



## Prairie Pod Transcript

Season 2, Episode 8: The Hills are Ablaze (Restoration Series: Fire Management in Prairies)

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Transcript:

((sounds of birds chirping and wind blowing))

Megan Benage: Hey, welcome back to the Prairie Pod, season two, episode 8. This is our final episode. I can't even believe it. Jess, can you believe it?

Jessica Petersen: No, of course not. It's flown by as usual.

Megan: I know. I'm sad. It's flown by like a wildfire, like a really fast prairie wildfire. You just light it and then all of a sudden booshk it's done. (Laughing.) The reason why I'm being such a dork and talking about fire is because that is what we're talking about today. Our episode title is, The Hills Are Ablaze. I was going to sing it, but then I decided not to. You're welcome Jessica. You're welcome. Later, later I will. So we are joined by two fabulous guests today to help us round out the season and there's no better people we could think to round out the season with than these two gentlemen. Joe, how about you introduce yourself.

Joe Blastick: I'm Joe Blastick, with The Nature Conservancy. I manage our Prairie Coteau Program, across eastern South Dakota and southwest Minnesota and I'm also the fire manager for South Dakota, making sure all of our staff are following the rules and staying compliant with our guidelines and things.

Megan: I like it. Chris?

Chris Smith: Yeah, good morning. My name's Chris. I wear many different hats. I work for the Department of Transportation, where I serve as Protected Species Program coordinator, but a lot of my experience with invertebrates and fire actually started when I worked for the Department of Natural Resources in the Nongame Wildlife Program and I've continued to stay involved with DNR as a private contractor doing some fire effect works with them.

Megan: Awesome. See these are the people to talk to when you want to talk about setting stuff on fire. I didn't say who I was. I'm Megan. I'm a regional ecologist with the Department of Natural Resources. Jess you didn't say who you were either.

Jessica: I didn't. It's episode 8. I kinda figured people had it figured out by now, Jessica Petersen, invertebrate ecologist for the Minnesota DNR, Minnesota Biological Survey.

Megan: Good job. It's always good to stay in practice, know who you are. So yes, today's podcast, we're going to talk about prescribed fire. We call it prescribed because even though anybody who does fire management as part of their job absolutely loves the thrill of fire, these are controlled burns. That's the keyword: controlled. So they're for the purpose of disturbance-based management and they're done with the utmost safety in mind and we're usually trying to do it to improve the habitat because prairies need disturbance in order to persist. I wish I had another P in there because then I can get alliteration. Prairies need perpetual disturbance to persist. I'm going to keep going. Stop laughing, Joe. Oh, let's just jump right in, but wait. But wait. We can't jump right in without a caveat. So, I just want to make sure everybody understands we are talking about prescribed burning in tallgrass prairies, and so I just want to make sure because we're in Minnesota and this may not be clear to everybody. We are not talking about mid or shortgrass prairies that you'll find as we move across the United States west. Go west, young man. So, we're talking about tallgrass prairies and these tend to get a little bit more rainfall. So our climate people tell me we get about roughly 30 inches of rainfall per year. And Minnesota ranges somewhere between 18 inches in northwest and about 32 inches all the way to Southeast Minnesota towards the boot. So just keep that in mind that rainfall matters when you're talking about setting stuff on fire. So Joe, tell us a little bit about when prairies burn originally.

Joe: I think, you know, historically we talk about them burning in the spring, some in the summertime, and then in the fall when you had natural, you know, natural things like lightning strikes and those sorts of natural occurrences. But over time, you know, our systems have been altered and that's become a lot more challenging to mimic and to do, so, you know, right now the prescribed fire world focuses a lot more on spring burning and fall burning with not as much summer burning, not because the ecology doesn't need it, it's just because things have changed.

Megan: It's usually staffing, right? Like that's when we have crews.

Joe: Yeah. Staffing and, you know, back in the day, we didn't have all the noxious, you know, invasive weed issues. So we've got to take that into consideration, too, when we're talking about burning and removing all the vegetation. We sometimes can open ourselves up to some invasion from the plants we don't want.

Megan: Now we're burning and you say removing the vegetation. We're just taking off-- burning just ignites what's above ground. We still have so much below ground.

Joe: Absolutely. We're talking about the vertical structure, the duff, the thatch, allowing that sunlight to hit the soil, to stimulate our native plants to come back.

Jessica: Well Joe, tell us a little bit more about how prairies survive fire. What is it that part of their biology that makes it so that you can burn off the top layer of them?

Joe: Well, it comes down to their extensive root structure. You know, a lot of folks don't realize that our non-native grasses, Kentucky bluegrass and smooth brome, really don't have that much of a root structure and they might go down a foot or so, whereas our native plants, our native forbs, their roots will go down 12, 15 plus feet, which is really impressive. So when you remove that top, they still have all that stored energy below the ground to revegetate and come back up.

