

The Prairie Dog

Newsletter of the Native Prairies Association of Texas
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Gene bank Success: 2005 Granger Report

NPAT & Army Corps of Engineers explore remnant prairie sites and add to the Gene Bank at Granger Lake

Contributed by Scott Lenharth

Granger Lake lies just northeast of Taylor, Texas in an area once covered by native tall grass prairie. The Granger dam site, approximately 11,000 acres is managed by the Army Corps of Engineers (ACoE). The Native Prairie Association of Texas (NPAT) works with the Corps to manage and promote grasslands throughout the site. Weather is always a factor in land management. The tremendous drought of late 2003 finally ended with an extremely wet 2004. Strong summer and fall rains resulted in a flood level lake. A dry spring in 2005 was followed by erratic rainfall patterns for summer and fall.

Following old accounts of remnant prairie areas that were provided by Carey Weber of ACoE, NPAT members explored several areas of Corps land at Granger.

The first of these is located a **West Taylor Park**, an area on the south side of the lake which is characteristic of an upland chalk prairie. Plants include a large colony of *Arkansas yucca* that were producing seed. This is a sight rarely seen in this county due to the loss of the pollinating moth. Big bluestem, New Jersey tea (*Ceanothus herbaceous*), and many others were observed. One interesting find was prairie phlox (*Phlox pilosa*), a plant we have not previously found in the wild in Williamson or surrounding counties. Approximately 15 species of prairie plants have been added to this area in small numbers, including NJ tea from other locations in Burnet and Williamson counties. Carey documented the plants of this area and the list is kept at Corps headquarters. Copies of this list will be made and distributed.

The second site explored was the old **Machu Cemetery**, approximately 2 acres of little and big bluestem. Heavy brush invasion, typical for the area will need to be dealt with. The area is targeted for burning in the near future. Unfortunately, a large poison ivy colony will make that somewhat hazardous.

Carey discovered a colony of native *Echinacea* (purple coneflower) along the **spillway wall**. The species somewhat resembles *atrorubens* and *angustifolia*. There



are no herbarium samples that document *Echinacea* in Williamson County, so this is a very interesting find. There is a nearby colony of *Silphium radula*. Some little bluestem was added to this area in winter 2004, and additional seeds and plants will be added to the area. NPAT members have collected seeds from the *Echinacea* and *Silphium*, and both species are being grown. A follow up with a professional botanist is needed to confirm the identity of the *Echinacea*.

An open area near the dam, an **Oakalla soil remnant**, contains a single rattlesnake master (*Eryngium yuccifolium*). Carey observed this plant blooming once many years ago. It is hoped to add other plants of this species possibly from the Burleson Prairie, which is the only known source from a similar soil type. This would aid with seed production and plant conservation. Also found in this area were more *Echinacea* and a very small colony of mountain mint (*Pycnanthemum* sp.). These are both notable species.

The Corps and NPAT maintain a Gene Bank at Granger. This living gene bank was the concept of Carey Weber and the late Arnold Davis, who was a founding member of NPAT and the original manager of the Natural Resources Conservation Service's first plant materials center in Texas at Knox City.

Approximately 2400 plants have been added to the gene bank in the last three planting seasons in winter 2002, 2003, and 2004. The area has burned twice in the last 3 years.

Consistent with the goal of the gene bank to protect examples of the remaining genetic diversity of surviving prairie plants in central Texas, the following were planted in winter of 2004. (See table on page 3 for list).

Save Prairies in Conservation Easements

**Who We Are And
What We Do**

- We care about Texas prairies
- We teach prairie importance
- We encourage prairie conservation
- We manage & restore prairies
- We advocate protection of prairies
- We study and visit prairies
- We learn to recognize prairies
- We practice prairie restoration
- We supervise prairie easements
- We maintain prairie gene banks

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About This Newsletter

If you wish to submit articles send to pat@merkord.com. We welcome reports, articles, literature reviews and announcements related to native prairies. Please submit photos via email.

Deadlines for submission are:
Winter 2006: Jan. 5th
Spring 2006: April 5th
Summer 2006: July 1st
Fall 2006: October 1st

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**Some Prairie Conservation
Easements and Land
Holdings of NPAT:**

Maddin Ranch

This 1,114-acre ranch near Colorado City in the rolling hills of West Texas was donated in 1996. A major prairie restoration project is in progress on this property. NPAT welcomes volunteers interested in participating in native prairie restoration.

