



Prairie Pod Transcript

Season 2, Episode 7: How do I know if I'm doing a good job? (Restoration Series: Prairie and Grassland Monitoring)

Podcast audio can be found online at mndnr.gov/prairiepod

Transcript:

((sounds of birds chirping and wind blowing))

Megan: Welcome back to the Prairie Pod. It is still season two, all season long and this is episode seven. How do I know if I'm doing a good job? The importance of prairie and grassland monitoring. I'm Megan Benage and I'm joined here by my fabulous co-host - -

Jessica: Jessica Petersen , invertebrate ecologist, Minnesota Department of Natural Resources Biological Survey.

Megan: Good work, Jess. I forgot to say what I was. I am the southern region ecologist for the DNR's southern region and today's podcast we're going to talk about monitoring. This is one of Jess's favorite topics.

Jessica: It really is.

Megan: I know you, this is like if my soapbox is seed mixes, this, your soapbox is monitoring.

Jessica: (Inaudible...).

Megan: (Inaudible.) (Laughing.) Get so excited. So monitoring is one of those things that we're not always very good at doing because we have so many other demands and so many other things on our plate from a day-to-day basis. But it's really difficult to know where you're going if you don't know where you've been, right?

Jessica: That's true.

Megan: We all now prairies change through time and it's normal, it's natural, everything is satis-, oh okay. There's a little singing just for the beginning of the podcast. So that change though can be incredibly frustrating when you're trying to rebuild them. Because trying to figure out is this okay, is this patch of invasive weeds all right? Should I do something right now? Should I just sit back and wait? It's really hard to know what

choice to make and something that can help you in making your choices is monitoring, which plays a key role. It's critical in helping us understand what's going on at our site and then how our site is being influenced by the land around it, as well. Sometimes I think the hardest choice that we have to make is the choice to do nothing and just be patient and I think that's something that comes as we get further and further or at least I feel like as I get further and further in my career, I am more patient than I used to be. Mom, are you listening? I'm more patient than I used to be. (Laughs) That's my public service announcement at least in terms of prairies, maybe not in terms of when we're going to get ice cream. But for prairies I know that they, if I give them everything that they need to succeed, a lot of my job as a land manager, as a restoration ecologist is to sit back and let them do their thing. But in a fragmented landscape there are also times where I really need to step in and I need to make critical choices. So Jess, talk to me a little bit about some of the goals that we're looking at when we're looking at monitoring and walk me through some of the different types.

Jessica: Right. So you kind of touched on some of the things already that we might be thinking about when we want to monitor. So, first thing to do when we're thinking about starting some sort of monitoring regime or, you know, we'll talk a little bit later about some of the ongoing monitoring that's already happening here in Minnesota and, and elsewhere. We really have to first decide what our goal is in terms of monitoring. And so then after we figure out that goal or at least stating the objectives of our monitoring. You know, maybe that objective is something like, well, I'm going to mow this patch of brome at a different time than I typically burn to see if I get a better response in controlling that invasive. So, that is one type of monitoring. That is what I would call effectiveness monitoring. Another type of monitoring - -

Megan: So, wait, before you go on, let's, so effectiveness monitoring, all you're trying to do is you take a management task and did it meet my objective? Like I (inaudible, two speaking at once) - -

Jessica: Yeah. How effective was I at meeting my very specific goal. I think of effectiveness monitoring as really assessing the outcomes of a very particular action. So, maybe that action is - - I guess I think of, at least in the prairie world, and these are really general monitoring suggestions for all types of ecosystems. But in the prairie world I think of, you know, we kind of have status quo management that's happening. So I think of effectiveness monitoring as being more along the lines of trying something slightly different. So, maybe that involves a burn or grazing or mowing or some sort of other management action that's happening maybe at a different time than usual or a different intensity than usual. And the usual here in Minnesota prairies is typically spring dormant season management, at least for burns, you know. So, trying something a little out of the ordinary or a little out of what you typically have done, that would be effectiveness monitoring. Monitoring the, to assess the outcomes of an action or multiple actions.

