

What Studies of the Past Can Tell Us About Grasslands

by Margaret Bolick

Curator of Botany, University of Nebraska State Museum

In paleontological circles, Nebraska is famous for its fossil bones. However, fewer people are aware that the state also has a superb record of plant fossils. Nebraska is home for one of the world's oldest fossil flowers, found in 100 million year old sediments from Jefferson County. In addition to this rose-like flower, we have chunks of petrified wood, clumps of tree leaves, clusters of hackberry seeds, and millions of fossil pollen grains. These fossils can help us understand more about past environments in the Great Plains.

All of us are aware that today's grasslands are not exactly like those of two thousand or even two hundred years ago. However, everyone may not agree that the answers to the question "What were the central North American grasslands like in the past?" have much practical use today.

Understanding both the recent and not-so-recent history of life in grasslands provides valuable information that helps us plan our use and conservation of grasslands to ensure that our children and grandchildren will enjoy its natural beauties and economic benefits. In particular, studies of past ecosystems give us three major pieces of information:

1. *It gives us a record of the responses of grasslands to long-term changes in weather and climate.* These records allow us to estimate the precipitation and temperature limits within

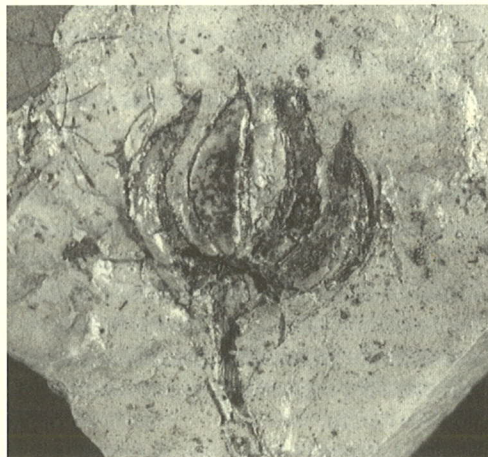
which grasslands can survive without shifting to desert or forest. For example, we know that the climate in Nebraska 12 million years ago was one that allowed plants and animals that require frost-free winters to co-exist with ones like spruce trees that need cool summers – it looks like there was good football weather all year long. However, it also looks like the balance between grassland and forest

shifted more easily in this equitable climate; factors such as grazing intensity and short-term droughts may have had larger effects.

2. *It gives us a time scale for the rate at which the plant and animal life of the Great Plains change when subjected to different types of environmental stress.* On a scale of 20 million years, the decrease in rainfall on the Great Plains caused by the rise of the Rocky Mountains has changed the region from forest to grassland and switched its herbivores from mostly browsers to mostly grazers. During the last 2.5 million years, we know that advances and retreats of the Arctic

and alpine glaciers has shifted the natural ranges of plants and animals hundreds of miles north and south about every 100 thousand years. Studies of fossils, especially of fossil plant pollen, indicate that boreal spruce forest can

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Fruit of 100 million year old flower from southeast Nebraska.



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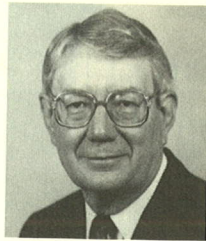
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The Center for Grassland Studies is a unit within the University of Nebraska-Lincoln Institute of Agriculture and Natural Resources. It receives guidance from a Policy Advisory Committee and a 50-member Citizens Advisory Council.

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From the Director

We are pleased to bring you this first issue of the Center for Grassland Studies Newsletter. This newsletter is planned as a quarterly publication.

Much progress has been made since the Center was approved approximately one year ago. The Center has established offices in Keim Hall with a secretary, a part-time coordinator, and a part-time director.

A Policy Advisory Committee was appointed and has been actively working with the director on issues of importance to the Center. There are now 120 Associates of the Center. These are professional workers involved in research, extension, teaching or technical assistance who work in areas related to the Center's mission, and represent various federal and state agencies, state colleges, and not-for-profit associations, in addition to the Lincoln, Kearney and Omaha campuses of the University of Nebraska. We held a workshop in January at which Associates shared their work and professional interests. Proceedings from this workshop were published in the spring. Later this year, we plan to publish a directory that contains information about the expertise of our Associates.