Riesel Prairie

A beautiful five-acre prairie remnant donated to the Native Prairie Association. This property lies in the heartland of the nearly extinct native black land, tall grass prairie region of Texas. Each year NPAT finds more prairie species at Riesel, making it one of our most diverse sites.

**Falls County Conservation
Easements**

NPAT holds conservation easements on 3 remnant prairie sites in Falls County near Waco, Texas. These were hayfields of German farmers that left the native grasses in these fields for the superior quality hay produced by the native grasses.

**NPAT is a tax deductible
Non-profit corporation dedicated
to prairie conservation &
restoration**

**JOIN NPAT TODAY AND
HELP SAVE PRAIRIES**

Winter 2004 Plantings at Granger Gene Bank (cont from page 1)

Common Name	Botanical Name	Number of Locales
False gaura	<i>Stenosiphon linifolius</i>	3
Tall blue sage	<i>Salvia azurea</i>	21
Indiangrass	<i>Sorghastrum nutans</i>	19
Little bluestem	<i>Schizachyrium scoparium</i>	25
Sideoats grama	<i>Bouteloua curtipendula</i>	27
Texas cupgrass	<i>Eriochloa sericea</i>	13
Rough dropseed	<i>Sporobolus clandestinus</i>	2
Vine mesquite	<i>Panicum obtusum</i>	1
Big bluestem	<i>Andropogon gerardii</i>	12
Prairie sedge	<i>Carex microdonta</i>	1
Snake herb	<i>Dyschoriste linearis</i>	1
Switchgrass	<i>Panicum virgatum</i>	3
Western ironweed	<i>Veronia baldwinii</i>	3



Big Bluestem

Granger Prairie Replication Site

With the help of NPSOT volunteers from Travis and Williamson counties, and the leadership of Mark Sanders of the city of Austin, and Jay Kane of Native American Seed, a section of the replication site was burned in Dec. 2004. This area was approximately 35 acres. All though mainly Alamo Switchgrass, this area contains a significant population of bluebells (*Eustoma* sp.) The burn was exciting and long overdue. By summer it was apparent that Indian plantain and two species of *Silphium* had profited by the burn. The larger *Silphium*, noted as species *laciniatum*, was originally planted and cultivated by Carey from seeds of this beautiful plant in central Texas are all from a roadside discovered by the

kindly provided by the Buresons. It appears that the known remaining examples Buresons many years ago. The central and southern areas of the replication site will require burning in the near future. These areas are much more diverse than the north end, reflecting the growing knowledge of the replication site founders during the early 1990's. NPAT members have girdled hackberry and mesquite trees in the replication site; the resulting snags providing good homes for a variety of insects including solitary bees. There is nothing quite as beautiful as the sight of a large dead tree on the open prairie!

Invasive Plant Conference in November in Austin

Invasive non-native plants have emerged as one of the greatest threats to the biodiversity of native plants and quality of native habitats. Many native species may be pushed to the edge of extinction from these invasives. There are at least 122 invasive species in Texas already causing serious impact. One of the latest to invade Texas is the giant Asian dodder. This is a plant parasite that looks like yellow green spaghetti and can grow six inches in a day. It first appeared in the Houston area and has a wide range of hosts. The time for action on these invasives is now. The first statewide meeting of professionals concerned with non native invasive plants will be held in Austin, Texas, on the 17th &

18th of November at the Ladybird Johnson Wildflower Center. A day of public awareness and education will be open to the general public on Nov. 19th. Those who should attend include local, state and federal land management specialists, environmental organizations such as NPSOT, NPAT and Nature Conservancy, nurserymen, gardeners, landscape designers, consulting firms, researchers, students and any others involved in land management. The conference program will focus on seven key strategies for dealing with non-native invasives. These seven strategies include leadership & coordination, early detection and rapid response, control and management, restoration, research,

information management, education and public awareness. For all those involved in maintaining natural areas or restoration, this is a significant opportunity to learn the latest strategies for control and to network with others involved in this effort.

Advanced training certificates will be given to Master Naturalists and Master Gardeners. The early registration deadline is November 1, 2005. For more information and registration go to <http://www.texasinvasives.org>.

