

SEEDS OF DIVERSITY



Iowa DNR Prairie Resource Unit

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Fire: Challenging, but Beneficial

Written by Eliot La Follette

Once again, another burn season has come and gone. Burn season passes so quickly when you take into consideration the time, preparation, and coordination that goes into the process before you ever strike a match. And if that isn't challenging enough, add weather conditions, available manpower, and burn objectives into the picture and a simple 40-acre burn can become quite complex.

Weather and manpower are the two most limiting factors. Sometimes it's amazing we can burn at all, and this was one of those years. March was extremely windy in our area, and April had plenty of wind as well. Gratefully, manpower was not an issue this year with help from Bays Branch and Brushy Creek Crews, so, when conditions were right, we could rock'n'roll. We were able to complete 8 burns totaling 420 acres, and able to assist on 7 other burns totaling 189 acres. One of these burns was 200 acres in size and with help, we were able to complete it successfully. The challenge of this burn was the complex nature of landscape: timber, pasture, remnant prairie, mixed grass seedings, hills, and valleys. The objective of this burn was to study effects of fire on timber stand improvement, remnant and savannah restoration, and invasive species control. We hope to put fire on this site several successive years and be able to identify and document changes we see. This year's burn was quite patchy, especially through the timber area.

Burn objectives are also a limiting factor in your ability to burn. If you are unable to meet your objectives, it is pointless to waste time putting fire on the ground. There are far too many objectives to mention in this brief article, and they can vary depending on your management priorities: wildlife, prairie, or

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seed production. A primary burn objective in wildlife management is gradual elimination of trees and small brush from a grassland. Another is removal of a dense litter layer from years of having no fire on the landscape. Both of these objectives help to enhance movement of nutrients (P, K, and N) through soil. They also allow soil to warm at a faster rate stimulating fresh new growth and producing improved wildlife habitat, especially, cover for nesting birds and brood rearing.

Primary burn objectives in prairie management may include the same objectives as wildlife management but must incorporate the concept of diversity management. By this I mean that measures are taken to maintain or improve diversity of a grassland or prairie using fire. Timing of a burn is crucial when desiring grass or forb domination or a good combination of both. Continually burning in mid-to-late spring will eventually lead to less diversity and total grass domination. While burning in late fall, late winter, or very early spring can maintain diversity and maybe even enhance it. Mixing up burn schedules from year to year and possibly including a late summer burn from time to time can also stimulate diversity.



Burn objectives for seed production are simple - turn everything black. Increased nutrient load in soil along with increased soil temperatures will stimulate tremendous new growth and produce an increase in seed production. Another objective for seed production as well as other management practices would be weed control. After turning the ground black, it is easy to spray and obtain good herbicide contact as seedlings begin to green up. This may not be practical if seedlings contain forbs since many forbs green up early as well.

With planning, preparation and follow-up, all of these management objectives can be met with a single burn. Also, with a long-term plan and some luck with weather and manpower, fire will help you develop, maintain and/or preserve a diverse prairie grassland that has tremendous benefits to both wildlife and seed production.

Lastly, please remember that prairies and grasslands are extremely complex ecosystems consisting of far more than grasses and forbs that make them so attractive to us. Invertebrates largely go unnoticed but are a very important component to this ecosystem. By leaving a portion of similar habitat untouched by fire, we help to preserve invertebrate integrity in this environment.

A Prairie Aristocrat: The Regal Fritillary (*Speyeria idalia*)

Written by Stephanie Shepard, Wildlife Diversity Program

The Regal fritillary (*Speyeria idalia*) is arguably one of the most fascinating and beautiful insects found on Iowa prairies. It is a large showy butterfly dependent on prairies for its rather interesting life cycle. Regal fritillaries are univoltine (only one generation per year) and females are especially long-lived. Males emerge in mid-June approximately two weeks before the females, which emerge in early July. Females mate immediately after emergence but curiously do not start laying eggs until mid August/early September. Once oviposition begins the female deposits up to 2500 eggs in the vicinity of (but not usually on) the host plant (Birdsfoot or Blue Prairie Violet). Caterpillars hatch in about one month, eat the chorion of their egg and go into “hibernation” for the winter. Caterpillars become active again in early May, having not eaten a thing but the shell of their egg for 7 months, and they must search for a 6-inch tall birdsfoot or blue prairie violet to feed on. Obviously, caterpillar mortality is high and this explains why the female lays so many eggs; this is known as “sweepstakes” reproduction.



Female Regal fritillary (*Speyeria idalia*) nectaring on thistle

For this rather convoluted and specialized life cycle to be successful, specific habitat features are required. These specific habitat requirements have led to a significantly declining population trend over much of the regal’s range including Iowa. It is suspected that regals require large areas of grassland with some topographic diversity to support its host plant (which requires dryer, well -drained soil) as well as large stores of nectar in the form of flowering plants available from June through September. This suspicion is supported by the fact that regals are still plentiful in the loess hills of Northwest Iowa and in the very southern part of Iowa where larger grassland areas still exist and where the prairie violets are common.

