Fire to Increase Plant Diversity and Control Invasive Species

Bill and Dotty Zales of Westfield, Iowa.

Bill and Dotty Zales of Westfield, Iowa, are no strangers to burning prairie land. They've burned portions of their 280 acres of Loess Hills prairie land eight times in the past five years, and Bill has helped as a volunteer with more than 20 other burns.

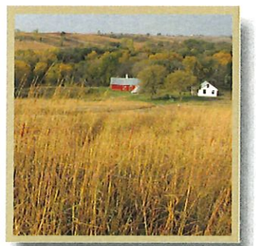
"Because this land hadn't been burned, we had a real problem with Eastern Red Cedar, rough leaf dogwood, elms, and too much sumac invading the prairie grasses," Bill says. "The invading plants aren't fire tolerant, but the native grasses evolved under a fire regime, so they not only tolerate fire, they thrive because of it," he explains.

"Once you see a prairie before and after a burn, you're convinced of the value of burning. You walk the land the year after a burn, and you see so many more plants blooming. They've always been there, but the fire released them. We've seen as many as 30 new forbs and the grasses grow higher than your head," Bill says.

Experience Over the Years

Bill first began burning prairies and savannas in the late 1970's as a Professor of Botany in Illinois. "I volunteered to help burn along a 22 mile stretch of bike trails along an abandoned railroad line, without a lot of experience. Then about 1994 I took some formal training from the U.S. Forest Service," he says.

Bill's burn certificates include the Forest Service S-130 "Firefighter Training", S-190 "Introduction to Fire Behavior" and an "arduous duty" test. He had to walk 3 miles with a 45-pound backpack in 45 minutes for that one. It was part of the test he had to pass before going to Oregon and Montana two years ago as part of a paid burn crew.



Bill and Dotty Zales have burned portions of their prairie eight times in the past 5 years.

He's signed up for a refresher course in December to maintain his certificates. Bill continues to volunteer to help on local burns. "I learn something new every time, it seems," he says. "Like in a Nebraska burn, we learned if you rake a windrow from a mowed firebreak, you shouldn't throw the windrow into the burn area, because that windrow can smolder rather than burn right away."

Do the Burn Yourself?

"I don't think you can expect most landowners to burn on their own," Bill says. "No one has enough equipment or manpower to do it, and that often includes private landowners, the county, and local organizations."

"You might get by with 6 people helping on a burn if they're experienced and they have 2 pumper wagons, walkie talkies, and the other equipment you need. But we've more often had 9 or 10 inexperienced volunteers. In quite a few cases, you just need people watching at different points. Neighbors will volunteer, local Audubon members have helped us, and you find some people willing to help just to experience a burn," Bill says. "We've worked a lot with Scott Moats, the Director of Stewardship with the Nature Conservancy, too."

Burn Equipment Available

"We rent the fire cache equipment from the Plymouth County Conservation Board. Anyone can rent it for a small fee. It includes a 6-wheel ATV on a trailer with a water tank, pumper and hose. They also have rakes, rubber flappers, helmets, goggles, and Nomex fire retardant pants and shirts.

A group of organizations have an initiative called "Fire in the Hills" and they make the equipment cache available to anyone throughout the Loess Hills. The Fire in the Hills initiative also has a mobile professional burn crew available at a cost to landowners. That initiative was begun by the Loess Hills Alliance.

The main reason the Zales burn is to control invasive woody species including Eastern Red Cedar.

No Cost to Burn

"Since the equipment is loaned at minimum cost, there's really no expense to burn," Bill says. "We do make sure we have a lunch for everyone. And we exchange help with others who burn."

Harvesting Seed

Bill has harvested seed from his prairie and donated it to local agencies to reseed prairies. It's helpful to have local seed, with mixtures of a variety of native grass and forbs.

No Fear of Fire

The Zales respect fire, but don't fear it. Their house is surrounded by tall prairie grasses, and they have mowed and then burned around it. "We talk about it, but fire doesn't scare me," Dotty says. "Bill is very careful and good with it. I feel safe with his expertise."