Megan: There's a really awesome, I'm trying to think of the name of it, the Land Institute in Kansas did this really cool partnership with National Geographic where they took photos of prairie roots and they had to do them in sequence and Dr. Jerry Glover is standing with I think either a picture of intermediate wheatgrass or switchgrass, I can't remember which one, and it's like 21 feet of roots that they show and it's just this huge tangled mass. I mean, they-- prairie roots, Rapunzel ain't got nothing on them, let's just say it that way. Because they're just huge. And so I encourage you to look that up. It's Jim Richardson is the photographer and he's a fabulous photographer and he really captures when we're talking about roots, he really captures it. That, I don't know if you guys have seen. Have you guys seen that? I know. It's iconic. If you're going to do prairie management, you have to take a look at that because that just tells you how much we're dealing with below ground. There's a whole community under there. Okay. I segued myself but I just got really excited. Joe, keep going. Tell us a little bit just quick and dirty, what are the benefits of burning. Why would we want to burn? Especially since now like you mentioned earlier, we're not usually burning in midsummer, which would have been historically the prairies would have caught fire because of lightning strikes because that's when we have most of our peak storms or used to have.

Joe: So now I think most of the, you know, the prescribed burners are burning to control, our invasive grasses, our smooth brome and Kentucky bluegrass. And really, the best time to get after them is in the early growing season. So that's why things have kind of shifted to the summer or spring and the fall. And the benefits of the spring burning is, is once we remove that vegetation first thing in the spring, that allows that sunlight to come down, heat up the soil, and you get this wonder flush of your native grasses and your forbs. And because you just burned and removed most of that vegetation, there's quite a bit of research out there that shows when those forbs and grasses set seed in the fall, you get a lot better seed to soil contact. So it's kind of the whole system renewing itself to keep things going. And that's really what we're going for, rejuvenate the prairie and, you know, keep things open. I was kind of using the analogy of think if you're a little teeny tiny bird with two-inch legs. If you go through grasslands that are really thick with, you know, duff and thatch on the ground, what a miserable experience that would be to walk around. When you go through a really nice prairie that's been burned or grassland and you've got all this open space, I mean,

that's like the Indy 500 of birds. You know, you can get around really well and chase insects and be a lot more successful.

Megan: I used to do this activity with high school kids when I was teaching them about how prairies need open structure and different heights where I would make them crouch down as small as they could to imitate being a baby pheasant. And then I'd have them run at each other in the prairie to see how fast they could do it and then then they'd run at each other in the long grass. Yeah. We make kids do weird things sometimes, but it's really effective as a teaching tool because it helps them see like oh, okay, I have to get down to a different level. Like when we're teaching the native plant community trainings, we tell people okay, first get at your bison level, then you got to move down to your prairie chicken level, then you got to move down to your skipper level, or as Jess would say, the regal fritillary level, so that you can see all the different structures that you need depending on the size you are as an animal in the prairie.

Joe: And that's super critical because all the different critters, they have different needs. So if you have one monoculture of one thing, you're excluding that habitat to other species that need the other, you know, structures.

Megan: I would 100% agree with you. I think structure is the hardest thing to recreate when we do restorations. I think it's the absolute number one hardest thing.

Joe: It totally is because a lot of our plantings, no matter how hard we try, tend to go towards warm season plantings. It's just easier to get the warm season going. And the follow-up management tends to lean towards warm season grasses, so - - or warm season plants. So it's really hard to get the cool season components and it's really hard to keep, you know, the natural heterogeneity that the grasslands used to have.

Megan: I agree with you.

Jessica: How many years did it take those roots to grow down? How many years? Do we know the answer to this question?

Megan: How long it would take them? It would totally depend on, you're going to love this answer, Jess. This is my science answer. It would totally depend on the amount of moisture they're getting, nutrients in the system, right. Are they getting predictable rainfall? Age of the plant? When they did, I think when they did that National Geographic study, and again, they were growing them in pots. They weren't growing them out on the prairie and I don't know how often they were fertilizing them but they were able to do that in one season and have that depth. But I think they were really encouraging the growth, so I think it would only take a couple of years. I mean, think about a reconstruction that we go out to even Swessinger last year. If you start digging up some of the older, like the two-year-old plantings, it's already really hard. I mean, if you want to give somebody a horrible task, go tell them to dig up a big bluestem plant.

Joe: That's just mean.

Megan: It is mean. Like if you really dislike somebody, be like you know what I want you to do? I want you to go dig up this plant and get all the roots.

Joe: On a restoration, not a native prairie.

Megan: Yeah, of course. We don't want to be digging up a native prairie, good job, good flag, Joe, there you go. But I don't know, Jess. I don't know the answer but I would think only a couple of years. I mean. They're really only limited in this part of Minnesota by the hardpan once they hit till. I mean, they're not magic. They are magic, but they're not invincible. They can't break through till.