Megan: Good. Next.

Jessica: So that's one, one kind of monitoring. A different kind of monitoring might be, we might call it adaptive management monitoring and that's where we want to monitor to assess outcomes of multiple actions in some sort of explicit framework that's going to inform the next action. So that's, that's the important part for me is informing that next action. So, we're going to learn about some work going on here in Minnesota that kind of gets, gets at that adaptive management monitoring. So, you know, feeding into some sort of larger system that can tell you what to do next based on monitoring and prior history management - - (inaudible, two speaking at once) adaptive management monitoring.

Megan: And this (inaudible, two speaking at once) before you go to the next one. So, to me, adaptive management monitoring is what, at least from a DNR's perspective or from any perspective where somebody is managing lots of tracks of land. This is kind of what we're doing. Because you're sort of always trying to look at what you did this year and then how you're going to change that prescription or that plan for next year. And if you're doing it really well, you want to make sure you're taking that into account. So I always like to think of this as it's the end of the season, right? You're going to walk through your prairies and your grasslands and you're going to try to take a look at what happened last year so that you can inform your management for next year. Instead of just saying, oh, I burned in spring this year, and I'm going to burn in spring next year, and I'm going to burn in spring the year after that. Like you want to make sure it's based on ground truthing.

Jessica: Sure. Some sort of evidence. And that gets at being the most effective with our limited resources. So if we can make more science-informed decisions about how to act next we're being more effective than just following some sort of prescription that may or may not be necessary.

Megan: Good.

Jessica: So, another type of monitoring that we do in the biological survey is, sometimes, right, is status and trends monitoring. So that's monitoring to understand some sort of system. I think of this as kind of a longer term monitoring so it has a longer timeframe to it. Yeah. So it's understanding the whole system. Not necessarily looking at any kind of actions or, you know, any kind of thresholds deciding when to act or any kind of management outcome. It's just monitoring to assess, you know, are we going up? Are we going down? What are we doing? Where, where we going?

Megan: You're just tracking and detecting change through time, but you're not necessarily answering the question, okay, so, I see that it's changing, what do I do next?

Jessica: Or why.

Megan: Or why, yeah. You're just tracking the change as it happens.

Jessica: Yup.

Megan: And then you have the hard part of saying okay, what does that mean? Now what? (Laughing)

Jessica: Yup. So that's status and trends monitoring. Some people looking at that in terms of climate change. And then, and then the last monitoring tie or kind of major goal that some people might think about are, are threshold monitoring. So deciding when to act. So, so you're monitoring a system to decide - - you know, I, I think of this more in kind of animal systems. I don't know quite how it applies to the plant world. You know, if your population is getting to a certain size, then you're like, oh, we got to cull the herd, you know? I don't, I don't know, maybe it has something to do with invasive species monitoring. You know, if your, your patch of, of whatever invasive species you have is getting larger, you're like okay, this is out of control. I don't know, I don't know how it - - do you have ideas on how that might fit?

Megan: Not for animals, I don't. I mean same - -

Jessica: No, for plants.

Megan: For thresholds, I think it's the same kind of thing that you're looking to see, okay - - I can think of Canada thistle as a really good example, since you mentioned non-Native invasive species. So, in that case if you're doing some type of threshold monitoring, you might say across your site, okay, well, and I'll just add this caveat in here, forget thistle monitoring and any type of management related to it. I am one who likes to give it a little bit of time because what you see in the first year is not, it's really easy to freak out, right, in that first year? You get this whole, huge flush of Canada thistle when you're brand new into reconstruction and it's very easy to have that response of, oh, we, we better do something real quick. We got to spray this. We got to take care of this. When I've kind of found in the literature is showing this as well that if you - - and Jeff mentioned this when he was on the podcast, that if you leave it alone and you have diversity - - again, it comes back to diversity on your site, that Canada thistle will drop out. It's still going to be there, but it's not going to be the most dominant thing that's there. It's just taking advantage of that bare ground situation to colonize. So, that's something where I would see you'd have a threshold in place as a manager where if it tips at this point, say a 50% cover or 60% cover, whatever, whatever the threshold is you want to use, that's when you would take management action. And we use similar things for animal pests like aphids. We want them to reach a certain threshold before we would go in and treat them with some type of chemical means. And part of that when you're dealing with animal pests like that is you're also looking for the predators, the native predators like ladybugs that eat them. Because you don't want to just say, okay, I have a lot of aphids here. You also want to say do I have a lot of ladybugs here too. Because if you have a lot of ladybugs pretty soon that's just lunch and it's taking care of your problem for you. So that's the only animal example I can think, but it's the same kind of invasive, you know, interaction.