**Native Prairies Association of Texas
Third Biennial Prairies and Savannahs
Conference A Big Success**

This summer, a daylong conference sponsored by NPAT and Baylor University on prairies was held at Baylor University, Waco Texas. The conference, titled "Native Grasslands and Water Resources — A Natural Partnership" featured speakers from Baylor University, Texas A&M, Texas Agricultural Extension Service, Texas-Tech, BRIT, National Wildlife Federation, Audubon, Texas Quail Conservation Initiative, and private landowners. The quality of the speakers and presentations were outstanding. If you didn't get to attend, you missed one of the most informative land ecology and management conferences held in Texas. In the evening there was a tour of the Baylor Wetlands Facility where dinner was served. After the evening dinner, attendees

were treated to a pleasant walk through the wetlands where green tree frogs were present in abundance among the reeds and blooming pondweed. This facility is a reconstructed wetland and illustrated the merging of prairie and wetland habitats. On the following day there were numerous field trips available including a visit to the Burleson's restored prairie in Temple, a tour of prairie plants at Mother Neff State Park and a tour of NPAT conservation easements and Riesel Prairie. Pictured are board members at Riesel Prairie on the conservation easement field trip where basket flowers, blackeyed susan and indian blanket were growing in profusion amid the big and little bluestems.



**Board Surveys Falls County
Easements and Riesel Prairie**

Falls County is the location of three NPAT prairie conservation easements that NPAT surveys on a regular basis as part of the management plan. This year members and directors Marcia Hermann, Pat Merkord, Glenn Merkord, Jason Spangler, Lisa Spangler and Scott Lenharth visited these easements and NPAT'S own Riesel Prairie. October is a special time to visit prairies in Texas and all who attended were not disappointed in the display of fall

flowers. At Riesel, Liatris and Texas giant sage, *Salvia azurea* was in full bloom, waving tall amidst the big bluestem, switchgrass, Indian grass, gamma grass, little bluestem, silver bluestem, sideoats grama, cupgrass, vine mesquite and Canada wildrye. The dominant plants at Riesel were big bluestem and little bluestem. A major threat to the conservation of Riesel and all the other easements visited is the encroachment of invasive plants. The

most widespread invasives noted included Johnson grass, KR bluestem and Bermuda grass. Woody invasives included southern dewberry, cedar elm, hackberry and mesquite. Other issues at all sites included time and frequency of haying, use of herbicides and use of fertilizers. It is a challenge for all involved maintaining these beautiful remnant prairies. Landowners were present during the surveys and members were able to discuss their

prairies with them. At the Wieting Prairie, while out surveying, members were treated to a kettle of broadwinged hawks migrating overhead. These Neotropical migrants were soaring over the prairie on their way to Central and South America. At Dragoo prairie, a Northern Harrier made its appearance as it swooped low looking for a meal. This prairie bird is now threatened due to loss of habitat.

Preserving Your Paradise

A workshop in Holistic Management on small acreage

Contributed by Lee Stone

What actions should you take to keep your land healthy? Holistic Resource Management of Texas invites the public to a one-day intensive workshop on managing small tract (5 to 50) acres with or without grazing animals. This event will be held outside, on the land in Wimberley, Texas, from

8:30am to 4pm, November 12, 2005. Cost for the day is \$25 and includes handouts and a catered lunch. Register online at www.hrm-texas.org or by calling Peggy Cole 512-847-3822.

The following are some of the topics covered:

- Making sound land management decisions
- How to plan for maximum enjoyment of land
- Restoring springs –for wildlife and for pleasure
- Good and bad plants and how to identify them
- How much cedar should be removed and how
- The cost of doing nothing to your land
- Ways to restore the land’s health
- How to graze without harming the land
- How to attract songbirds, quail and butterflies
- Beneficial & Harmful Insects
- The significance of soil organisms
- Reseeding – when, where & why?

After a variety of speakers on the above topics and a catered lunch, participants will go out in teams on the 15 acre tract to practice making a land plan, while they learn plant identification from team leaders. Consolidation of the plans and brainstorms will follow with a panel of experts to answer questions specific to your own operation or the practice tract.

Holistic management enables you to improve the quality of your life while enhancing the environment that sustains us



all. It’s all based on how decisions are made. Holistic Management give you a practical way to develop a clear focused vision for your future and enables you to plan how to get there in the most economical, environmentally and socially sound way.

Join others who love the land in an enjoyable and informative hill country event. Please reserve your space by November 5. Dress for walking on hill grassland.