Jessica: Yeah. I just wonder if some of that structural heterogeneity might come with time, with a diverse planting once it achieves some sort of root competition or, you know, limiting root space. I don't know. Thinking out loud here.

Megan: I like when you think out loud.

Jessica: We're going down that rabbit hole, though.

Joe: Yeah. I don't really know the answer to that, but I think of when you talk about in a grazing system, if you overgraze, how much root volume you lose in a very short amount of time. You know, rested the course of a season gives you a whole lot of recovery below the ground, too, so how long it takes you to get to 15 feet, I don't know. That sounds like an awfully mean grad student project.

Megan: Well, the other component of that, too, just around this rabbit hole out here, is that there's the impressive depth and that so they're going vertical and they're going horizontal, most prairie roots. Not all of them. Some of the forbs just go vertical. But it's not just about how deep they can get, it's also about what's colonizing the soil, like how long does it take to build back your soil biology, to get all of your microbes and all the tiny things that you can't even see functioning and working together. That I think that takes maybe a much, much longer time like (inaudible, three speaking at once).

Jessica: Perfect podcast topic for season 3.

Megan: Love it. Rabbit holes always lead to podcast topics.

Jessica: Mark it down.

Megan: All right, back to burning. Sorry. Talk to us a little bit about the risks of burning, Joe.

Joe: So, you know, we're in the Great Plains and the weather is not very consistent for very long, so, you know, we're talking prescribed burning. We're talking about setting up parameters when you can be the most successful and have the utmost safety along

with that. So, you know, the bigger thing is what happens when an unforeseen natural system happens. You know, the wind changes or something goes wrong, equipment breaks. You know, those are the things that are really hard to plan for. You can prepare all day long for weeks, you know. We usually start prepping the fall before but a wind shift for five minutes sometimes can't be predicted and sometimes that can make you have a really bad day, so you try to prevent those things by having a little bit more equipment. You know, you don't always just go with the bare minimum and having really good fire breaks. It's my opinion that when it comes to prescribed fire, you know, 90% of the successful prescribed fire is put in before you even go and drop the match. Having a good burn plan, having really good solid fire breaks, and having staff and people to do it. You know, landowners. If you want to be really successful, have good fire breaks and that really prevents bad things from happening and keeping the fire, as we say, in the box.

Megan: I like that you mentioned having a backup in place-- always planning for the worst, like hoping for the best, plan for the worst. Because it is all about safety. I mean, we could talk about how cool it looks to see a prairie on fire, but really we want to make sure everybody's safe, staff are trained, and that you guys have contingency plans in place.

Joe: And on the landowner side, you know, you don't have to have shiny trucks and 15 people to show up to your prescribed fires on private lands, but you do need to have, you should have a burn plan and you should have really good fire breaks, and you should have ways to get water from point A to point B. You don't have to have the shiniest of contraptions to do that, but you need to have something, whether it's ag tanks that you use in the summer for spraying noxious weeds or whatever that have been modified. How you do it, it depends on your situation, but you need to have water to get from point A to point B.

Megan: And all the permits in place to protect yourself. That's the CYA portion of the podcast. Jess, do you want to talk with Joe about goals?

Jessica: I would like to talk with Joe about goals. Talk a little bit about, you know, knocking back cool season invasive species, but what might be some other site goals that you would have in occasions where you would use fire as a management tool?

Joe: So it seems like any more, you know, there's just more and more encroachment from the green glacier, you know, eastern cedars, eastern red cedars. Particularly as you get along some of these river valleys and farther west into South Dakota, but they're popping up along shelter belts and, you know, people plant them. It's still in South Dakota, I don't know about Minnesota, it's still the number one planted tree in South Dakota. When you're talking about cedar control, it really comes down to timing. Little small cedars are a little more susceptible prescribed fire. As these cedar trees get a little bigger, it comes down to timing and putting a really hot fire on them. And the timing might be earlier in the spring when you can really send a ripping head fire because what you're trying to do with cedars is get all the needles to fall off those trees.

If you leave a little bit of green on the trees, essentially, they're going to come back and continue to be a pain in the butt. So if you're going to target cedars, you want to target it when you're going to get the most heat and the most pressure on them and a lot of times when you're really trying to get after cedars, those are the days that others may not want you to do prescribed fire because it's usually a little bit hotter, a little bit on the dryer end of things. Things are a little more volatile. But when you're really trying to kill those, you know, mature cedars, that's what it really takes to get after them.

Megan: So it takes a little bit more planning and prep to make sure you're still safe while you're doing it.

Joe: Oh, absolutely. Yep. And fire unit design comes into play. Not putting fire breaks right next to the big patch of cedars. You know, buffer yourself couple hundred yards so when those things start torching up and you get the really cool flames and all that, you don't want to have to worry about embers coming across your fire breaks and creating issues.