But what about the rest of the state which supports only scattered areas of larger remnant prairie separated by thousands of acres of inhospitable habitat? Regals have become increasingly scarce in these regions. Prairie reconstruction would seem to be a good solution. However, prairie violets have not been a very common component of reconstruction mixes because seed is very hard to collect and is therefore very expensive. But is this the only factor keeping reconstructions from being good habitat for the prairie obligate Regal fritillary? We decided to find out.



As a graduate student at Iowa State Univer-

sity I worked with Dr. Diane Debinski on a project to reintroduce the Regal fritillary to Neal Smith National Wildlife Refuge (NSNWR) in Jasper County, Iowa. NSNWR is a 3000+ acre prairie reconstruction established in 1991. In 1998 and 1999 several plots of blue prairie violet were planted in various locations on the refuge (over 2000 plants). In late July – September of 2000 and 2001 adult female regals carrying eggs were taken from Ringgold Wildlife Area in Ringgold county, IA and released into mesh cages situated over the violet plots at NSNWR.

On July 5, 2002 we observed our first free-flying adult regal. We caught and marked 17 individuals that summer and had 84 sightings. Regals have continued to be observed at NSNWR in subsequent years, and it appears that a viable population is being established.

This apparent success indicates that reconstructed prairie, as long as it has the required habitat elements, can support a population of this prairie obligate species. This is good news for the regal because it means we can use reconstructed prairie to help fill in the gaps between the prairies of central Iowa and decrease fragmentation of this landscape. It is crucial however that the prairie violet host plants are more frequently added to reconstruction mixes and thankfully the DNR Prairie Resource Unit is doing this!

Grazing Prairies for Biodiversity



Prairies have incredible plant diversity. That's one of numerous reasons why many of us are drawn to them. However, plant diversity is not something that maintains itself for long periods of time without some kind of management. Most of our prairies are too small for us to "allow nature to take its course" and assume that they will maintain their diversity and function over time. Even in large prairies, invasive species, climate change, and other threats have changed

the playing field so much that human intervention is necessary to keep biodiversity intact.

Maintaining (or increasing) biodiversity in prairies through management is a complicated challenge. Plant diversity is tied to heterogeneity across space and time. The tie between plants and location within a prairie is obvious when you walk up or down a slope and see different plants growing on the top, side, and bottom of the hill. But plant communities also change over time as individual plants “blink” in and out of the community. One of the great joys of prairie-watching is knowing that you will see different plants blooming every time you go out, and it’s common to find a plant where you are sure you have never seen it before. Competition between plants is fierce and constant. Plants we see as we walk through a site are the ones who have best managed to take advantage of current conditions. They may not be the ones who are winning the battle when we return the next time.

Because each plant species has its own set of conditions that allows it to grow and reproduce, maximizing plant diversity in a prairie means providing maximum diversity of those conditions. That doesn’t mean that we have to manage for each plant species to do well each year, but each plant species needs to be able to reproduce periodically in order to stay in the prairie. If it never gets a chance to start new plants from seeds or rhizomes, the species will disappear when the parent plants die. This brings us back to the importance of heterogeneity. A prairie that is managed will obtain a certain appearance if a repeated homogeneous treatment like fire or haying is applied to the entire site. Some plants will respond well to that management treatment, and some won’t. Those that respond well will thrive, but those that don’t will slowly disappear. This is especially true if treatment is applied in any kind of repetitive pattern (every other year haying, or burning every three years, etc.)

The key to keeping the maximum diversity of prairie plants around is to manage the prairie in a way that keeps the system off balance. Periodically changing the season of fire or haying, or the frequency of application, can have tremendous benefits to a plant community by allowing different plants a chance to shine. But an even better strategy is to use management treatments that are patchy – that vary in intensity or timing across the site, which creates a multitude of little habitat patches that may each favor different kinds of plants. In this kind of management, hundreds of plant species with different strategies and needs can thrive and reproduce all in the same year.

Grazing is a great example of a management treatment that varies in intensity across space and time. Cattle grazing has received a bad reputation among many prairie enthusiasts because we have all seen pastures that look like putting greens year after year. And there are certainly many good prairies that have been overgrazed out of existence. But grazing is something that prairies have evolved with. Prairie plants are well adapted to being nipped off and growing back. And more importantly, many prairie plants need the space created when their competitors get nipped off. Plants like Black-eyed susan, Evening primrose, and many other short-lived wildflowers rely on having open space for their seeds to germinate and grow. Without that, they would die without reproducing and eventually disappear from the prairie. While those kinds of plants can also take advantage of small-scale disturbances such as gopher mounds, and grazing can create disturbances at a greater scale – and we can decide when and where cattle graze. (Try negotiating with a pocket gopher!)