Jessica: Sure. Well, disease threat, yeah. You don't want things to get above a certain level. Anyway, so, you can see where you really have to understand what your objective is or what your question is or your goal before you embark on some sort of, figuring out the methods. This is the part people always jump to. It's oh, I'm going to just throw some quadrats out there. Well, woo, woo, woo. We got to figure out what we're trying to accomplish here.

Megan: (Laughing) Woo, woo, woo.

Jessica: Woo. I get excited about methods.

Megan: What's your voice in your head? Woo, woo, woo, woo, woo. What are we doing here? (Laughing)

Jessica: Yeah. We, we really have to figure it out because this is really important. It's really important to monitor, to, to assess our prairies because we don't have very many left, right? We don't much prairie left on the landscape and so we want to be efficient and effective with our management actions so that we can build really resilient habitat and, and have all that habitat connected in the landscape. So, if we, if we don't know what's going on in our prairies because we're not monitoring them, it's going to be, it's going to be more challenging to be efficient and effective at creating these landscapes. Or maintaining, maintaining the landscapes that we have even. So.

Megan: And creating.

Jessica: What's that?

Megan: I said maintaining and creating because I was thinking we want to save what we have and then we try to reconstruct what we don't, so, we're doing a little bit of both.

Jessica: True. Both of those things are important. Yeah. So, those are the, those are the, that's the basic overview of monitoring in general. I mean, not just vegetation monitoring, but whatever you want to monitor. It's important to go through this process of trying to figure out, what, what you already, what your goal is. Luckily, some folks in Minnesota have already done this for us.

Megan: Thank goodness. (Laughs)

Jessica: So, Megan, can you tell us a little bit about some of those endeavors?

Megan: I can.

Jessica: The veg.

Megan: But before I describe the very specific types of monitoring efforts that are going on, I, I want to break this down into some general terms. Because when I was doing my pre, you know, podcast research, as we, as we always do. We like to make sure we're

informed and knowledgeable and there's so much to learn even if you start with a good base. I, of course, found this Chris Helzer article about monitoring. And then I just kept reading the comments because sometimes the comments are, there's great discussion between land managers across states and across all these regional boundaries and everything. Where they're just having these great ideas and it leads to this super nerdy, great science collective of folks who are citizens, folks who are scientists and they're just sharing their knowledge, which I love. I just love reading those comments. And one of the things that he was talking about in there is we wrestle with this idea of monitoring, right? Like once you figure out your goal and once you figure out your objective and the type of monitoring that you're going, you're going to do, that's the first kind of sweep, right? But then the next question is okay, what am I looking for? Like how do I know if this prairie is resilient and healthy and how do I not? And in one of the subposts under this he mentioned that he was talking with a bison rancher and guy said, he was having this conversation with him and he was like, oh, your prairies have the three critical things that I look for. And so, of course, Chris Helzer, asked him, what are those three things? And the guy goes color, movement, and noise. It's that simple. And I just loved reading that because sometimes we, you know, we need the details, the devil's in the details. It's super important to figure that out. But there's also this really basic level that we sometimes forget about. Like is this prairie alive or is it not? There is nothing more eery and more devastating to me than when I go to a prairie and it is silent. That right there tells you something is not right. Something is not, not going on. And I would argue and Jess you're going to love this because I'm going to say it, that if a prairie is silent, it does not have the number one indicator of health, which is diversity, diversity, diversity. (Laughs) I should just like make a ring tone that says like diversity. (Laughs) I could sell it.