Megan: I read a paper last year that said if you start, you know, without cedars, and cedars are a native tree. We've mentioned this before. And so a lot of times we get the question like well, if it's a native tree, why are you so focused on trying to get rid of it? And it's because cedar likes more of itself and it doesn't play well in the prairie. I think we mentioned this on season one, too. It's just about maintaining that prairie vista and we have so little prairie left. We're talking less than 2% remaining in Minnesota. And so I think another comment that we hear is well, they're great deer habitat. They are but you know what else is great deer habitat? Prairie. You don't need deer trees to have deer. I guarantee you, you will have deer if you have open prairie habitat. But so the paper was saying that if you start, you know, without any cedars in your prairie, that if you burn on a rotation of seven to eight years, you can keep, you can suppress them and keep them at bay. But sometimes it's hard to do because of staff and timing.

Joe: Yeah. I think that goes back to historical regime when you used to have big fires, it'd be really big and hot, you get rid of a lot of those mature trees. You know, in the current system we have, it's harder to get fire on the ground and, you know, for TNC, we try to target, I'm probably in the five-year range for getting back [to reset] fires, five to eight sometimes. It is really hard to stay on a three or four-year rotation because of all the factors you can't control and one of the factors that gets bigger and bigger in Southwest Minnesota in my work area on the Prairie Coteau is urban sprawl, houses, people want to build their houses on these nice vistas or live next to a natural area and that's great. But then those same people also don't necessarily like to have smoke in the air. And we have to accommodate for that and the highways and hog barns and all these diff ag things that are coming up are just more challenges to, you know, to make [using] fire a little bit harder. Because you are responsible for your smoke so you have to take into consideration all those different factors and roads and people and it's tough. And then you have to have good weather on top of all that.

Megan: You have to find the right balance. So it's like you said. There's nothing wrong with wanting to have - - who doesn't want to have their house next to a natural area? I do. Can't afford it, but I do. So, but you have to still figure out how to find that right balance so that you're being a good neighbor.

Joe: When you build your house on the prairie next to natural areas, expect the smoke.

Megan: You'll be the first one I call, Joe. Please come help manage my prairie.

Jessica: So it sounds like getting the appropriate return interval on your fires is a challenge. Are there other hurdles that you face, Joe, when you are trying to manage all these lands with fire?

Joe: You know really, it's the factor that nobody could control is the weather. You look at last spring when we had blizzards and snow all the way in the mid to the end of April, and then May came around and then it got to be like 90 degrees within three weeks of the snow going away, so when we have all these big fronts coming through, it can be tough to find our weather windows that keep us within prescription to even allow us to do the work. So like I said, you know, prescribed fire that means you have a very defined set of parameters you're trying to stay within and, you know, sometimes the weather just doesn't cooperate when these big pressure fronts are moving through and winds are screaming on the northwest for three days and then screaming out of the south for a couple of days. And then you get some rain or whatever. So yeah, those are the challenges and we'll never be able to predict that and that's why I really, I don't necessarily like to measure our success based on acres. I like to measure our success kind of based on units and our ecological objectives. So if someone comes and says, you know, we did 1,000 acres this spring or whatever, that's awesome. But I might give the same value of awesomeness to someone that did four acres of a really defined and ecological object, you know, with ecological objectives and give that person just as high of a high five as I would someone with a bunch of acres.

Megan: Because it's quality over quantity.

Joe: Yeah.

Megan: I like it. So we talk a little bit about this, well, I talk a lot about this because I'm always thinking about how we can randomize what we burn. You're talking about you have these goals, you have this number of sites and you have different challenges on each site. Maybe one site you've got cool season invasives. Maybe another site as you called it the green glacier. I've never heard that term. I love it. I want to coin it. [So, you've got] a red cedar coming through, and so you're trying to manage all these different things in each site, but then there's also the very real, when you're thinking ecologically, this would have all happened randomly. So now we're in this prescribed system, so I think a lot about how can we, if we don't have let's say we get the prairie to a point where it's pretty good, you know, it's functioning pretty well. We've got our invasives at a tolerable level. You're never going to get rid of all of them. But you've got



them at a tolerable level where your natives are dominant. You feel pretty good about the health of your prairie, good wildlife response going on. Then I talk to managers about how can we randomize this. So I really want to make a wheel of fire. I want a wheel of fire. And so this would be, I wish that it would be as big as like the Price is Right wheel so that when we spin it, you can like reach really tall and like (making wheel spin noise) it would be so exciting. But so on the wheel of fire, you'd have like your spreadsheet of which unit and then you'd spin the wheel and then it would give you your timing and your return interval. So it would say like okay, you're going to do a spring burn, summer burn, fall burn. That's one of your choices on the wheel and then it would tell you like five years, three years, whatever. When you're coming back. And so then that would really help you randomize it. And I want it to be a wheel because it's more fun than a random number spreadsheet. A really big wheel, if somebody could build me a wheel of fire. That would be the best thing ever.