Plan Ahead of Burning, Watch Afterwards

You do need to plan for a burn, Bill says. Rounding up a crew is the first thing – you have to have people commit ahead to being there the day you burn. You also need to mow firebreaks before the burn, or plan to use creeks or roads.

"You have to watch the weather for the burn day, and that really needs to be local," Bill says. "I think the two things people don't watch closely enough are relative humidity and wind direction. Wind direction can change on you in the middle of a burn, and if the humidity goes up or down it will affect the intensity of the burn. You have to be prepared for that," Bill says.

> "Most people around here consider it poor land, but for us, it's prairie land that you can't just find anywhere," said Bill Zales.

After a fire sweeps across the burn area, its' done, but you need to stick around for "mop up". Dead trees might burn awhile, and so do dried cow pies.

Change in the Land

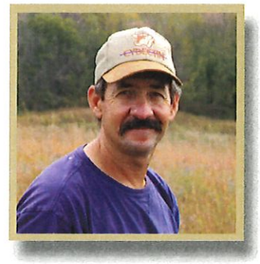
The change in the prairie also means a change in habitat for wildlife. "We see lots of deer and wild turkeys here, and pheasants, hawks, and all kinds of owls," Bill says, "but what's really changed with burning is the grassland birds we see now, like dickcissels, warblers, meadowlarks and woodcocks."

And Bill and Dotty see lots of butterflies. They're in a migratory route for snow geese and butterflies, and have seen bald eagles in the winter.

"I've been fascinated with these hills since I was a young boy, when I would visit relatives in Westfield," Bill says. "Then I became a botanist and learned about prairies. "We bought 160 acres in these hills at auction in 1984, and would come from Illinois for a week in the summer to enjoy it. Then we added 120 more acres. It's all in the Loess Hills," he says.

"Most people around here consider it poor land, but for us, it's prairie land that you can't just find anywhere," Bill says. "We have a conservation easement on it, and want it to stay like this long after we're gone."

Burning Makes Better Grass for Better Pasture



Dean Lord, cow-calf operator in the Loess Hills near Hornick.

As Dean Lord sees it, invasive woody plants have a domino effect on his business. "Red cedars and brush will encroach on a prairie. They will overtake it over the years and choke out the grass. If you don't have good grass, you can't grow good calves. And without good calves, I'm out of business," he says.

Lord uses a combination of prescribed fire and mechanical means to control brush and invasive woody species on his Loess Hills pastureland east of Hornick along the border of Woodbury and Monona Counties.

About 60 percent of his pasture is prairie grass on hilltops – the rest is bromegrass and orchardgrass.

Healthier Grass After Fire

Lord burned 60 to 70 acres in two burns in one day this past spring (2005). "I did it early in the spring because I wanted to promote growth of cool season grasses, too. Later in the spring would set the cool season grasses back, and I didn't want that. Timing the burn is important in a grazing system," he says.

Mechanical brush removal and fire go hand in hand to make better pastures and better prairies in the Loess Hills.

You have a healthier stand of grass after a fire. The ash puts some nutrients back into the soil, and the big thing is getting rid of the woody competition so the grass gets sunlight," he says.

Lord didn't graze the pasture after the burn until late fall. "That pasture had a lot of Cedars and no fence. I wanted to get the fence built this year, and then graze it. I didn't really want to graze it this year at all, but ended up grazing it a little," he says.

Burning, Mechanical Control Go Hand in Hand

"If you've got invasive woody plants in your prairie pastures, and most people around here have that problem, clearing and burning go hand in hand to control them," Dean says. "That's what I've seen from personal experience, and I think studies show that, too."

"When I clear brush and Red Cedar from a pasture, the seed and the smaller plants are still there. Fire will control the little plants, set the brush back and promote grass growth. So I like to clear the pastures first of the brush and larger invading trees, and then follow that with a burn," he says.

"With the right conditions, you can kill the large trees with fire. But I've also seen very small invasive plants survive a burn in poor burn conditions. So the weather has to be right," he says.

