hand, the impact on the soil is greatly diminished. Even a thin cover of litter will protect soil from capping and reduce erosion. Live plants intercept water both from the sky and running off from higher ground. By slowing its progress, the plants diminish the water's erosive power. Studies indicate that small increases in the basal cover of plants can dramatically decrease rates of run-off. Plants also help to increase the infiltration of water into the soil. The leaves of grass plants catch water and deliver it to the base of the plant, where it is unlikely to disrupt the soil upon impact. Roots open pores in the ground and support communities of insects, fungi and bacteria that create cavities and tunnels for water to pass through. The difference is especially pronounced when rainfall is torrential, as in Southwestern summer monsoons.

The more water that is retained in the soil, the more resilient the system will be to extremes of rainfall or drought. Floods will be



Where vegetation is dense, water flows are tortuous. Erosive energy is dissipated, and more water absorbs into the ground as it moves across the land. (Source: Ludwig et al. 1997:15, *Landscape Ecology, Function and Management: Principles from Australia's Rangelands.*)

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**The Nutrient Cycle.** The nutrient cycle is more difficult to see than the water cycle. It consists in the movement of nitrogen, phosphorus, and other minerals from the soil, through plants, and eventually back into the soil. The more effectively the nutrient cycle functions, the more nutrients are available to support plant growth. Nitrogen availability can limit plant growth in desert ecosystems almost as much as water does, and in some cases perhaps more. Even small differences in available nutrients can affect what plants grow, if any.

Decomposers—especially insects—are a key link in both the water and nutrient cycles. Termites can dramatically increase water infiltration rates by opening pores in the soil. Without plants to feed on, termites disappear and the soil becomes more compact and impermeable. Termites actually consume the majority of dead plant matter in Southwestern deserts. Without their activity, much of the nutrients in dead plants would remain trapped in standing matter, unavailable to other plants. Eventually it would escape into the air through oxidation. Instead it is consumed by termites and moves downward to the surface and subsurface of the ground. The termites are then consumed by predators like ants, who return the nutrients to the soil in their excrement. Research in the Chihuahuan desert suggests that the cycling of nitrogen is more important than new inputs of nitrogen from rainfall, and that a significant fraction of the total nitrogen cycled passes through termites and their predators.

In the passage of nutrients from the soil to plants, other organisms also play roles. Tiny fungi form symbiotic relationships with plant roots, assisting in the uptake of water and nutrients from the surrounding soil. These mycor-

rhizal fungi help to increase the survival of seedlings and the growth of mature plants. But they exist only in relation to certain kinds of plants, including grasses and perennial forbs. If their host plants disappear, so do they, and in their absence, other types of plants (shrubs and annual forbs, for example) will have a greater chance of establishing.

Disturbances like grazing and fire also play a role in the nutrient cycle by reducing the standing crop of old plant material and bringing it into contact with the ground, either as manure, ash, or by trampling. Like all disturbances, these can have positive or negative effects depending on timing, intensity, and frequency.

The nutrient cycle is strongly affected by the water cycle, for better and for worse. Plants are the mechanism that enables the two cycles to reinforce each other. An area with good plant cover will retain more water and cycle more nutrients, allowing the plants to survive droughts better and to produce still more vegetation in good years. If the soil is hard and bare, on the other hand, less moisture penetrates into the ground, which dries out more quickly and makes plant growth more difficult, which in turn diminishes the amount of nutrients being cycled in the area. Plants and litter also have a strong effect on ground surface temperatures and evaporation rates. Bare ground is hotter, drier, more subject to temperature extremes, and less likely to permit germination of new plants.

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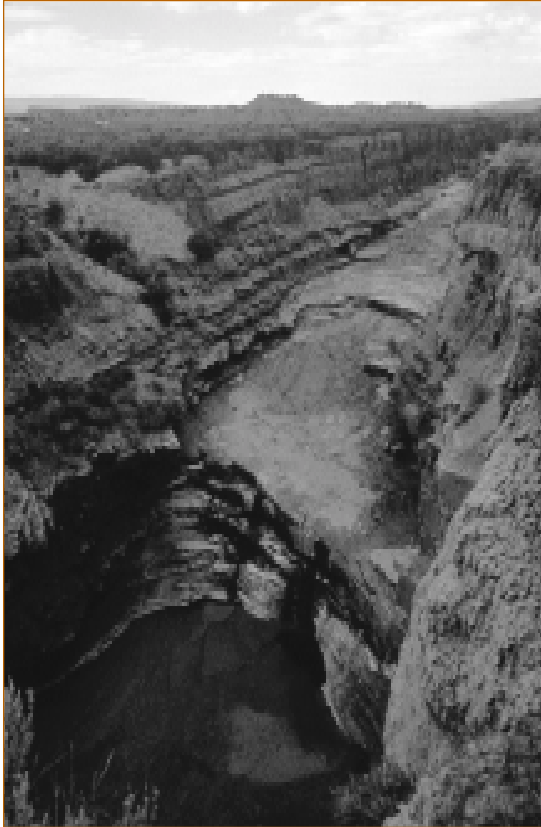


Capping. (Photo courtesy of Kirk Gadzia.)