Joe: So I think, you know, managers that work for, you know, entities or agencies, whatever, kind of do some of that in our heads. When it comes to, you know, a landowner side of things with different farm bill programs and stuff that, you know, you lose some of that capacity. So the randomness might not come from your timing because they're set, but maybe from unit design, you know, a third, a half, or a quarter each year type of stuff to keep it kind of mixed up. You know, that's the other side of prescribed fire that gets challenging is when you go and try to hit your objectives, it's easy to burn a square every time. But when you go out into these, you know, natural systems, nothing's really square very easy very often. So we're talking about doing prescribed fire, taking weird-looking shapes and trying to divide that into quarters or thirds or sixths or whatever, and that's a challenge, too, just to kind of, you know, the unit design and once you have all your shapes kind of figured out, then you can throw in your wheel of fire and see what that spits out at you.

Megan: I love wheels of fire. Real quick because we got to shift gears to Chris here in a second. Tell me because you mentioned this earlier, you said that quality is better than quantity. So what to you is a quality burn? Because it used to be this idea of we've got to get it black, Jack. But now we know that's not the case because there would have in natural fire, natural burn regime, there would be skips, there would be all of these other things. So what is a quality burn to you? What does that mean?

Joe: So quality is one. It's, you know, everybody's safe, nothing breaks, and it stays in the box. That's always the first few checkboxes for me. But it also, you know, goes back to those ecological objectives and we're designing our units, we're targeting certain things. And like you said, the refugia is really important. I think when I started doing fire almost 15 years ago, it really was you walked around with a drip torch and you made every square inch of that unit as black as could be. You know, now we know better. We're trying to do more with less and provide more habitat with less available on the ground and if there's an area that doesn't get burned, that's great. You know, we'll catch it next time. We got to leave something left for all the little critters.

Megan: I like it.

Jessica: Perfect segue to talk about critters. So this is a really good, thanks, Joe for all that great info about managing with fire. Chris, talk us through invertebrates and vertebrate response to fire.

Chris: Sure. Yeah. I think the most important piece, you know, we have to mention that not all invertebrates are created equal, and so, given their biology and the way they use habitats, we anticipate that some species are going to respond favorably, some species are going to respond negatively to fire, and then there are species that don't seem to really be impacted. It has a lot to do with their biology, so, you know, how many generations per year does a species have. You know, if it's multiple generations, they're more likely to respond positively. If it's one generation or even less than a generation per season, they're more likely to respond negatively. If you think back to your population biology classes that hopefully most of us have taken, it makes sense. They're going to be slower to bounce back after a disturbance like fire. Reproductive output is another one that, you know, species are laying hundreds or thousands of eggs, they have a lot more potential to rebound. But we do have some species that are only laying, you know, a few eggs to maybe a couple dozen eggs and they tend to respond negatively. Also, just, you know, where they're at during the burn season. Joe mentioned that a lot of our burns are occurring during the spring. We do some fall burning as well. If you have species that are migratory or sheltering below ground during the burn season, they're often less likely to be impacted. Monarchs come to mind. You know, we all know monarchs migrate way down in the Mexico and during our spring burn season, they're either not here or they're just kind of starting to show up, and so they're not usually impacted too much. But we have a lot of species that don't go away. They occur in our little prairies. Most of our prairies are pretty little these days. Year round and they're some species [that] overwinter above ground even pretty high up on the grasses and so even if you wanted to try to avoid impacting some of our rare butterflies, for example, by doing a winter burn, which we don't see too often, but I've heard it kind of recommended as a possibility. Things like the Poweshiek skipperling, which hopefully everybody listening to this podcast has at least heard of the Poweshiek skipperling as this critically endangered little butterfly and it overwinters up high on grass, and so even a wintertime burn would have catastrophic effects on the population if it occurred in a particular prairie. And there are a lot more things to consider from a biology standpoint. I will mention because I always get this folks come up to me after I give a presentation and they're like well, this paper says fire is good for butterflies or this paper, you know, says it's bad for butterflies. What are we to believe? But you really need to dig into the details because a lot of these publications that find positive fire effects, the species that are being detected, whether or not they're reporting as species richness or relative abundance, they tend to be the species that are kind of on the side of having a biology that lends themselves to recover quickly and a lot of our really specialist species tend to, to be honest, they tend to not occur in these prairies where a lot of this research is taking place because they've been, for whatever reason, lost. Maybe they've been burned out. And so if you don't have any of the really fire-sensitive species in these study sites, you would expect to see positive or neutral results. And so it can be a bit misleading, and so you do really have to dig into the details.

Jessica: Yeah. I asked you a question that I hate getting because people like to think of all invertebrates as the same. Right. But just as you mentioned, many different species are doing vastly different things, they're at vastly different life stages, overwintering, or at any other time during the year, and so to ask the question, you know, how does fire affect invertebrates, well that's kind of - - there's a lot of answers to that question.