Jessica: It's an important thing to remember these, these three things. It's certainly a first cut, but what I think we can do, we can also do more. It's important to see the bigger picture of the noise and the color.

Megan: Well, and there's certain things that you want to look for when we're talking about veg. And so we'll give you a couple of different things that you want to look for and then we'll walk you through some of the types of already established monitoring protocols. They've already kind of vetted it through all the different scientific literature and aspects and it, and they're robust and they're good and they're working. And so there are things that you can kind of take part of. So I would say, in general, when you're going into a prairie you want to make sure, or a grassland, you want to make sure that you're looking at the structure. You want to make sure you're looking at the composition of the vegetation. So, remember that diversity is not just the number of species, but the evenness of how they're spread around the site. And so particular species to look for would be some of our more restoration conservative species that tend to drop out after management or they're very difficult to establish in the first place if you're doing a reconstruction. So, things like, you know, field pussytoes, hairbell, some of our gentians, lead plant, prairie phlox and just for a second because I mentioned lead plant, Jess, do you want to go on a lead plant rant?

Jessica: I love lead plant. I would talk about lead plant for days. It's really one of my favorite plants in the prairie and I'll tell you why. So, Fred Harris has, also has this belief that lead plant is like an ecosystem in and of itself. If I had one plant to monitor in the prairie where I would just - - if I was just - - had limited time, right? And I had lead plant in my prairie, thank goodness I have lead plant in my prairie (laughing) because I get to go out and watch it, but I mean the number of critters that come and use lead plant are incredible. There are several species of galls. There's a leaf gall that's a, that's a fly that I believe is undescribed to science. Hint, hint, anybody that can rear it gets a gold star from me.

Megan: (Laughing) The coveted Jessica gold star, we will be giving that out if you can rear this fly.

Jessica: There's also a leaf gall or a stamped gall. There are beetles galore on there, chrysomelids. There are loads of pollinators that go to that species of plant. Fred always remembers the small mammals that use it as shelter because it provides this structure in the prairie. It's a woody species. So that's super cool. It's beautiful. Have you seen the pollen of lead plant? It is this brilliant orange color? I just love it.

Megan: I can't, I can't believe you mentioned beetles and you mentioned all these other things, but you didn't even talk about the number of different genuses of bees.

Jessica: I talked about bees. I talked about bee (inaudible).

Megan: Okay. Well, I missed it. I was just like writing stuff down and I got excited and I was like I can't believe - -

Jessica: How many, how many bees visit a lead plant, Megan?

Megan: Oh, gosh, I don't even know. A lot. That's the answer. Do you have a list? Do you have, do you have the actual number?

Jessica: I don't, I don't know that I necessarily do, but it's a lot. I believe it's 20.

Megan: That's not very scientific. Okay.

Jessica: I believe it's 20.

Megan: I was going to say, it's, it's quite a few. And then moths as well.

Jessica: Moths, there's a lead plant flower moth that is a specialist on lead plant and super rare, I've never seen it, but I know from some work in Iowa that if you plant lead plant in a reconstructed prairie that lead plant flower moth can come to the lead plant. It can find it. And it's an absolutely beautiful moth. The larvae and the adult are absolutely beautiful. So, once again, another cautious tale, not cautious, celebratory tale of plant it,

it says plant it and they will come. We know that from several specialist pollinators that you use, use plants. We're going to get into this more later so I, so I better - -

Megan: We, we will. I mean, lead plant rants are hard to get off of. That's the problem. Once you go down the lead plant rant road, you just, it's hard to get back on the road we were on with monitoring. But the reason why to, to bring us back to monitoring, the reason why we get so excited about lead plant. Not just because of all these, like Fred says, it's an ecosystem in and of itself, but it's because it's one of those restoration conservative species where it tends to be one of the first things to drop out after over managing a site, I'll say. And then it tends to be one of those things that is very difficult to grow. And I think that, that has a lot to do with the soil biology because it is one of those plants that I, I like to think of it as, it occurs in a late successional stage prairie or a climax prairie, I guess we'll say. That's when you see lead plant. So all of the microbial organisms, all of the bacteria, the biology in your soil has to be just right in order for you to get lead plant. So that nerdiness aside, when you see it, it's a good sign that your prairie is healthy. So, that's why we get excited about lead plant.