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Rio Puerco near Cuba.  
(Photo courtesy of Courtney White.)

It is also poor habitat for microorganisms and insects that enhance nutrient cycling.

The processes that determine water and nutrient availability come together at the surface of the ground. If the soil is stable and the watershed is functioning properly, the potential for long-term sustainable production of forage is good. Chances are that the range will be able to recover from disturbances like drought and grazing. Soil loss by wind and water erosion, on the other hand, weakens the resilience of the system, making it vulnerable to disturbances. Productivity will gradually diminish, usually for a long time.

### Thresholds and Monitoring

**Thresholds.** How are we to understand these mutually reinforcing cycles of improvement or degradation? In recent decades, scientists have recognized that arid and semiarid rangelands do not fit the classical, Clementsian model of succession and retrogression; rather, they are subject to abrupt shifts among a number of vegetation communities. The factors that cause these shifts are complex and non-linear; changes occur when critical thresholds are crossed. An example is the shift from grasslands to shrublands in the Southwestern United States. Ecologists recognize several contributing factors: overgrazing, fire suppression, drought, a change in seasonal rainfall patterns, and an increase in atmospheric CO<sub>2</sub> levels. There seems to be no way to isolate a single one as the cause; different combinations may have occurred in different places. In any

case, once the shift to shrublands occurs, grasslands do not reappear on their own. Some threshold is crossed, beyond which the change becomes self-reinforcing. Once mesquites reach a certain density, for example, abrupt decreases in grass cover and increases in erosion have been observed. Once the grasses decrease below some amount of cover, there isn't enough fuel for a fire. Without fire, the mesquites persist and dominate further. Resting the land by excluding livestock does little or nothing to restore grasses.

The high degree of variability in arid and semiarid rangelands, combined with the issue of thresholds, makes management a very difficult challenge. The same grazing pressure can have little effect in a year of good rainfall, but cause lasting damage during a drought. It is much easier to prevent an area from crossing a threshold than it is to reverse the change after it has occurred. But science has not yet learned to predict exactly where these thresholds are.

**Monitoring.** The water and nutrient cycles, and their effects on plants, are difficult to observe or measure directly. Most of a grass plant is below the ground, in the root system. Nutrients like nitrogen and phosphorus are invisible to the eye. Monitoring is a way of measuring ecological processes indirectly. The processes themselves cannot be observed, but indicators of the processes can be observed and measured. Litter cover, for example, is an indicator of the nutrient cycle, because for nutrients to cycle, organic material must be produced and then returned to the soil for decomposition.

Monitoring programs can be designed to measure almost anything, to almost any degree of precision.

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They can be as simple as a series of fixed points where you take photographs every year. Often they are more labor-intensive and require several years of committed effort to yield their full benefit in improved information. For these reasons, it is very important to choose one's monitoring objectives carefully, paying close attention to particular circumstances and needs. Time invested in good design can dramatically increase the efficiency and utility of monitoring.

Above all, monitoring must be: 1) consistent; 2) practicable—that is, not too time-consuming or difficult; and 3) related to management goals and activities. The point of monitoring is simple: it provides feedback that is timely and objective. Monitoring data can reveal the effects of management decisions well before they are apparent to the naked eye, greatly increasing one's ability to avoid lasting damage and to encourage range improvement. Every manager learns from experience, but good monitoring allows that learning to happen more quickly and systematically.

### ***New Ranch Management***

By controlling the timing, intensity, and frequency of grazing, the New Ranch ensures that rangelands recover from the disturbance that grazing inevitably causes. By focusing on the ecological processes that sustain range productivity, the New Ranch works to enhance and restore habitat for wildlife, proper functioning of watersheds, and—most important—economic vitality for the ranch operation.

Two primary tools are available: disturbance and rest. Some disturbances can be manipulated, like grazing and (to some degree) fire. Others, like drought and flood, are largely beyond the manager's control. The central principles of New Ranch management are to use the tools skillfully (control grazing and rest) and to

plan for the disturbances that cannot be controlled. By exercising greater control over grazing pressure, and planning one's management to adapt to changing conditions, the New Ranch achieves sustainability, both economic and ecological. The first lesson is to control the timing, intensity, and frequency of grazing pressure.