Chris: Yeah. It's a tough one and a group that's very rarely talked about. We actually have a lot of prairie endemic land snails, they're specialist species. We don't even really know anything about them. Probably some of them are critically endangered and we don't even know it. And they tend to respond very negatively after a fire and so it really comes down to the specific property. If you know what you have, then hopefully you design your management to try to minimize impacts on those species, but yeah, there's just so much diversity out there, you know, ranging from their dispersal ability, the amount of eggs that they produce, the number of generations, and so it's really tough to have a one size fits all goal.

Jessica: But there are some things we can do to try to mitigate the effects of fire on invertebrates and, you know, keeping in mind that fire helps the habitat that most of these insects depend upon. So it's a necessary part of the ecosystem but there are some things we can do in this fragmented landscape to make sure we aren't doing more harm than good.

Chris: Yeah, absolutely. So, you know, we already discussed refugia a little bit. These are leaving the unburned patches of habitat inside the burn unit. They can be accidental. A lot of times they are accidental, but I would encourage folks to actually intentionally plan on building in some of these unburned refugia, especially if you're working on a property where you know you have a rare species, try to locate the unburned area where those species have been observed in the past. You know, having more, you know, small burn units can be really helpful, and then just making sure because it's always tempting, you have all your resources out on a prairie to burn as much as you can get done in that day. It's always good to take a step back and remember what the objectives are and to kind of really burn as little as you feel like you absolutely need to. And then where possible, supplement burning with other less destructive methods. So cedars came up earlier. They're one that's easy to control with some mechanical removal going out with the chainsaw. It's a lot more work. I know from firsthand experience, a lot less fun to control cedars with a chainsaw, but it will have a lot less impact on the prairie invertebrates as a whole and so maybe extending your fire rotation interval in between doing some mechanical removal is a good way to minimize those impacts.

Jessica: So what do you think about refugia and, you know, Joe, you can jump in here, too, with some logistical considerations, but what kind of percentages of a parcel are we talking about here if we have, say, a 300-acre, you know, TNC preserve or WMA. What's feasible and what's reasonable from an insect perspective to leave?

Chris: Yeah. And so from my perspective, it's really tough. You almost need to look at it on a property-by-property basis. You know, on a 300-acre property, personally based on some of that research that I've read and some of the observations I've made, I wouldn't burn more than a quarter of that, probably, you know, every three years, and so you're giving several years of rest where there's no burning happening on a property that size. It's a relatively small property. If you're working on a really large property, and there are folks out there that are fortunate enough to work on tens of thousands of acres, if you have a really giant burn unit, there's a lot of core habitat or core area inside that unit and some of our little butterflies and bees don't disperse very far. And so if you want to retain them in that unit throughout that unit, you're going to have to have some pretty large refugia on the interior of that unit. Otherwise, they're never going to have to time to recolonize between burns. And so it really is going to vary quite a bit.

Megan: Even the ones-- I just want to jump in here really quick give a throwback to episode one because there's so many that don't even have wings, right? They're either an egg or like we learned in episode one from Cale at the zoo. He was talking about how Dakota skippers spend much of their life cycle as a chubby caterpillar, and so it just breaks my heart to think that they could be burned up. I know that it's in some cases it's part of maintaining habitat for them. If there's no prairie, you also don't have Dakota skippers, so it's this tradeoff, but they're just so chubby.

Joe: You know, Chris hit the nail on the head there, too, it's not all about a ripping really hot fire, too. You can burn on different days, you know, cooler, maybe more humid days so it's less intense. You know, when we do a lot of the prescribed fires, it's just not all we've got back fires and flank fires to kind of change up the intensity, so, you know, your question on the refugia. I'm probably right there with Chris most of the time. We're not burning more than 25%-30% of any one site. Like I said, our rotations are usually a little longer than what we might desire, but I think the word refugia, it's more than just leaving stuff standing. You know, it's different intensities so there's different layers of thatch or maybe not everything gets burnt off as well.

Megan: I know. I think, oh, there's so many things we could talk about and I feel like we're just not even scratching the surface, but we have to jump into our next session. Jess, are you ready to do it?

Jessica and Megan together: Let's Science! To the Literature!

Megan: Okay. This is the part of the podcast where we recommend a book, a blog, or a paper, or sometimes all three, and so our guests-- feel free to jump in as we talk through some of these articles and literature that we're going to discuss today. Feel free to give us some of your insights about these as well. Jess, take it away.