Because grazing is done by living animals that make choices about which plants to eat and where, grazed prairies often have patches of intense grazing and patches of light or no grazing (assuming that the stocking rate is halfway reasonable). In addition, you can vary both the timing and intensity of grazing very easily. By controlling the time of year cattle are in a site and the number of cattle present, you can greatly change the impact on the plant community. For example, grazing a large number of cattle during April and May and then pulling them out for the rest of the season is a great way to suppress smooth brome and allow warm-season grasses and forbs to thrive. Another option would be to graze a small number of cattle for the entire growing season. Because cattle would rather re-graze grass they ate earlier in the season than taller, stemmy grass that hasn't been grazed yet, they revisit the same small portions of the prairie over and over. This creates small areas of short-cropped grass, or "grazing lawns" surrounded by taller, ungrazed vegetation. Those grazing lawns create open space for seed germination, but also habitat for wildlife such as prairie chickens.

Perhaps the most promising way cattle grazing is being used in prairies is a system called patch burn grazing. Patch burn grazing is based loosely on the way bison and fire interacted historically in prairies, when bison were attracted to recently-burned areas because of lush nutritious grass there. In today's version, a portion of a prairie is burned each year, and cattle are given access to the entire site for most or all of the growing season. Like bison, cattle prefer recently burned grassland, so they spend the great majority of their time grazing in the burned patch and largely ignore the rest of the site. And surprisingly, they become much more selective feeders. In the patch burn grazing system cattle eat almost exclusively grass – eating right around species of wildflowers that we have always assumed were their favorites.



Heterogeneity of vegetation structure within the patch burn grazing system provides excellent wildlife habitat. The current year's burned patch is grazed intensively all season, and so has very short grass interspersed with ungrazed wildflowers. The patch that was burned in the previous year is filled with weedy annuals that are taking advantage of the space left between the grasses that were stressed the previous season. And the unburned portions of prairie have tall, dense vegetation. This structure can be altered by changing the stocking rate of the cattle. Higher stocking

rates lead to more grazing of forbs in the burned area and more grazing of the previous year's burn patch. Lighter stocking rates can lead to almost no grazing other than in the burned area, patchy grazing within the burned area itself, and very low amounts of grazing on wildflowers. Each year, a new patch is selected for burning (typically 1/3 to 1/4 of the site) based on where vegetation is most dense.

The recovery period in the year following the burn may be the most important part of patch burn grazing system. Grasses that were grazed for the entire previous season slowly start to regain their vigor, but in the meantime there is ample open space, both above and below ground, for germination of seeds. The most visible response to that seed germination is a flush of annual plants that cover the patch, but perennial forb and grass seeds can also take advantage of the opportunity to grab new territory. From a wildlife habitat perspective, the recovery period provides short grass and tall, weedy forbs (both newly established forbs and those already established forbs that were ungrazed in the previous year) – a rare and valuable type of vegetation structure for prairie chickens, quail chicks, and for many other wildlife species. Typically by the end of the first or second year after burning, the patch has recovered to the point where grasses are dominant again.

Patch burn grazing is still being actively tested and developed by groups such as Oklahoma State University, Missouri Department of Conservation, and The Nature Conservancy in Oklahoma, Kansas, and Nebraska. In addition, Dr. Dave Engle, who was one of the first people to start testing the idea, is now at Iowa State University and is planning projects in Iowa. While the system seems to have many positive benefits to plant diversity, wildlife habitat, and livestock production (weight gains on cattle have been very good), however, there are a number of questions remaining. Stocking rates play a large role in the intensity of grazing in the burned patch, how much “spillover” of grazing there is into the previous year’s burned patch, and how much grazing there is on forbs. Further quantifying of those differences will be important. Also, the season of fire (spring vs. summer vs. fall, etc.) changes the response of the plants to the system and needs to be further investigated.

However, the unknowns about patch burn grazing are not that different from cattle grazing in general as it’s applied to prairies. We are still learning how to use grazing to help keep prairies healthy and one of the great benefits of using cattle is that they are somewhat unpredictable. The way they react to the prairie (and vice versa) one year may be different the next. That unpredictability helps shake up the prairie and keep it diverse and vigorous.

Grazing may not be appropriate for every prairie, but it may be a tool worth trying. It’s nearly impossible to destroy a prairie with grazing in a single season because plants there are adapted to surviving (or even thriving) all kinds of situations. Watching how cattle graze and how the prairie responds will teach you a lot about the prairie and help you manage grazing to meet whatever management objectives you might have.

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Please note that the once known Prairie Seed Harvest Team now has a new name, the Prairie Resource Unit. Our new headquarters building will be known as the Prairie Resource Center and will be located at Brushy Creek State Recreational Area starting approximately July 1, 2006.

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