Lord also thinks mechanical removal of the trees is helpful, even with burning. "You will still need to move the tree carcass out of the pasture after a burn, especially the sharp, prickly Red Cedar trees, if you want cattle to graze the pasture," he says.

"The Red Cedars are very invasive. They will lay down a mat of needles that choke out the grass. But you burn, and that prairie grass will come back," he says.

Lord uses a Bobcat skid steer loader with a tree shear to clear trees up to 2 feet in diameter. He also uses a rotary mower for smaller brush. He started clearing his own land, but neighbors wanted some work done as well, and the word spread that he was available for brush clearing work.

"I've never advertised, but seem to keep busy from word of mouth. I've been to Nebraska, South Dakota, and both southern and northern Iowa. It seems to be a problem everywhere," Lord says.

Help From the Local Fire Department

"I have S-130 and S-190 certification. And I have my own back pack, drip torch, and flappers. But you need more people on hand, and fire scares me, so I wanted to be cautious," Lord says. "I'm a volunteer with the Smithland Fire Department, and asked them for help. They're certified, they have the equipment, and we did it right through them."

The fire department furnished volunteer firefighters, grass rakes, tanks and sprayers, and back packs. They also prepped the site for backfires.

> "I want to eventually have a rotational burn plan that is coordinated with a rotation grazing plan," said Dean Lord.

"They charge by the acre to do a burn. You don't want to spend any more than you have to, but the Smithland Fire Department is a volunteer department, so you know the money is going to a good cause," Lord says.

Cost-share, Burn Plan and Grazing Plan Help From NRCS

Lord also worked with the local office of the USDA Natural Resources Conservation Service. "They worked through an official burn plan with me, and they also offered cost-share to help with the cost of the burn," Lord says. "It came off as planned. We didn't have any problems the day of the burn. We had 10 or 12 people there, and we killed a lot of brush and invading woody trees that day," Lord says.

His next step is to incorporate future burns into a rotation grazing system plan. "I want to eventually have a rotational burn plan that is coordinated with a rotation grazing plan," he says.

Recommends Fire to Other Cattlemen

Cattle grazing on a pasture of native grasses.

"There are some areas with buildings too close, or neighbors I would be concerned about, so I wouldn't want to send fire through every part of every pasture. But I would recommend the use of fire in most cases to improve pastures," Lord says. "If you're going to spend the money to clear pastures of larger brush, you need to burn to control those new Cedars and other invasives. Otherwise, they will come back, and you'll have the problem all over again."

"Benefits are positive for livestock."

Dr. Dave Engle, Iowa State University

Quality of forage is improved after a burn.

In general, benefits of fire are positive for livestock grazing, says Dr. Dave Engle, Professor and Chair of the Department of Natural Resource Ecology and Management at Iowa State University. He says studies have shown fire can increase summer gain in stocker cattle by 15 percent.

"It's the quality of forage after a fire, not the quantity, that makes the difference," says Dr. Engle, who has 35 years' experience with prairie grasses throughout the Great Plains. "After a fire, digestibility and protein content of ingested forage is higher. The fire eliminates the old, dead material from previous years," Dr. Engle says. "Because cattle are selective eaters, they usually consume less of the high quality forage in a non-burned area because each bite is smaller than in the burned area."

The exception, he says, is heavily grazed land. If you're grazing heavily, you may not want to burn and a fire may not spread anyway because your livestock hasn't allowed dead material to accumulate.

Burning is also likely to increase forage quantity. "Many people have thought burning reduced forage production. That may be the case at times, but it's more likely to increase," Dr. Engle says. "In the southern Great Plains, production after burning depends on many circumstances. In a higher precipitation area like Iowa, I'd expect an increase."

"Fire does play an essential role. It's a major driver in grassland ecosystems, just as grazing is, so without fire, grassland does not function as well as it should," Dr. Engle says.

"You see the difference."

Noel Mumm, Harrison County prairie landowner

"I knew the prairie would be healthier after a fire, from observing the results of other burns. But I was still surprised at just how well it worked on my land," says Noel Mumm. "It was like you had fertilized the grass. It must have grown 40% higher after the burn," Mumm says of the 18 acres he recently burned.