The first meeting of a 50-member Citizens Advisory Council was held July 21. This council will meet two or three times per year, learn about programs and activities of the Center and offer advice related to user needs. To better inform people about the Center, we published a brochure and developed a display for use at numerous events and activities.

The Center is the culmination of discussions by University faculty, administrators and citizens for more than a decade. The idea initially was to have a range, forage, and beef cattle center with emphasis on forage and range management and beef systems production. With the involvement of more people and numerous discussions this was expanded to a much broader and more inclusive center. While range, forage and livestock production remain a primary area of emphasis, the definition of grasslands has been expanded to include turf and landscape grasses as well as wildlife habitat, watershed management, riparian and wetlands ecology, natural habitats and basic grassland studies.

There is every reason to develop such a Center at the University of Nebraska. Grasslands cover more than half of the state's land surface mass. They serve as the basis of a strong and large livestock industry, a vital wildlife habitat, a natural resource for maintaining surface and ground water quality, a means of controlling soil erosion, a growing sports and leisure industry, and a positive influence on quality of life.

Also, there is a history of excellence in grass and grassland research at the University of Nebraska. Faculty have and continue to provide nationally recognized leadership in the breeding and management of forage, range, and turf grasses, grassland ecology, grassland cattle production, grassland pests, and wildlife management. We believe these units and/or individuals can come together through the Center for Grassland Studies, interact, discuss ideas, and develop cooperative projects and programs that better serve our citizens.

M. A. Massengale

The Buffalograss Story

by *T.P. Riordan*

Department of Horticulture, UNL

The Turfgrass Science Team has been working on the development of turf-type buffalograsses for about ten years. This effort has led to the release of five new cultivars, '609', '315', '378', 'Cody' and 'Tatanka'. This year's sales of these new buffalograsses will approach \$3 million.

Buffalograss is a warm-season, native species which is adapted to the Central Great Plains. It has been used in warm-season pastures, because it required less water and fertilizer than other grasses. Its uses in the 1800s also included the construction of sod houses, since it produced a strong sod. Its first use as a turf probably goes back to rural homesteads, but the late Dr. Larry Newell, UNL forage grass breeder, and Dr. Ed Kinbacher, UNL turfgrass researcher, both thought enough of buffalograss that they studied it and planted experimental clones in their lawns.

This was all the background knowledge we submitted and received a small grant from the United States Golf Association (USGA). The first plots were established in the spring of 1985. By August the best plots were covered, and turf quality was evident in some experimentals. The USGA continued to fund the research, and thanks to the excellent work of graduate students and technicians, a great deal was learned about buffalograss during the next few years, including some pleasant surprises. One example was the automation of plug harvest. With research on pre-rooted plug establishment and the necessary increase of experimental plant materials, a great many plugs were required. This was all done using a hand plugger at a rate of 300 plugs per hour per person. Through the initiative of a Biological Systems Engineering graduate student, a plug harvester was developed that harvests 10,000 plugs per hour.

In 1989 a significant event occurred that would move us toward commercialization of our first buffalograss, '609', a southern adapted cultivar. David Doguet, a Texas sod grower, and Ben Crenshaw, professional golfer, formed a company to market grasses that were better for the environment. They obtained the rights to Prairie buffalograss, the only release from Texas A&M University, and then proceeded to obtain the rights to '609' from Nebraska. In 1990 we field tested '609' plugs in Texas. The first sales of '609' were made late 1991, and up until the spring of 1995 '609' was completely sold out. It is used as a preferred turfgrass in high-end home lawns and for many other sites, such as roadsides and golf courses throughout the South. Crenshaw and Doguet have more recently obtained the rights to all vegetative buffalograsses developed by Nebraska, and are making efforts to market

new buffalograsses for the northern U.S. The first two northern adapted cultivars, '315' and '378', are now available from Nebraska growers. This plant material has improved quality and color and, hopefully, increased vigor which will improve the sod production potential in the North.