Jessica: Well, I have a couple things chosen today. One is kind of a technical article we like to include these here. This one's pretty long, but there's just one part of it that is focused on grasslands, and the central region. The title is Ecological Effects of Prescribed Fire Season: A Literature Review and Synthesis for Managers. And it starts--

it's an 80-page document, but the central region starts on page 29. And they've got some really nice points about how it's hard to know what the historical fire regime was but that it's most likely these lightning strike fires that we've talked about that are in the late summer that we don't do quite as much for a variety of reasons, some of which Joe mentioned at the beginning. So, but some of the key points that they include in this literature review is the idea that changes in community composition can happen by altering the burn season. So, you know, again, spinning that wheel and saying whether or not we're doing a fall burn or a summer burn or a dormant winter season burn, mixing it up is going to provide that thing we love best, diversity. It's going to help all the wildlife by mixing it up a little bit. So burning to promote diversity by burning during different seasons within that historic range of possibility will benefit the most species. And, you know, just as Joe mentioned, too, timing your burn to achieve site-specific goals, whether or not they're to avoid certain insects or other invertebrates or what have you is important to consider. The second paper I want to talk about came from Wisconsin. I don't know if you've read this paper, Chris. It's by Rich Henderson and others, Disentangling, that was tough, Effects of Fire, Habitat, and Climate on an Endangered Prairie Specialist Butterfly. So again, as Chris mentioned, as always when we read these papers, we need to take into consideration the scope of what they're talking about. So in this case, they're talking about my favorite butterfly, the regal fritillary. Chris knows it's my favorite. Megan knows it's my favorite. It's flashy and big, so the authors used a 20-year dataset in Southwest Wisconsin, really close to here, on seven different sites, and they surveyed yearly for 20 years for regal fritillary butterflies, and they measured habitat quality. So they measured, they went out and measured violet density, a floral ranking, some topography measurements, patch size, and really the key results are much like what we've talked about today that it doesn't matter what you do, as long as you do something, so that habitat quality was more important than fire. So having violets there was more important than any kind of fire return interval. But burning was better than not burning in many of the cases. So to me, we got to get violets into our plantings.

Megan: (Laughing.) Love the plug for violet plugs.

Jessica: It's my plug for violet plugs. Yeah. And we're doing some really cool stuff to that end, so are a lot of other people. So in summary, the negative effects of the prescribed fire are vastly outweighed by positive effects of habitat specifically, making sure there's violets there. Unburned refugia are important, but small amounts of rotating burn units suffices in this case, at least in Wisconsin with regal fritillaries. They don't talk too much about the season of burn. It's generally I think they were spring burns, you know, as usual, but.

Chris: Yeah. It's interesting study. I think it's worth mentioning that regal fritillaries, if you think about the continuum of being very sensitive and not very sensitive, they tend to be kind of middle of the road just because they're very good dispersers, they lay quite a lot of eggs, and so some other things - -

Jessica: They're strong fliers.

Chris: Yeah. Strong fliers, also something to keep in mind.

Jessica: Yeah. And I think that some work by Kelsey McCullough in Kansas actually showed, she went out into burned prairies. It's in Kansas, so again, you got to take that into consideration. Went out into burned prairies right after and was able to find larvae in the burn areas on violets. So again, it's the timing of the burn and whether or not those violets themselves got burned, but they're at larval stage, we should mention, during this spring burning time. So maybe there's some way that they can drop down under a rock or something. I don't know. They're able to--

Chris: It's fascinating and it's pretty rare to have a dataset that's that long.

Megan: When I was in kindergarten and they ask you what you want to be when you grow up, the person who looks for regal fritillary larvae after a burn was not on my checklist. So I would like a do-over because (laughing) I just love science. This world, prairies are so complicated and amazing and you can do all these really interesting things that are super weird, but beneficial and awesome. I just had to throw that in there. Oh, gosh. Jess, you want to mention the two, as always, we like to do a shout-out to the Prairie Ecologist and Chris Helzer's blog with The Nature Conservancy. And it's only right since one of our guests today is with The Nature Conservancy. Do you want to talk about this difficult decisions, growing season fires, and other prairie management choices?

Jessica: No.

Megan: You want me to talk about it? (Laughs) Okay. I will. So, Chris always talks about fire a lot because it's part of managing prairies. And so I just sort of randomly found this one. It's an older blog post. It's from 2013. And I just want to read a paragraph from it because I think that it sort of gets at everything we're kind of talking about today and it'll be a nice little wrap, I hope. So these are his words: "Right or wrong, I guess I've trained myself to focus on the long-term positive outcomes of our management and not to dwell on the short-term negative impacts. I'm not sure if that makes me insensitive or just sensible. One thing that helps me justify our actions to myself is that we're collecting as much data as we can about the overall impacts of our management. If we're going to make tough decisions that have negative consequences for other living creatures, I want to know that those decisions are leading to the long-term benefits we think they are. We can never collect enough data to know everything we want to, but we collect enough that I'm convinced most of our management strategies are working as planned and we constantly tweak those strategies as we learn more."

Jessica: As always, you know, Chris does a great job of reminding us about the need to monitor. So we've touched on it a little bit here, but we haven't talked about it directly. If we want to know what invertebrates we need to protect, we got to know it's there and we got to know how the fire affects them, so if we want a 20-year dataset like Wisconsin has, we got to get out there and start doing some monitoring.

Megan: And that gets right back into what Chris was saying, our very own Chris.