**Intensity.** Intensity refers to how much biomass is removed from a plant by livestock. It measures the percentage of net primary production that is channeled into herbivores rather than consumed by fire, oxidation, or decomposers. Intensity is a function of three variables: the number of animal units in a pasture, the length of time they are there, and the size of the pasture. To manage intensity, therefore, requires a tool with three components: one for animals, one for time, and one for area. Animal-unit-months, or AUMs, is inadequate for this, because it has only two components: one for animals and one for time. Its time component, moreover, is rather gross: a month is not very precise. Another conventional tool, stocking rates, also has only two components: one for animals and one for area. Head per section, or acres per head, takes no account of time. Utilization rates—which superficially resemble intensity—have none of the three components. A certain utilization rate may be a good goal for management, but it is not a practical tool. Something else is necessary to translate the goal into a management strategy.

Animal-days per acre, or ADAs, contains all three components necessary to measure and manage intensity. Adjustment must be made for the class of livestock being grazed. Once this adjustment is made, animal-days per acre

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*“Resting the land by excluding livestock does little or nothing to restore grasses.”*

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is exactly what it says: animal units, multiplied by days in the pasture, divided by the size of the pasture in acres. ADAs can be measured quickly and easily with practice, and they are both a flexible and relatively

fairly simple: 1) the more leaf area that's grazed off, the longer recovery will take, and 2) a plant that is grazed again before recovering will store less energy in its tissues and will weaken over time. Finally, graz-

### Overgrazing and Overrest

Overgrazing occurs when a severely grazed plant does not have time to recover before being grazed again. A plant that is grazed once or twice, then allowed to rest for the remainder of the growing season, is very likely to recover completely. If it is grazed repeatedly, it will have less time and reduced resources for recovery. The health of the plant depends on both its leaves and its roots, and an overgrazed plant tends to have shallower roots, weakening its ability to recover from subsequent grazing events or to withstand other disturbances such as drought. A downward spiral can result: less forage for cows, who then impact each plant more severely, leading to still less forage, and so on. Livestock, plants, soils, watersheds, wildlife, and ranchers all suffer when overgrazing occurs.

Note that the critical issue is time. The number of cattle in a pasture is important, too, but only because higher stocking rates make it less likely that a grazed plant will have time to recover. Lower stocking rates make it more likely. Moreover, what makes for overgrazing changes from year to year and season to season. In a good year, with more moisture, plants recover more quickly; in a drought, they recover slowly. So even a lightly stocked pasture may be overgrazed in a very dry year, whereas a heavily stocked one might not experience overgrazing in a very wet year. Control of timing is critical to avoiding overgrazing.

Overrest is, for certain grass species at least, the opposite of overgrazing. It occurs when disturbance is absent for such a long time that the accumulated growth of past years prevents the plants from cycling enough energy to remain vital. The old leaves give the plants a gray tone; they shade out areas where new plants could otherwise germinate; root systems slowly contract. Overrest can occur even in the presence of livestock, since decadent plants are not palatable and may be avoided.

In the long run, overrested areas are prone to a similar fate as overgrazed ones. Eventually, some disturbance will occur—a drought or a fire, for instance—and the weakened plants may be unable to recover, leading to more bare soil, erosion, etc. (The same risk attends forests where fire has been suppressed for too long.) In ecosystems adapted to disturbance, managers must negotiate carefully between overgrazing and overrest.

precise tool for managing grazing. The limitation of ADAs as a management tool is that they do not account for the other factors that determine the impacts of grazing: timing and frequency.

**Timing.** During the growing season, the challenge is to control the impact of grazing in such a way that the grasses have time to recover. It's impossible to know when it will rain, how much, or how long the growing season will last. So there's no telling exactly how long it will take for grasses to recover from grazing. But the principles of growing season grazing management are

ing should not happen at the same time of year every year in any given pasture. If it does, the palatable species that are young and green at that time will bear a disproportionate share of the impact and will eventually decline relative to other species.

Control over grazing boils down to control over the distribution of livestock across the range and over time. The most common way to do this is with fencing, but there are other ways to control the distribution of livestock, as well. Mineral blocks have been used this way for decades.

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Where water can be turned on and off, it can also be used to control the location of grazing pressure. Herding is an ancient technique that is currently being reborn in a few areas. Riders and dogs move and control the herd. There are also skilled practitioners of stockmanship, who have mastered the art of “low-stress” livestock handling. The effectiveness of these tools depends on the terrain and vegetation of a given range, the breeding and disposition of animals, and the inclinations and training of managers.