Most of the research described so far related to the development of vegetatively propagated cultivars. There is also a major effort in developing seeded cultivars, and the first turf-type seeded variety 'Cody' should be readily available next year; this is a denser, darker green variety requiring less water, mowing and pesticides than standard buffalograss. Many characteristics relating to drought resistance and quality have been studied, and the new seeded buffalograsses will be significantly improved over the pasture-types we are currently using.

During 1993 the USGA funded a new project on the breeding and management of buffalograss for golf course turf. This has allowed us to upgrade our research efforts in several areas such as mealybug resistance, shade tolerance, low mowing tolerance, extension of the growing season, and turfgrass quality. Over the five years of this new grant, there should be major improvements in the buffalograsses that are available in the marketplace. In July, Dr. Paul Johnson became the new coordinator of this project.

Dr. Roch Gaussoin is studying the interrelationship of various management practices in order to make recommendations for various turf situations. He is doing a great deal of work with weed control in buffalograss as well as sod harvesting and transplanting of buffalograss.

We are deeply indebted to the USGA for supporting our buffalograss research. The results should help the game of golf by reducing inputs of water, fertilizer and pesticides during a time when this is a big concern.

Jim Gerrish to Speak at Fall CGS Seminar Series

Professor Jim Gerrish, a member of the Forage/Livestock Research-Extension Team at the University of Missouri, will be one of the speakers at the CGS fall seminar series. His presentation on September 25 will be on Basic Concepts of Management Intensive Grazing. Other speakers scheduled to participate in the series include: Ken Hubbard, Director of the High Plains Climate Center; Dave Lewis, Lowell Moser, and Ken Vogel, Agronomy; Terry Riordan and Robert Shearman, Horticulture; Patricia Freeman, Curator of Zoology in NU State Museum; Ron Case, Forestry, Fisheries and Wildlife; Terry Klopfenstein, Animal Science.

All seminars, which are open to the public, will be on Mondays during the fall semester, 3:30-5:00 in the East Campus Union. Students may take the course for credit. For more information, or a copy of the schedule, contact the CGS office.

Nebraska Proposes Cooperative CRP

by Scott Hygnstrom

Department of Forestry, Fisheries and Wildlife, UNL

The current Conservation Reserve Program (CRP) has been touted by many as the most significant Federal program to hit the Great Plains in years. The benefits to water quality, soil conservation and wildlife populations have been tremendous, but they have come at a high price. Nearly 1.4 million acres of Nebraska farmland have been enrolled in the CRP, at a cost of \$76.6 million to the American public. Observers of the current political storm in Washington predict a gloomy economic future for the current CRP.

To avert a massive loss of CRP acres and federal dollars in Nebraska, Senator Kerry and Governor Nelson have proposed a Cooperative CRP that would be tailored to suit Nebraska's needs, provide a more diverse pool of funds, and serve as a demonstration for the rest of the nation. Several meetings have been held during the past six months, involving farm, commodity, conservation and wildlife organizations and federal, state and local agencies with an interest in preserving the popular CRP. The objectives of Nebraska's Cooperative CRP are:

- to continue to be voluntary and incentive-based;
- to focus on watershed regional plans or conservation priority areas to achieve soil and water conservation, water quality improvement, and wildlife enhancement;
- to develop regional plans by a partnership of federal, state, local and private agencies and organizations; and
- to devise a system to allow the blending of state, local and private funds to provide leverage for federal funds.

A State Technical Committee, consisting of representatives from several agencies and organizations will oversee development and implementation of the program. The Natural Resources Conservation Service and Consolidated Farm Service Agency will be the lead agencies dealing with enrollment, financial transactions and enforcement. Details of the proposed program can be obtained by contacting Senator Kerry's office in Lincoln.

NRCS Holds Listening Sessions In Nebraska

Kim Stine, State Range Management Specialist for the Natural Resources Conservation Service (NRCS) organized six meetings throughout the state June 26-30, 1995. The purpose of the meetings was to give producers and others who work with pasture and range activities an opportunity to tell state and federal specialists what kind of technical assistance they need from NRCS. Input gathered at the meetings will be used to help design NRCS' grazing management program. If you are interested in having a copy of the comments from the sessions, contact Kim Stine, 100 Centennial Mall North, Room 152 Federal Bldg., Lincoln, NE 68508-3866.