The response of remnant and restored prairies to fertilization

A review of literature on fertilizers and grasslands

Contributed by Pat Merkord

Rangeland scientists have been studying the effects of fertilizers on grasslands for many years yet what effect fertilizers have on remnant and restored prairies is just now beginning to emerge. The first scientific studies on fertilizers began in the 1950’s and were usually conducted by departments of agronomy at various universities. In North Dakota a

study of nitrogen fertilization of a mixed grass prairie resulted in increased yield in wheatgrass and decreased yield in blue grama. One conclusion was no overwhelming evidence in favor of fertilizer use except in pure stands of wheatgrass and that lower applications of fertilizer were better than higher. In a study of minerals and proteins in prairie grasses

(Williams, 1953), it was found that nitrogen fertilization resulted in greatly increased growth of cool season grasses like junegrass, western wheatgrass, and needlegrass as compared to warm season species of prairie dropseed, little bluestem, big bluestem, blue grama and side oats grama. In a study of desert grasslands in Arizona, amounts of ammonium nitrate higher than 100lbs/acre decreased production and ammonium phosphate had definite advantages over ammonium nitrate (Freeman & Humphrey, 1956). In a Canadian study native range was fertilized with nitrogen. It was concluded that fertilizers may or may not produce sufficient extra growth to warrant their use and that range fertilization manipulates the natural composition by favoring some species over others (Lodge, 1959). In Arizona, a dryland range of blue grama, hairy grama, sideoats grama, three awn and curly mesquite was tested with ammonium phosphate at different rates of application. The response by different species was extremely varied. Low levels of fertilization gave overall increased forage production. Sideoats forage decreased at high and low rates (Honnas, Branscomb & Humphrey, 1959). By contrast a study on desert grasses in Arizona showed fertilizers extended the green feed time for cattle (Holt & Wilson, 1961). In conclusion, the 1950's showed that cool season grasses like western wheatgrass responded much better to fertilizers than warm season grasses, other native species in general had mixed reactions and fertilizer use might not be warranted. If fertilizers were used, the lower amounts got a better response than heavier applications and fertilizers with phosphate produced better results.

Studies in the 60's also tended to focus on positive or negative effects on species associated with livestock production. Research on Texas prairies began in the 60's at Texas A&M University (Reardon & Huss, 1965) on a pure stand of little bluestem. Varying amounts of nitrogen, potassium and phosphorus were applied to the site and only with sufficient rainfall did a positive response to phosphorus occur. Potassium increased weed species and yields and decreased bluestem production. Nitrogen caused earlier and greener growth but was effective only with increased moisture not usually available during hot Texas summers. Another Texas study (Pettit & Dearing, 1974) classified little bluestem and sideoats grama as decreaseers in comparison to competitive increaseer species of invader grasses like *Cenchrus* sp. and annual lovegrasses. Sand dropseed responded best to fertilization. Forbs decreased and some perennial forb mortality was observed with high nitrogen applications. Sideoats grama and little bluestem did not show increases in crude protein

due to fertilization. The main conclusion was fertilization of fair condition rangeland facilitated vigorous growth of invaders and undesirable species like sandbur and annual lovegrasses and placed better perennials under stress. One important study on native prairie grasses in Oklahoma concluded that fertilization yielded inconclusive results on species composition with no statistical differences between treated and untreated sites. It was observed that fertilization caused undesirable vegetation (like three awn and western ragweed) to grow profusely and three tons of prairie threeawn could not be called forage. They pointed out that in restoring range with low quality vegetation, unpalatable increaseer species will respond much more to fertilization than decreaseer species like big and little bluestem, and indian grass (Graves & McMurphy, 1968). Another Oklahoma study on native prairie hay pastures that received cutting only once a year found that fertilization increased weed production 2 to 5 times by weight and that total production of grass slightly favored the unfertilized pasture (Huffine & Elder, 1960). In a prairie restoration study in Nebraska (Warnes & Newell, 1969), it was determined that poor eroded soil sites may need some nitrogen applied to restore sufficient nutrients but it should only be done after the desired dominant grasses are well established because indiscriminant use of fertilizers increases weed and cool season grass competition with desired species. They concluded there was no significant benefit from planting time fertilization.