Jessica: Right. And I think you get, I really, I legitimately think you could sit at lead plant and count how many things are coming to lead plant and have a really good sense of your resiliency of your prairie.

Megan: I like it. Lead plant rant. All right. Back onto monitoring. So, a couple different types of monitoring that we have going on in the state of Minnesota. Like we said, they're robust methodology. They've been developed collaboratively with lots of different scientists, lots of different groups. The first one we want to start with are meander surveys. This is probably one of your easiest types of monitoring that you can do in terms of veg work because what a meander survey is, is you're walking around through the site. You're meandering. You can do it with a buddy, you can do it by yourself. It's better with a buddy. So, you just walk randomly through the site and you note each new species. So, if you're doing this like a rapid, floristic quality assessment, if you're doing it based out of that, that manual, then you want to be doing this. Your base meander time is about 30 minutes long unless you can cover the community that you're sampling in less time than that. I would venture to say there's not very many that you could cover in less time than that because, again, diversity is the key. So, every time that you stop and you record a species, you can stop at a time and then at the end of the survey, if during that last 10 minutes you find three or more new species, then you would add an additional 10 minutes to your meander survey. So the goal of this is that you're kind of getting an idea for the types of species that you have there. This is a great - - and after you do any kind of reconstruction, this is where at the end of that first growing season year whenever the end of that first growing season year is. If you planted in the fall, look next fall. If you planted in the spring, you can go back that, the fall of the same year. Take the list of what you planted and meander through that prairie. We want to know if what you planted grew. That's step one. That's a very, very critical step when we're talking about reconstructions because you have to - -

Jessica: Go ahead.

Megan: (Laughs) We just did a Minnesota like no, no, no, you first. No, after you. I don't know what I was going to say. I just think that's the perfect first kind of blush look at your, your community that you're trying to build and see if, you know, what you planted grew.

Jessica: Right. I think it's the perfect example of matching your objective to your methods. So it's, it's pretty easy to do and that's all you need. You don't need anything more. Is, is what I planted getting established?

Megan: Right. Jess, talk to me a little bit about the Prairie Reconstruction Initiative because I love this group. I feel super honored that I, since you have taken your new role within the DNR, I have now stepped on to their advisory team and I just love working with - - I mean, in the DNR I am blessed to work with amazing, knowledgeable, hardworking, super helpful scientists and land managers and just people across the board every day. But I also love being on this Prairie Reconstruction Initiative team because it's all folks who are really clued into restoration. And we're just a bunch of people trying to figure out how to build this Lego without the full instruction manual. And I just, I just love being on that team.

Jessica: Yeah. So the goal really is to crowd source. So we can't, each one of us know enough or monitor enough to be able to know what makes a restoration successful. So if we all pitched together and we all do the same monitoring protocol and feed into a database maybe we can begin to learn from mistakes, from successes. So the basic idea and so this is taking your meander survey to the next level. The basic idea is to put some, it's called nested frequency monitoring. So putting out plots, these are, you know, you're going to have to get your quadrat out for this one, but it's really not hard. I guarantee you this is not a difficult type of, of plot based monitoring. So, the, the methods or, or the number of plots vary depending on the size of, of where you're monitoring can vary anywhere from 10 to 40 plots. So the plots or the, the sampling frame is a half meter by one meter, but ultimately you're going to flip it and so it's, it's half meter by two meter sampling frame. So what you're going to want to do, basically what you do is you put your plot down and it has these nested subplots is what they're called. And you just say which subplot, which nested subplot, so they're small, the first one's really small. Then the next one's double the size of the first one. The next one's double the size and it goes on and on. So you just write down which subplot you saw each plant in first. And you continue. So you, what you get at the end is a frequency of each plant that you monitor. And then you can know over time from this data whether or not you're getting - - your more aggressive plants maybe are getting more frequent and your less aggressive plants are getting less frequent or if you're staying stable. So that's the outcome. It's a really great organization. We should, you know, reinforce that this is only look at reconstructions and the monitoring's really suited to that. And so it's really trying to ask this question of, of the establishment piece that Megan talked about, but then the persistence. How are our prairies doing through time? We know from science that sometimes our prairies decline in diversity through time. Who's having success and

