NEWS RELEASE
USDA Forest Service -- Northern Region

February 6, 2001
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Fire Fortifies Native Grasslands

By Deborah Richie Oberbillig

The history of the western plains is replete with images of a sea of grasslands teeming with wildlife. Meriwether Lewis wrote in his journal on Sept. 18, 1804 of the South Dakota prairie, "This senery...already richly pleasing...was still farther heightened by the immence herds of Buffaloe, Deer, Elk and Antelopes which we saw in every direction feeding on the hills and plains."

The Lewis and Clark Expedition also recorded another aspect of the prairie: fires ignited by lightning and by Native Americans. A July 20, 1804 entry noted "plains to the south rich, but much parched with frequent fires..." An August 15th entry described finding trees on fire where a small band of Sioux had passed by only hours before.

While the great herds and endless plains have vanished, fire still plays a role in restoring the remaining pockets of native grasslands. A closer look at three recent grassland fires—two in Montana and one in North Dakota—illustrates that flames invigorate plants and wildlife native to grasslands.

"Fire is as essential to the health of western grassland ecosystems as it is to forests," emphasized Steve Shelly, regional botanist for the Forest Service Northern Region in Missoula.

Prescribed Burn:
Dry Mountain Research Natural Area, Beaverhead-Deerlodge National Forest, Montana

In the Spring of 1995, the Forest Service took the first step to reversing a century of fire suppression on Dry Mountain Research Natural Area (RNA) near Butte, Montana with a prescribed fire on about 1500 acres within and outside the RNA.

The results were dramatic in the first season, and even better three years later as the naturally fertilized grasses grew without competition and with plenty of moisture.

"In 1998 we had tremendous grass growth-- the bluebunch wheatgrass was chest-high and the needlegrass reached my nose," marveled John Joy, RNA Coordinator for the Beaverhead-Deerlodge National Forest.

The decision to plan a prescribed burn started with a fire study of the site by Dr. James Habeck, University of Montana ecology professor emeritus, who

found that fires had historically burned every 14 years, usually in the form of small patchy fires rather than uniformly large fires. Lack of fire over the past 100 years had allowed Douglas fir and Rocky Mountain juniper to colonize openings.

"Grasslands shrink without fire," Joy explained. "As trees encroach you start to lose grasses and that's happening all over the west."

Big sagebrush, which always was a component of the Dry Mountain RNA, also had taken over former grassland in fire's absence. Sagebrush, unlike grass, does not sprout from its roots. Fires will kill sagebrush, but provide a seed bed for new plants. Only in the case of too much fire too frequently will it disappear, which is of great concern to managers in the sagebrush steppe (primarily found in Wyoming, Idaho, Nevada, eastern Oregon and eastern Washington). The problem lies in the exotic cheat grass that catches fire as often as every year, which prevents sagebrush seedlings from surviving. Without sagebrush, there can be no sage grouse.

Dry Mountain is not sage grouse habitat, Joy stressed. However, farther south on the Beaverhead-Deerlodge National Forest, the Forest Service works with Montana Fish Wildlife and Parks to plan burns that will maintain a healthy sagebrush and sage grouse community, he said.

Armed with Habeck's historical data for Dry Mountain, the Forest Service marked off 300 acres of the RNA for the burn, plus a surrounding 1,250 acres to spread the effects over a larger landscape. The burn in April, 1995, set back the colonizing trees and sagebrush. Complete restoration will take more than one burn, with plans to simulate historic fire frequency.

"One thing that's great about grasslands is that fire generally doesn't hurt the grass much," Joy said. "We apparently caused no harm because the plants grew like crazy. Even a few months after the fire you'd think you were looking over a field of wheat."

Ashland Ranger District Wildland Fires of 2000:
Custer National Forest, Montana

Linda Spencer, ecologist for the Custer National Forest, explained why fires in native grasslands can result in lush growth after rainfall.

"Fires consume the grass litter and release nitrogen and phosphorus that benefit all plants," she said. Although there are differences in the results of fire depending on timing of the burn and the composition of warm or cool season grasses, the basic premise remains the same.

After a late fall tour through last summer's wildland fire on the Ashland Ranger District in south central Montana, Spencer saw green ash trees in the woody draws already sprouting, and quick recovery of riparian areas—the vegetation lining streams.

She also observed large numbers of wild turkey congregating along burned streamsides. Given enough moisture, she expects the wildflowers and grasses to respond vigorously.

The fire started on July 23rd, 2000, when lightning ignited drought-stricken grasslands and ponderosa pines. In five days, the fire raced through 83,000 acres of southeastern Montana, about 40 percent of that grasslands,

The light fuels in the grasslands meant that the fire moved through quickly without causing soil damage, said Spencer. Thousands of lightning strikes each year guaranteed that this ecosystem developed with many low intensity fires.

The difference now, she said, is that suppressing fires has allowed the ponderosa pine stands to connect across former meadows. That rate of spread can be impressive when pine seeds from one tree can sprout 200 feet away.

From an ecological perspective, Spencer believes that the year's fire was a success in reconnecting grasslands, from bunchgrasses like needle-and-thread and little bluestem on the drier slopes to the western wheatgrass and blue grama in the valleys. Even the Idaho fescue beneath ponderosa pines will be energized and the emergence of more shrubs will offer better browsing for the mule deer herds.