In the 70's and 80's studies focused on manipulations of fertilization rather than the general effect on range grasses seen in the 50's and 60's but the emphasis was still range management for livestock. The effects of massive nitrogen fertilization application as opposed to more numerous smaller applications was studied in Wyoming and found that at least 4 forb species accumulated nitrate levels that were at or above toxic levels to livestock and caution should be used in massive nitrogen applications (Houston, Sabatka & Hyder, 1973). A study in Wyoming (Rouzi & Fairbourn, 1983), investigated the effects of low fertilization rates on species composition, mineral content, total herbage and water use efficiency in a mixed grass prairie. and it was recommended that low nitrogen treatments were not economically feasible for the results obtained. A Kansas study looked at fertilization relative to the nutritive value of big and little bluestem (Allen et al, 1976) and found, contrary to other reports, that nitrogen application failed to increase protein content. Crude fiber increased the most in little bluestem but decreased the energy value with the increase in crude fiber in both grasses. The conclusion was nitrogen

fertilization does not improve nutrient content but may increase the carrying capacity of pastures.

The nineties gave a more balanced community approach to fertilization studies and aspects other than grass and fertilizer interactions were investigated. Species diversity, invasive species, symbiotic relationships, soil biological properties, plant community succession, seed germination and soil microbial communities received much needed attention. A study of plant community succession of range plants in Florida showed that the plant community became less diverse with increased amounts of Nitrogen fertilization. Early successional species replaced later successional species and invasives like bermuda grass and bahiagrass became established where they didn't previously exist. This study could not recommend any addition of fertilizers (Kalmbacher & Martin, 1996). The effects of soil microbial biomass, activity and community structure were studied by Bardgett et al (1999). The most significant finding was the combined effect of invasive plants and fertilization that increased the fungal content of the soil and thus negatively altered the microbial community in favor of fungi. Another study by Eom et al, 1999, focused on the effect of fertilizers on mycorrhizal symbiosis in tallgrass prairies. Nitrogen fertilization significantly altered these fungal associations. This influenced plant competitiveness, demography and diversity of grassland species. In a more conventional study in Oklahoma, fertilizers increased blue grama and windmillgrass and decreased sand bluestem, indiagrass and switchgrass. Windmillgrass is considered a weedy species. Downy brome, an introduced species increased from 5% to 25% in the fertilized pastures. Marestalk, an annual forb increased 2 to 3 times in the fertilized pasture and was not consumed by stock (Gillen & Berg, 1998). A study by Masters et al, 1993, investigated the use of fertilizers on good to excellent condition native prairies in Nebraska to increase seed production in big bluestem and Indiagrass. No treatment reliably increased seed production and the amount of seed produced was low compared to commercial production. In Oklahoma it was again found that fertilizers increased forage production but the increased yields may be from weedy undesirable species (Berg, 1995). Overall this decade's research indicated fertilizers bring changes to prairie communities including increased forage but the changes may favor invasives and weedy species.

The 2000's have opened new windows to research and knowledge on native prairies. Invasives and microbial interactions have taken a front row seat as significant to prairie maintenance and restoration. A study on soil carbon amendment by the addition of

sawdust to agricultural land being restored to tallgrass prairie was conducted in Ohio (Averett et al, 2004). The amendment caused a 94% decrease in N mineralization, a 27% increase in soil moisture but no effect on total N or pH. In the first year there was a reduction in plant mass in grasses (67%) and exotics (62%), but after the second growing season, exotics responded with a 40% decrease in mass production. They concluded that soil C amendment had several immediate benefits in prairie restoration being reduced N availability, slower plant growth and lower competition from exotic species. Although fertilizers were not used in this study, it sheds light on N requirements in prairie restoration projects. By contrast a study by Corbin and D'Antonio (2004) in California on the addition of carbon and competitiveness of native grasses did not find an advantage to native grasses competing with invasives but did suggest the amount of carbon added to might make a significant difference. In a study of diffuse knapweed, an invader of grasslands, it was found that increased phosphorus availability gave knapweed a competitive edge (Suding, Lejuene & Seastedt, 2004). Another study on knapweed found that additions of nitrogen and phosphorus to grasslands decreased the impact of biological control insects because nutrients changed timing and quality of growth and reproduction in knapweed. This would indicate that fertilization might not enhance the use of biological control of invasives (Lejuene et al, 2005). In order to shed light on efficiency of N use in prairies vs. agricultural systems a study in Wisconsin (Brye, 2003) determined that prairie N use efficiency was 12 to 72 times greater than that in agricultural systems. Two recent studies focused on microbial soil activity changes due to nitrogen enrichment. One study (Matocha et al, 2004) documented the suppression of soil phenol oxidase activity. This enzyme is important to the formation of humic substances in soil. They found nitrogen fertilization had a marked negative effect on phenol oxidase activity by 38%. The other study (Frey et al, 2004) found that N fertilization decreased active fungal biomass by 27 to 69% in plots but did not significantly alter bacterial biomass. This change in biomass ratio was followed by a significant decrease in phenol oxidase activity. Finally, in a study on diversity in newly established tallgrass prairie, it was found that (N) availability affected young and mature grasslands in similar ways. Nitrogen addition decreased diversity and increased productivity. Diversity was a maximum in soils that closely resembled native prairies (Baer et al, 2003).