Chris: Can I throw out a shameless plug for myself here?

Megan: Absolutely. Now is the time.

Chris: Yeah. So I have my own blog. It's just [fieldecology.com](http://fieldecology.com), and I have a presentation that I gave to the Minnesota Chapter of the Wildlife Society on insect biology and fire effects. And so I would encourage folks if they haven't seen that, to check it out and give it a look and hopefully, you learn a little bit of something new

Jessica: Yeah. We can link to it on our website, too. That would be great. All right. Megan.

Megan: Yeah Jess?

Jessica: Take a hike.

Megan: I think I will. I love this part of our podcast because this is the part where we recommend some of your amazing public lands where you can go out and visit some awesome prairies. And I do mean awesome in the true sense of the word because prairies, just like the night sky, are awesome. So because we have guests, like always, we want, this is always tough for them, we know it's hard, but we ask them to choose their favorite or at least their pick for the week, whatever they were in the mood for, of where they want to go hiking. So Chris, what's your pick?

Chris: Yeah. So I picked Uncas Dunes SNA and it's a mix of prairie, oak savanna, and oak woodland. I know it's maybe not true prairie in the sense of what you usually cover, but it's a really fascinating place. A lot of remnant habitat. It's sand, sand prairie, so lots of cool, rare plants and animals. Just a really unique property that fortunately, DNR acquired to protect and lots of great working happening there to maintain and enhance that habitat, and so it's a wonderful day to be out there hiking through the hilly terrain.

Jessica: It's in Sherburne County.

Chris: In Sherburne County, yep, in Central Minnesota. I don't know. Probably 20-30 minutes east of St. Cloud.

Jessica: Nice, the transition zone.

Megan: It sounds beautiful. I like when there's lots of different types of habitat in one place because prairie landscape, it has all kinds of things in it, not just prairie. It has calcareous fens, sedge meadows, all these things.

Chris: It's a property we work closely with DNR to make sure our burn plans adequately address rare insect conservation.

Megan: Nice. Joe?

Joe: Yeah. So I guess I'm going to cheat and go with two since I cross the border and work in South Dakota and Minnesota, I'm also going to be shameless. You know, a kind of hidden gem in Southwest Minnesota down at Jackson County is Lindgren-Traeger Bird Sanctuary. It's a TNC-owned site on the shores of North Heron Lake. And that's one of the few spots, actually, it's the only spot on the lake where you can actually look out on the lake and see the migratory birds in dry years, the mud flats are full of shorebirds. I'm personally not a birder so I couldn't tell you what the birds are. I just know there's a lot of them. There's a few more swans starting to nest in that area. There's some other great habitat projects, you know, in that vicinity, as well as some waterfowl production areas or game management areas. But then on the South Dakota side, when we're talking some unique spots like calcareous fens, just across the border about 10 miles or so, TNC has a series of sites, 7-mile Fen, Jacobson Fen, they have multiple calcareous fens that can be a really cool place to get out and explore towards the end of August, early September, so those are my two plugs, one for each date.

Megan: Good job. I like it. And for those of you who don't know what a calcareous fen is, they're prairie wetlands, super rare, fed by groundwater. They have peat in them and they have so much calcium that they basically sweat calcium, which looks like this white crust, over all the plants, and they have this unique group of plants that grow there and some of them only grow there. They're pretty treacherous to walk through, so take a buddy because you can definitely fall through the peat, but they are very rare. They formed after the glaciers receded and they're pretty amazing. Oh, my gosh. I can't believe it. That's our last Take a Hike for the season. I need a backpack and some snacks, and my belt, my seed belt, Jess, and you and I just need to go spend some quality time out on the prairie because I don't want it to be over.

Jessica: Only fitting that Joe would leave us with, once again, not following the rules.

Megan: No better way to end a season than that.

Joe: Megan says she's getting a map, so she'll find South Dakota.

Megan: It's hard for me. I try not to leave Minnesota. Oh, Chris, Joe, thank you so much for your expertise and your time. We really appreciate it. All good things must come to an end, so this is the wrap for our final episode of season 2 of the Prairie Pod. We really hope you've enjoyed it. We've enjoyed it. I learned stuff every time. Jess, you learning still? You still learning?

Jessica: Of course. Always.



Megan: I know. There's always so much to learn. So we hope that as you know, it doesn't end here. Us talking at you ends here, but the time on the prairie doesn't end. So as the blue stem turns purple and the Indian grass gets golden, we look forward to seeing you out there on your public land holdings or just on the prairie somewhere. So get out there and explore and let us know what wonderful things you're seeing on the land. As always, you can catch all of the resources we talked about today, including the Let's Science and the Take a Hikes on our websites at [mndnr.gov/prairiepod](http://mndnr.gov/prairiepod). All right. 'Til next year, bye y'all.

Chris: See ya.

Jessica: Check ya later.

Joe: See ya.

((sounds of birds chirping and wind blowing))