The pronghorn that dwell on the uplands of the Ashland Ranger District provide a prominent example of how one species has evolved with fire. North America's fastest mammal takes advantage of keen vision and speeds of up to 50 mph to outrace predators across the open plains. In addition to fire opening up the landscape, the grasses and wildflowers after a fire contain higher protein and mineral levels with lower levels of indigestible materials.

Spencer summed up the fire's significance to the community of plants and animals as follows: "Fire conditions were ripe for a big burn and this one set back succession, reestablished grassland connectivity and invigorated the grasses."

Little Missouri Grasslands, North Dakota: Gap Fire of 1999

Farther east in North Dakota, biologists are monitoring the aftermath of the 1999 Gap wildland fire that burned 52,000 acres—90 percent on the Little Missouri National Grasslands, managed by the Forest Service.

On October 31, 1999, the Gap Fire on the Little Missouri Grasslands turned Halloween into a truly ghoulish night in North Dakota. There, 60 mph winds fanned a fire at the Montana border at a rate of 300 feet per minute. Within six to eight hours, the fire had burned 25 miles into North Dakota.

The specter of fire in the grasslands is not desirable in a landscape of plowed farms and communities, but on the largest chunk of native prairie remaining in the Northern Great Plains, fire is ultimately good for plants, wildlife and the livestock that graze there, according to Spike Thompson, who oversees the McKenzie Ranger District.

"Our policy remains that we will try to put out wildland fires, whether natural or human-caused," Thompson said. "What we're looking at is reintroducing fire in the ecosystem as prescribed burns."

The upcoming Northern Great Plains Planning Process Final Environmental Impact Statement will contain specific proposals for prescribed fires on the Little Missouri Grasslands for purposes such as enhancing bighorn sheep habitat, riparian areas and woody draws that are vital to migrating and breeding songbirds.

Despite a dry growing season that slowed the growth of grasses following the Gap Fire, Thompson said that the chokecherries and aspen re-sprouted dramatically.

Darla Lenz, botanist for the Dakota Prairie Grasslands (which include the Little Missouri Grasslands) has visited the fire area several times to see how the land was recovering.

"I thought it looked great," Lenz said. Even though the dry year prevented a burst of growth from the grasses, she pointed out that the fire had already improved the species composition and diversity.

A good example is creeping juniper, she said. This shrub does not tolerate fire well and without fire will form a solid mat in places, eliminating grass and wildflowers. After the fire burned through these mats, Lenz found both grass and wildflowers filling in the holes.

"After the fire goes through it cleans up a lot of the shrubs," she said. "Some are fire tolerant and some are not and you get a natural shift in plant communities."

Naturally, this country that varies from flat to rolling to badlands burned anywhere from five to 20 years, with the longer intervals in the badlands. Even some erosion from fires is part of the natural cycle, Lenz said.

The forces of fire and rainfall in an arid land that receives about 12 inches annually have shaped the lives of more than plants. Dan Svingen, bird biologist for the Dakota Prairie Grasslands, said that two bird species illustrate the significance of fire to their long-term survival.

The Sprague's pipit and Baird's sparrow populations are declining and listed as sensitive species. The Little Missouri Grasslands are critical to the conservation of these birds, he said.

"Both songbirds need healthy prairie," he said. "Too much grazing or recent fire can be hard on them."

He explained that these birds need some grass litter on the ground for food and nesting. Areas that are grazed too heavily eliminate their nesting habitat, and conversely if a patch of prairie is rested for several years, the birds won't be able to find enough insects to eat in the dense, decadent grass.

As researchers delve into the life history of what some might call nondescript little brown birds, they are discovering an ingenious relationship to the prairie.

For example, the Baird's sparrow migrates during the breeding season on an east-west axis to find ideal nesting conditions according to rainfall differences across North Dakota.

Svingen plans to start a monitoring program this year to look at fire effects on birds, which he anticipates will help the Sprague's pipit and Baird's sparrow within two to three years as grasses fill in with renewed vigor.

The sharp-tailed grouse, a popular upland game bird, also demonstrates a delicate relationship with fire. These birds must have heavy cover for nesting and fires may have a mixed effect depending on the timing of the burn and the subsequent weather, he said.

"If a fire stimulates heavy growth, sharp-tails will benefit, but not if it burned shrub patches that were used for winter food and then lack of rain prevented good re-growth for spring nesting," Svingen said.

In spite of the dry year, the Gap fire did not burn the grasslands with equal intensity, which appears to be welcome news for all three birds. Like historic fires, the flames danced across the grasses leaving patches of blackened and singed lands. A Forest Service Burned Area Rehabilitation team investigated the fire intensity and found that only 4 percent burned at high intensity, 50 percent at low intensity, 26 percent moderate, and 20 percent was unburned.

Botanist Lenz observed that how and when the fire burned fits the fire history here. In the fall when thunderstorms are common, the grasses are dry, cured and ready to ignite. She views the expansive, relatively weed-free Little Missouri Grasslands as a fertile learning ground for how to restore prairies.

"We don't like to have fires that are uncontrolled like this but the bright spot is that it is actually good for the ecosystem," Lenz said.