Overall this review on the use of fertilizers on remnant prairies and prairie restorations hopefully sheds some light on this issue. These studies show

that fertilizers should be used with caution if at all and would suggest not fertilizing with nitrogen unless severe deficiencies are evident in soil testing. Fertilization increases weed and invasive species, decreases diversity and changes microbial communities. Phosphorus fertilizers give better results than nitrogen. No fertilization may do as well as any other treatment and would be more cost effective. If fertilizers are used, it should be done so with caution and low amounts. Even though much

research has been done it is apparent that more studies of a holistic nature on a long-term basis are needed to have an in depth understanding of the impacts of nitrogen and other fertilizers on prairie ecosystems.

Literature Cited:

- Averett, Jack M., Robert A. Klips, Lucas E. Nave, Serita D. Frey and Peter S. Curtis. 2004. Effects of Soil Carbon Amendment on Nitrogen Availability and Plant Growth in an Experimental Tallgrass Prairie Restoration. *Restoration Ecology* 12:568-574.
- Baer, S. G., J. M. Blair, S. L. Collins and A. K. Knapp. 2003. Soil Resources Regulate Productivity and Diversity In Newly Established Tallgrass Prairie. *Ecology* 84:724-735.
- Bardgett, R. D., J. L. Mawdsley, S. Edwards, P. J. Hobbs, J. S. Rodwell and W. J. Davies. 1999. Plant species and nitrogen effects on soil biological properties of temperate upland grasslands. *Functional Ecology* 13:650-660.
- Berg, William. 1995. Response of a mixed native warm-season grass planting to nitrogen fertilization. *Journal of Range Management* 48:64-67.
- Brye, K. R., J. M. Norman, S. T. Gower, L. G. Bundy. 2003. Methodological limitations and N-budget differences among a restored tallgrass prairie and maize agroecosystems. *Agriculture, Ecosystems and Environment* 97:181-198.
- Corbin, Jeffrey D. and Carla M. D'Antonio. 2004. Can Carbon Addition Increase Competitiveness of Native Grasses? A Case Study from California. *Restoration Ecology* 12:36-43.
- Eom, Ahn-Heum, David C. Hartnett, Gail Wilson, Deborah Figge. 1999. The Effect of Fire, Mowing and Fertilizer Amendment on Arbuscular Mycorrhizas in Tallgrass Prairie. *The American Midland Naturalist* 142:55-70.
- Frandsen, Waldo R. 1950. Management of Reseeded Ranges. *Journal of Range Management* 3:125-129.
- Freeman, Barry N. & Robert R. Humphrey. 1956. The Effects of Nitrates and Phosphates upon Forage Production of a Southern Arizona Desert Grassland Range. *Journal of Range Management* 9:176-180.
- Frey, Serita D., Melissa Knorr, Jeri L. Rarrent, Rodney T. Simpson. 2004. Chronic nitrogen enrichment affects the structure and function of the soil microbial community in temperate hardwood and pine forests. *Forest Ecology and Management* 196:159-171.
- Gillen, Robert L. and William Berg. 1998. Nitrogen fertilization of a native grass planting in western Oklahoma. *Journal of Range Management* 51:436-441.
- Goetz, Harold. 1969. Composition and Yields of Native Grassland Sites Fertilized at Different Rates of Nitrogen. *Journal of Range Management* 22:384-390.
- Graves, James E. and Wilfred E. McMurphy. 1968. Burning and Fertilization for Range Improvement in Central Oklahoma. *Journal of Range Management* 21:165-168.
- Holt, Gary A. and David G. Wilson. 1961. The Effect of Commercial Fertilizers on Forage Production and Utilization on a Desert Grassland Site. *Journal of Range Management* 14:252-256.
- Honnas, R.C., B. L. Branscomb, and R. R. Humphrey. 1959. Effect of Range Fertilization on Growth of Three Southern Arizona Grasses. *Journal of Range Management* 12:88-91.
- Houston, W. R., L. D. Sabatka and D. N. Hyder. 1973. Nitrate-Nitrogen Accumulation in Range Plants after Massive N Fertilization on Shortgrass Plains. *Journal of Range Management* 26:54-57.
- Huffine, Wayne W. and W. C. Elder. 1960. Effect of Fertilization on Native Grass Pastures in Oklahoma. *Journal of Range Management* 13:34-37.
- Dalmbacher, Rob and Frank Martin. 1996. Shifts in botanical composition of flatwoods range following fertilization. *Journal of Range Management* 49:530-534.
- Lejjeune, K. D., K. N. Suding, S. Sturgis, A. Scott and T.R. Seastedt. 2005. Biological Control Insect Use of Fertilized and Unfertilized Diffuse Knapweed in Colorado Grassland. *Environmental Entomology* 34:225-234.