Tape of Grazing Lands Management Satellite Videoconference Available

As part of their ecology training, NRCS employees participated in a July 19 satellite videoconference, "Ecological Principles and Grazing Lands Management." The program included professors from the University of Missouri, Texas A&M University, Utah State University, and NRCS on the following topics: limiting factors, competition between plant species, landscape characteristics and plant communities, effective plant community changes, grazing animal choices, management with ecological principles, and energy flow, nutrient and water cycles. To borrow the tape, contact Kim Stine at 402-472-5303.

CGS Holds First Advisory Council Meeting

More than 50 Citizens Advisory Council members and CGS Associates gathered at the East Campus Union in Lincoln on July 21 to share information and ideas on what is being done and what needs to be done in areas related to the Center's mission. Policy Advisory Committee members provided leadership for this meeting.

Robert Shearman led the information sharing session on turf and landscape grasses. He pointed out that the diverse turfgrass industry contributes \$30 billion to the national economy. Home lawns comprise the largest component. He also noted that many synthetic sports turfs are now being converted back to natural grass. Horticulture professors Gerald Horst, Terry Riordan and Roch Gaussoin also made presentations in the turf session.

The session on wildlife, wetlands and habitats was led by Ron Case, with presentations by Gene Mack with the U.S. Fish and Wildlife Service and Jim Douglas with Nebraska Game and Parks. We learned that of the 19,300 sq. miles that makes up the sandhills, 95 percent is classified as grassland, and 91 percent is in private ownership. The one billion acre feet of water under this area is quite renewable due to good recharge capability.

Lowell Moser set the stage for the presentations in the forage, range and livestock session by describing some



Participants visit during first Citizens Advisory Council meeting.

current research and education efforts being conducted by IANR faculty. He mentioned that agronomy professor Jim Stubbendieck has pictures of specific areas of Nebraska grasslands from 1900 and 1993, and said it is very interesting to compare pictures from the two years. Animal science professors Terry Klopfenstein and Don Adams discussed grazing and the livestock industry, and agronomy professor Ken Vogel (YSDA-ARS) shared current research in grasses, including ethanol from biomass.

During the discussion session the group offered many good suggestions that will help guide the Center as it develops.

International Turfgrass Meeting Held In Nebraska

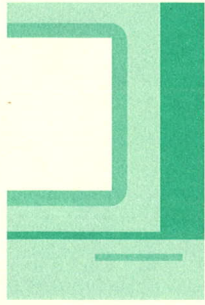
On July 28, 1995 members of the Turfgrass Producers International (formerly the American Association of Sod Producers) toured the John Seaton Anderson Turfgrass Research Facility at the UNL Agricultural Research and Development Center. More than 200 people for the morning and 125 for the afternoon braved the heat to see research on wild flowers, intensively-managed turf, and ornamentals. They were also given information on insect and disease control and pesticide fate.

The sod producers also spent one day at Todd

Valley Farms where they viewed equipment used in the industry. They observed species and cultivar evaluations, and a biological growth stimulator evaluation conducted by UNL researchers.

TPI officials had been concerned about holding the meeting in Nebraska, but they were pleased with the near-record attendance (850 participants from 16 countries for the entire convention), and seemed to be very impressed by Nebraska and the work conducted by the University. Next summer's TPI convention will be July 25-27 in California.

Resources



Electronic

GRAZE-L is a listserv for people interested in management intensive rotational grazing (MIRG). It has over 470 subscribers in 11 countries who share, via this automated e-mail list, information on all aspects of MIRG, like pasture management and renovation, seasonal grazing/milking, low-

capital housing and milking parlors, animal health, farm family quality of life, health and safety, and strategies for transitioning to MIRG. It is a free service co-sponsored by the Center for Integrated Ag Systems, UW-Madison, and the Taranaki Polytechnic Institute, New Zealand. GRAZE-L is primarily intended to be a place where farmers share their knowledge with other farmers, but those in Extension, agribusiness, and academia also find it useful. Traffic ranges from five to 25 messages per day. To subscribe, send the message:

subscribe GRAZE-L
to this address:
listserv@taranaki.ac.nz
Contact: Michele Gale-Sinex, agsystems@igc.apc.org

Two e-mail groups of interest:
1) grasslands-mg@oes.orst.edu
2) forage-mg@oes.orst.edu

For subscription information, contact David Hannaway:
david@forages.ccc.orst.edu.