why? So, so that's basically the PRI. Megan, do you want to talk about the grassland monitoring team?

Megan: I sure do. Our dear friend and excellent colleague Sarah Bosich is my go to for all grassland monitoring team information. And so she provided us with this handy, dandy fact sheet that we're going to use today. I wish you could see the fact sheet. We'll put it up on the website for you because it has really nice pictures. But so this is basically a group that came together and they decided that similar to this Prairie Reconstruction Initiative group that they needed to figure out a way that they could monitor plant communities in remnant prairie. So this is not restoration focus, but it's the other half of the whole, right? So we need to know what's going on in both. So since 2008 this has been a partnership with the Nature Conservancy, the US Fish and Wildlife Service and the Minnesota Department of Natural Resources. And there's lots and lots of other partners and many, many volunteers or citizens just like you who come out and help do this work. So the way that it works, is it's a three-year cycle and they wanted to keep track of management actions and how those management actions might be impacting different things in the grassland. So, not just veg, but they also do a bird survey and then what - - are they doing any other animal surveys coupled with that, Jess?

Jessica: Ooo, that is a teaser for our next section where we're going to be talking about invertebrate monitoring.

Megan: Ooo, okay. Never mind. So they are probably doing some other (laughs) things. But so the idea is - - okay. We got a three-year cycle and they have these documented management actions and the ones that they are doing are burning, grazing, a combination of both, and then rest. And so they monitor those sites at least every three years. So at least once every three years. And so then the outcome is that they report these findings to managers and then they can provide recommendations on management for the next three years. So, again, this is kind of an adaptive management look at things. Where what they're really trying to do is say, okay, we did these actions, we saw these results, how do we think that's going to affect our choices for our next round of prairie management or non-management, if that might be the case? So the work they're doing is really cool and I just love that it kind of fits in to this bigger puzzle piece where we get this restoration look at things and then we get the remnant look at things, and then we can hopefully, at some point, put those two together and see how the landscape as a whole is functioning. And are we as resilient as we could be? Jess, did you BioBlitz last year?

Jessica: I did BioBlitz last year at Glacial Lake State Park.

Megan: (Laughing) You went back. Did you see a fisher?

Jessica: (Laughs) I did not.

Megan: BioBlitzing, the reason why we mention it here is because this is another really awesome kind of one-time look at everything that's going on in a particular site. So you've got all these scientists that come together, all of these experts, and they basically monitor everything all at once. Like what pollinators do we have onsite? What vegetation do we have growing onsite? What birds do we have? So you're doing all of these different - - that's why they call it a blitz, right? So it's one time. Sometimes they occur annually. Sometimes they occur on a long period, but this is just another thing that's happening all across Minnesota and you can be involved in it. It's also super fun because you get to be out there with lots of different folks who are really excited about prairie. And you're inventorying at the same time.

Jessica: Yeah. I would call it inventory, that's right. So should we talk about invertebrate monitoring? My favorite subject?

Megan: Yes, we sure should. And you're going to do it fast 'cause we're running out of time.