Leland, J. Allen, Leniel H. Harbers, Robert R. Schalles, Clenton E. Owensby and Ed F. Smith. 1976. Range Burning and Fertilizing Related Nutritive Value of Bluestem Grass. *Journal of Range Management* 29:306-308.

Lodge, Robert W. 1959. Fertilization of Native Range in the Northern Great Plains. *Journal of Range of Management* 12:277-279.

Masters, Robert A., Robert B. Mitchell, Kenneth P. Vogel and Steven S. Waller. 1993. Influence of improvement practices on big bluestem and Indiangrass seed production in tallgrass prairies. *Journal of Range Management* 46:183-188.

Matocha, Christopher J., Gerald R. Haszler, John H. Grove. 2004. Nitrogen Fertilization Suppresses Soil Phenol Oxidase Enzyme Activity in No-Tillage Systems. *Soil Science* 169:708-714.

Pettit, R. D. and Donald W. Deering. 1974. Yield and Protein Content of Sandyland Range Forages as Affected by Three Nitrogen Fertilizers. *Journal of Range Management* 27:211-213.

Rauzi, Frank and Merle L. Fairbourn. 1983. Effects of Annual Applications of Low N Fertilizer Rates on a Mixed Grass Prairie. *Journal of Range Management* 36:359-362.

Rauzi, Frank, Robert L. Lang and L. I. Painter. 1968. Effects of Nitrogen Fertilization on Native Rangeland. *Journal of Range Management* 21:288-291.

Reardon, P. O. and D. L. Huss. 1965. Effects of Fertilization on a Little Bluestem Community. *Journal of Range Management* 18:238-241

Rogler, George A. and Russell J. Lorenz. 1957. Nitrogen Fertilization of Northern Great Plains Rangelands. *Journal of Range Management* 10:156-160.

Silletti, Andrea M. and Alan K. Knapp. 2001. Responses of the Codominant Grassland Species *Andropogon gerardii* and *Sorghastrum nutans* to Long-term Manipulations of Nitrogen and Water. *The American Midland Naturalist* 145:159-167.

Suding, Katharine N., Katharine D. LeJeune and Timothy R. Seastedt. 2004. Competitive impacts and responses of an invasive weed: dependencies on nitrogen and phosphorus availability. *Oecologia* 141:526-535.

Warnes, D. D. and L. C. Newell. 1969. Establishment and Yield Responses of Warm-Season Grass Strains to Fertilization. *Journal of Range Management* 22:235-240.

Williams, John S. 1953. Seasonal Trends of Minerals and Proteins in Prairie Grasses. *Journal of Range Management* 6:100-108.

Go Native: Improve Land Values

Landowners in Texas are finding that the value of their property increases with more native plants. Why is this happening? It's happening because there is a greater interest in wildlife for hunting, bird watching, fishing and nature tourism. These activities bring millions of dollars to the Texas economy. Native pastures are hardier and require less maintenance and reduce soil erosion. If you are a landowner we urge you to go native and restore your pastures to native species. Going native can also mean new avenues of income from the production of native seeds, landscaping with natives, restoration projects or using natives as buffers in organic gardening. If you are interested in going native on your property and need assistance see our website for lots of helpful information on how to restore a native prairie or how to seek assistance. If you don't own land but would like to get involved in prairie restoration, contact us because we have plenty of opportunities in various areas of Texas. Our website is www.texasprairie.org.