David also manages the www site: <http://www.forages.css.orst.edu>.



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Turfgrass Research Report for 1994. No charge for single copies. UNL Center for Grassland Studies.








FORAGES (Fifth Edition, 1995), Volume 1: An Introduction to Grassland Agriculture (\$54.95), Volume 2: The Science of Grassland Agriculture. \$49.95 + \$5.00 s&h.

Iowa State Press, 2121 S. State Ave., Ames, IA 50014.

Forage Quality, Evaluation, and Utilization (1994). \$44 (Society members \$36). ASA/CSSA/SSSA Headquarters Office, Attn: Book Order Dept., 677 S. Segoe Rd, Madison, WI 53711-1086.

1995 Conservation Directory. \$20 + \$4.85 s&h. National Wildlife Federation, 1400 Sixteenth St., NW, Washington, DC 20036.

News Tufts

-  Forages are America's most extensively grown crops, occupying more land than all other crops combined, and are responsible for more than one-fourth of the total value created in U.S. agriculture.
-  Croplands in the U.S. cover about 28% (423 million acres), while pasturelands and rangelands cover an additional 36% (532 million acres).
-  About 26.7% (634 million acres) of all the land in the U.S. is privately owned grazing lands. Every five years NRCS conducts a Natural Resources Inventory. The 1992 data show Nebraska has 2.1 million acres of land in pasture, 22.7 in range, .78 in forest, and 7.5 in irrigated cropland.
-  Native Americans called prairie fires "red buffalo."
-  One of the most expensive projects ever undertaken by The Nature Conservancy is the acquisition and stewardship of the Tallgrass Prairie Preserve (36,000 acres) in Oklahoma.
-  To preserve tall-grass prairie, Ed Bass of Ft. Worth is paying a private conservationist group \$2 million for grazing rights on nearly 11,000 acres in Kansas. He is also contributing \$1 million to the National Park Trust's campaign to create a national park that would include the property, considered to be one of the largest tracts of pristine prairie left in America.
-  Annually 2,400 tons of pesticides are applied to Nebraska lawns, golf courses, recreational areas and commercial landscapes.

On the National Scene

There are several national initiatives devoted to aspects of grass/forage/range lands.

Grassland and Range National Goals (GRNGs) developed as an outgrowth of a September 1993 Workshop on Innovative Systems for the Utilization of Forage/Grassland/Rangeland Resources held in Airlie, Virginia. Sixty participants representing the agricultural scientific community, 14 organizations and agencies, and industry explored ways in which forage, grassland, and rangeland impact society. Three activities of continuance resulted from the workshop: 1) publication of proceedings; 2) preparation and dissemination of a brochure with the primary messages from the workshop; and 3) networking among participants via electronic mail and other means (see Resources). The proceedings document is due out this summer. Single copies of the brochure, which articulates the mission for continuing activities and national goals for research and education, are available from the CGS, which also has a slide set depicting same.

The Grazing Lands Conservation Initiative (GLCI) is a voluntary program developed in partnership with private landowners to enhance private grazing lands. The GLCI seeks to strengthen partnerships, promote voluntary actions, respect private property rights, encourage diversification to achieve multiple benefits, and emphasize training and education, and increase public awareness.



Members are from the private and public sector, including those in government (primarily Natural Resources Conservation Service), universities, and agricultural organizations.

The common objective of improving the management of pasturelands, croplands, forestlands, and rangelands for both the GLCI and GRNGs argues for their interlinking and cooperative effort. Representatives of these groups have identified specific tasks to work on over the next two years, and have presented their ideas to Dr. Karl Stauber, USDA Undersecretary of Research, Education, and Economics.

The NRCS has developed six technical institutes, one of which is the Grazing Lands Technology Institute. Rhett Johnson has been appointed Director of this new institute.