**Density.** Perhaps the most controversial issue in livestock distribution concerns density. Should livestock graze together in a herd, or should they be spread out across the range? For decades, ranchers and range conservationists have worked to spread cattle out in order to utilize forage more evenly across large pastures. The New Ranchers have chosen instead to amalgamate their herds and work them as a single unit or, in certain circumstances, as two herds. The benefits they attribute to this are several. A single herd is more easily monitored. This decreases labor and other costs associated with routine care. Cattle in a herd are also better able to fend off predators than if they were spread out, just as wild ungulates are.

There is also a great deal of disagreement over short duration grazing, particularly regarding its effects on carrying capacity. Judging from the scientific literature and the practices of the New Ranch, the safest conclusion seems to be that greater control over grazing in all its dimensions—timing, intensity, and frequency—may increase the productivity of the land, allowing for stocking rate increases over time.

**Planning.** New Ranchers are unanimous in saying that planning has been critical to their successes. Not only does good plan-

ning improve management, it also provides a greater sense of control over one’s livelihood, which can be an important boost to morale in a business characterized by uncertainty and risk.

Plans should be flexible, but always ready for the worst. In arid and semiarid regions, drought is a common occurrence. Over a 29-year period at the Jornada Experimental Range, 14 years were sufficiently dry that the range produced about half of the average forage yield. In rough terms, forage was half of normal half of the time.

The central task of planning is to allocate grazing pressure. This includes when the grazing will occur, at what intensity, and for how long. But planning is not complete until provision is made to monitor the effects of management actions and thereby learn from them. Grazing is a much more complicated process than meets the eye, and our knowledge of how it affects rangelands is far from complete. Careful, on-going monitoring complements the general principles discussed earlier and enables the manager to apply them, flexibly and creatively, on the ground. It completes the loop of education, enabling the land to teach us how to manage it better. Without monitoring, mistakes may go unnoticed until it is too late to minimize the consequences, while successes may be misinterpreted.

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Kirk Gadzia indicates the space between perennial plants on grazed land (above) and ungrazed land (below). These areas are about 15 yards apart. The ungrazed land has not been used in 40 years. (Photos courtesy of Courtney White.)



# UPCOMING EVENTS

## Collaborative Stewardship At Work: a two-day “Unconference”

April 27 - 28 (Fri-Sat), 2001

Best Western Kachina Lodge, Taos, New Mexico

This **FREE** conference will highlight the innovative, collaborative, and community-driven work being done to restore environmental and economic vitality on public and private land in northern New Mexico.

In the mid-1990s, after years of conflict, residents decided to open a dialogue with the staff of the Camino Real District of the U.S. Forest Service in an attempt to find a better way of managing, and restoring, the land they all shared. They chose cooperation over confrontation, and found a willing partner in the Forest Service. Together, they called their work **Collaborative Stewardship**.

We have planned this conference in order to share the lessons learned from this success story, and to encourage others to follow a similar path. It is organized around three topics vital to the future of the communities of the region: WATER, TIMBER, AND GRAZING—which will be discussed in half-day sessions. The focus of each session will be innovation. Speakers include: *Lynda Prim*, the Farm Connection; *Paula Garcia*, the New Mexico Acequia Association; *Brett Olsen*, lawyer; *Henry Lopez*, USFS; *Max Cordova*, La Montana de Truchas; *Ike De Vargas*, La Compania Ocho; *Kurt Winchester*, USFS; *Jan-Willem Jansens*, Commonground; *Virgil Trujillo*, Ghost Ranch; *Joe Torres*, Valle Vidal Grazing Association; *Courtney White*, the Quivira Coalition; *Will Barnes*, The Conservation Fund; *Matt Mitchell*, organic beef rancher; and others. For more information, call Courtney, (505) 820-2544.

## Herding Clinics

April 30 - May 5, 2001

The Quivira Coalition will be offering two, three-day clinics on the principles of low-stress livestock management (sometimes referred to as the “Bud Williams” method). These are hands-on clinics. Participants will get one-on-one training with the instructors and the cattle. Planning for a successful herding operation will also be discussed. **Session I** will be held **April 30-May 2** (Mon-Wed) and will emphasize the fundamentals. **Session II** will be **May 3-5** (Thurs-Sat) and will emphasize advanced techniques.

Both sessions will be held at the **Ghost Ranch** conference center, located 60 miles northwest of Santa Fe.

The instructors, Tim McGaffic, Steve Allen, and Guy Glosson, all have extensive experience with low-stress methods of livestock management, including herding.

The cost of EACH SESSION will be **\$300** per person, which includes the instruction fee, room and board at Ghost Ranch for three days and nights, a copy of Burt Smith’s book *Moving ‘Em*, and other educational materials.

Hurry! Space is VERY LIMITED. Last year, we sold out in a matter of weeks (and without much advertising). For reservations, call Courtney at (505) 820-2544.



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