Fire helps to control invasive woody vegetation.

Mumm, who owns about 25 acres of prairie land about 18 miles north of Missouri Valley in Harrison County, has burned twice in the past year and is scheduled for a third burn.

"We had a lot of brush and woody encroachment, but the burn sure worked great. It killed a lot of brush. The control from the burn was great," Mumm says.

Mumm worked through the Harrison County office of the Natural Resources Conservation Service to get a burn plan and reimbursement of 50 percent of the cost of the burn. He hired the mobile burn crew available from the Fire in the Hills Initiative to do the burn. "I think they brought in 8 or 9 people. They had all the necessary equipment, and were very careful," he says.

"I had done a little burning myself in the past, but I saw somewhere that this crew was available. That was appealing to me- I'm getting to the age that I don't want to do it myself," Mumm says. He thinks his cost was about $50 an acre, with half of that being reimbursed. The cost per acre is reduced on larger acreages.

"It's an ongoing thing, the prescribed burning of a prairie," Mumm says. "Like I said, I'm going to continue a burn program. I'm very satisfied."

"The first burn convinced us."

Jim Baylor, Fremont County prairie landowner

It's been 20 years since he first burned his prairie in the bluffs near Thurman in southwest Iowa, but Jim Baylor says that first burn convinced him of what a burn could accomplish.

"Plants come on strong after a burn – it's an invigorating force," he says. "It causes seeds to germinate, and eliminates invasive species. We've burned all 25 acres of our prairie land several times, and have become aware of what a growth stimulant fire is to the prairie."

The prairie has been in Jim's family since 1849. "I remember coming over here to the bluffs to play as a child 75 years ago – this prairie is a feature of our family heritage. But we didn't know what we had," Jim explains.

Jim Baylor, prairie landowner.

"We were raising sheep in 1981 after I had moved here to live on the family farm, and I thought I wanted to grow some warm season grass for them. The land was overrun with scrub trees – Eastern Red Cedar, buck brush, elms, ironwood, and other junk trees – so I asked a guy with a dozer to clear it that January. He sheared those trees off. My plan was to disk it that next spring and seed the warm season grasses, but the dozer operator knew a little about prairies. He thought we should just wait and see what developed, now that the invasive cover was gone. We did wait, the grasses began to come back on their own, and that was the start of what we have today," Jim says.

"The first prescribed burn was done in 1986 when a knowledgeable friend told us our sheep pasture was a pearl that ought to be developed. He said to burn it, and he brought friends from Wisconsin to help," Jim says.

Jim has had help for each of the three prescribed burns he's done. "I've tried to do it by the book, making the firebreaks and hiring the Thurman Fire Department to stand by," Jim says. "There's a lot more science in burning now than years ago when you just lit a match to it."

"Fire does play an essential role. It's a major driver in grassland ecosystems, just as grazing is, so without fire, grassland does not function as well as it should," said Dr. Dave Engle.

Each fire has helped the prairie thrive. After good rains this summer, "we have a bumper crop of grasses and forbs down there," Jim says. "I found rattlebox that the fire caused to germinate. People who have been out here counting say I have 187 different plant species."

Jim thinks clearing, grazing and mowing are also beneficial to prairies, to help keep invasive brushy plants in check.

Experts have told Jim his bowl-shaped prairie is rare. He has mesic prairie at the bottom of the bowl that turns to dry mesic prairie higher up the bowl. "Up on the ridges you find yucca and prairie willow, that you don't find down below," Jim says. "The bluffs are an ecosystem we want to preserve."

Photographs by Lynn Betts, Stanley Buman and Robert Buman.

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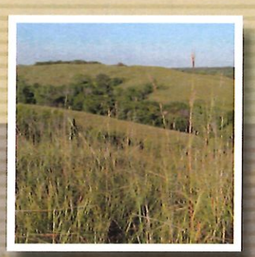
Prescribed Fire and Loess Hills Landowners



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