Calendar of Upcoming Events

November 12th. NPAT Board Meeting At Granger Lake

The rescheduled board meeting will be held on Saturday Nov. 12 at 10 am at the Granger Lake Army Corps of Engineers Headquarters in Williamson County. This is the rescheduling of the board meeting that was canceled due to hurricane Rita. At 10 am Scott Lenharth will lead a tour of the Granger Lake Gene Bank project. The board meeting will be from 11:30 to 1:00.

November 12th. Preserving your Paradise: A workshop in Holistic Management on Small Acreage

Holistic Resource Management of Texas invites the public to a one-day intensive workshop on managing small tracts (5 to 50 acres). The event will be held in Wimberly, Texas on November 12 from 8:30 am to 4:00 pm. Registration is \$25. Register online at www.hrm-texas.org or by calling Peggy Cole 512-847-3822.

November 15th. Chapter Meeting of NPSOT Austin Chapter: Texas Prairies is the Topic

Tuesday, Nov. 15, 2005, 7:00 to 9:00 pm at Wild Basin Wilderness, Austin. Lee Stone of the Native Prairie Association of Texas will speak about Texas Prairies.

Pulling Together Initiative: Invasive Plant Conference at Ladybird Johnson Wildflower Center, November 17-19

The conference will be held to facilitate communication among the state's stakeholders who have vested interest in non-native invasive plants. For land management specialists, environmental organizations etc. Professional level conference Nov. 17-18, Public Awareness Nov. 19. For information on Registration: www.texasinvasives.org.

Did You Know That Grassland Birds have declined more steeply and consistently than any other group of vertebrates in North America? Prairie birds are in a state of peril as a direct result of loss and decline of prairie habitat. The Nature Conservancy lists thirteen imperiled birds as indicators of overall prairie health. These species are:

Greater Prairie Chicken
Long Billed Curlew
Lark Bunting
McCown's Longspur
Sprague's Pipet
Baird's Sparrow

Lesser Prairie Chicken
Ferruginous Hawk
Chestnut Collared Longspur
Burrowing Owl
Mountain Plover
Cassin's Sparrow

Scaled Quail

Prairie restoration efforts will help these native grassland species survive

Prairie Plant Highlight **Wild Blue or Azure Sage** ***Salvia azurea***

Native Herbaceous Perennial 2-5 ft tall

Growth & Requirements:

Full Sun, Moderate soil moisture

Soil: loam, clay or gravel soils well drained

Tolerant of: high pH, drought, cold

Disease Tolerant

Blooms in late summer and fall

Easy and fast growing



This beautiful prairie plant native to the Central United States is loved for its sky blue flowers borne on tall stalks that often extend above the tall grasses. It can be easily grown in home gardens from seeds or cuttings and will continue blooming for 6 weeks or more. It is a great addition to a butterfly garden as it attracts many butterflies that feed on the nectar. Skipper and Nymphalid butterflies, long tongued bees and bumble bees are especially attracted to the nectar. The leaves have an aromatic fragrance that can be used in potpourri.

**Prairie plants like Blue Sage need habitat to proliferate.
Prairies are one of the most endangered habitats in the U.S.**

**Join the
NATIVE PRAIRIES ASSOCIATION
OF TEXAS
today!**

There are many ways to get involved through activities sponsored by NPAT. Field trips, restoration work, monitoring easements and maintaining gene banks are only a few

Membership application on next page

BECOME A MEMBER of the Native Prairies Association of Texas (NPAT)

MEMBERSHIP AND INFORMATION FORM

Use this form to request information or to join NPAT. If you are joining, please mail a check to:

**The Native Prairies Association of Texas
P.O. Box 210
Georgetown TX 78627-0210**

Membership categories are: \$350 Life, \$35 Group, \$30 Family, \$20 Individual, \$10 Student.

Name: _____

Address: _____ City: _____ State _____ Zip _____

Home/Office Phone _____ E-mail Address: _____

I'm particularly interested in prairies because: _____

Life Memberships are put into the NPAT Endowment Fund. Please consider adding an extra \$5 or \$10 to your membership dues. It really helps us out! <http://www.texasprairie.org>

Native Prairies Association of Texas
PO Box 210
Georgetown, Texas 78627
<http://www.texasprairie.org>

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