International Rangeland Congress Focuses On Future

by James Stubbendieck
Department of Agronomy, UNL

Nearly 800 individuals from more than 60 countries participated in the Fifth International Rangeland Congress in Salt Lake City July 23-28. The theme of the congress was "Rangelands in a Sustainable Biosphere" which emphasized that rangelands should be viewed from a long-term, broad perspective. Ecosystem management and biodiversity were common subjects of research in both developed and developing countries. Less emphasis was placed on grazing techniques than at previous congresses. Instead, grazing was more frequently viewed as a tool to be used to achieve a management goal.

Included in the nearly 500 papers was one by University of Nebraska scientists J.B. Lamb, D.C. Adams, T.J. Klopfenstein, L.R. White, and R.J. Grant titled "Plant maturity effects on intake, digestibility, particulate distribution, and retention time of subirrigated meadow

stem and leaf fraction in beef steers." Pre- and post-congress tours allowed visitors to become better acquainted and discuss common challenges while seeing rangeland in several parts of the western U.S.

Social issues as related to rangelands are very important in many parts of the world. Researchers in the U.S. pay little attention to social views of their constituents as they develop improvement techniques. They assume that producers will accept the new technique if it is economically and environmentally sound. In countries where land tenure, religion, and centuries-old customs influence acceptance or rejection of improved management techniques, social issues are of great concern to researchers.

The Sixth International Rangeland Congress will be held in 1999 in Edmonton, Alberta, Canada.

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change back to grassland in a few thousand years, a short time geologically but much, much longer than human grassland management plans.

3. *It gives us glimpses of past changes that pushed species into extinction.* As central North America changed from forest to grassland, many tree and shrub species were eliminated. Some became extinct while some persisted in areas that remained forested. Most of the plant species seem to have survived the Ice Age's alternating shifts of cold and heat. An amazing assortment of large mammals also survived, at least until the last swipe by the ice sheets. Then, in a few thousand years, we lost the mastodons, mammoths, ground sloths, llamas, peccaries, camels, horses, giant beavers, giant armadillos, and the sabre-toothed cats. Some paleontologists think that the lethal difference in the last ice advance was the presence of humans as hunters. These extinctions at the end of the Ice Age suggest that people can have a profound effect on an ecosystem's recovery from stress.

However, one of the major reasons that many of us study the ancient history of grasslands is because it's fun. From the giant tusks of mammoths to the tiniest grains of pollen, the fossils are as close to a time-machine as we will get outside of science fiction stories. The fascination of fossils is often contagious; all of us know children who can't learn enough about dinosaurs. As educators, we can use such childhood interests to create an appreciation of the complexity of the forces of nature that created grassland and that profoundly affect our lives today.

Additional reading: Bouc, Ken (coordinator). 1994. *The Cellars of Time: Paleontology and Archaeology in Nebraska*. NEBRASKAland Magazine, Nebraska Game and Parks Commission, Lincoln, NE.

Calendar

Contact the CGS for more information.

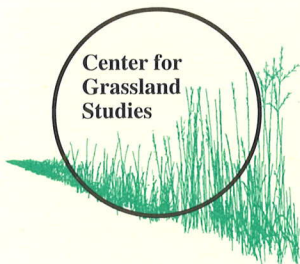
1995

- Fall** CGS Interdisciplinary Seminar Series, Mondays at 3:30, Aug. 28-Dec. 4, East Campus Union.
- Sep. 26-27** CRP Management Training (intended for area consultants and agencies, and statewide educators and specialists), Concord, NE
- Oct. 29-Nov. 3** Agronomy annual meetings, St. Louis, MO

1996

- Feb. 10-15** Society for Range Management annual meeting, Wichita, KS
- Feb. 22** Dairy Grazing Conference, Hartington, NE
- Mar. 7-8** Nutrient Cycling in Forage Systems, Columbia, MO
- June 13-16** American Forage and Grassland Council Meeting, Vancouver, British Columbia, Canada

If you have articles, events, resources, or other items you would like to submit for inclusion in future issues of this newsletter, please send them to the editor, Pam Murray, at the CGS office. Let others know about the work with which you are involved!



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