Jessica: Okay. So one really important thing to remember with monitoring is it's often what I like to call a dip in the bucket. So rarely are we having this opportunity like we just described with BioBlitzes where we're, we're doing some sort of inventory. So one, one thing that's just a really important thing to remember when we're talking about monitoring in general is that we have to kind of structure our monitoring to make sure that we're just, we're taking an appropriate dip. Not too big of a dip, not too small of a dip, just right in the middle. So one reason we might want to monitor insects is they might be able to tell you about broad scale ecosystem change. Before, perhaps, something like plants that can change more slowly. Folks right now, of course, seem particularly interested in monitoring changes in insect abundance and diversity in response to broad sweeping things like climate change, habitat loss, etcetera. So, some of the things that I think about in terms of insect monitoring is first you have to have some sort of baseline survey. Or, at least, it's helpful. So, in Minnesota we're doing this Minnesota bee survey that I'm involved with, wild bee survey where we're trying to get a handle on what species we even have in this state. So with insects it's an uphill battle to even just start with really super baseline information. So once we have that wild bee survey, then we can be, you know, or, or insect survey in general. Once we have some sort of what do we even have here in Minnesota and where are they we can begin to monitor for things like adaptive management or status and trends monitoring. Whatever our objective is. And one thing we already kind of mentioned is this focal plant monitoring. It's a really interesting way and we're getting some work out of the bee lab on, on what we might, what plants might be really good plants to sit at and monitor the bees. Things like dahlia and zizia are certainly bee magnet plants where we might be able to sit there and monitor the bees that come to those plants and get a really good snapshot of what the bee community is like at that site. We also are working on doing, as Megan alluded to, we're working on doing some plot-based monitoring as well as for bees as well as distant sampling monitoring for butterflies on those grassland monitoring team sites where they have that adaptive management framework already set up for plants and birds. So, we're testing that out this season, so we're going to walk a transect for the butterflies and we're going to mark down the distance that we see to

the butterflies so we can get some sort of detection probability. So detection's a really big problem with insects. When we're going out and monitoring insects, we have to know, get a sense of, of what is our detection probability? With insects and with things like birds, they might be there and we're not detecting them and, and we have to take that into consideration. So we're going to, we're going to work on that. Another thing I'd like to mention is the Xerces Society developed a protocol called the Upper Midwest Citizen Science Monitoring Guide for Native Bees. This is another thing that we are testing this summer with this plot-based monitoring for bees where we're trying to get some sort of rapid protocol. Monitoring for bees, all bees is really challenging. There's a lot of processing time involved on the backend so we, we're trying to slim down our time of that and how much time it takes us. So we're testing some things out. Another thing I get often asked is how do you do targeted surveys for rare species? One thing that you have to make sure you're doing especially with things like butterflies that have very short windows potentially of when they're out is you have to make sure that you're monitoring when they're out. So doing targeted monitoring is kind of challenging, but it's also a lot of fun. Megan and I are going to do some rusty patch bumble bee monitoring. Kind of a blitz where we get a whole lot of people out looking for this one species of and we're hoping we're, we're going to find it because if we find it, then we don't have to go back this year, which will be really great. (laughs) So keep your fingers crossed that we find rust patch bumble bees.

Megan: Hey, I also hope we find it because I really want to see one of these adorable orange butt bees, okay?

Jessica: True statement, yeah. So, those are some of the ways that you can start thinking about invertebrate monitoring that maybe isn't so overwhelming, right? There's thousands of species of insects, but I think there's ways that we can think about slimming that down to target some of the questions we might be interested in asking.

Megan: And I think, I just want to point this out too because the number one thing when people say to me when they talk about monitoring is, well, I don't know what it looks like, so how could I monitor for the rusty patch - - they're afraid of doing something wrong. There are so many resources out there now that we just never had like iNaturalist, for example. You can submit things to that. And folks scientist experts will identify species for you. Also, bugguide.net, I think?

Jessica: It's a good one. Yes, that's correct.

Megan: You can submit photos of different species and that's like entomologists from across, you know, the US. Is it across the world too?

Jessica: Oh, people all over identify things.

Megan: Yeah, people all over and they'll identify insects for you and they're, they're quick and they have good information. Sometimes depending on who does it, they'll give you the whole life history. Other folks will just tell you the ID and they'll give you a

link to something else, but that's a really nice way. So you don't have to feel limited by your own knowledge. Like don't ever feel like well, I can't do this because I don't know anything about this. We're doing the rusty patch survey. We just have Jess out there who's really well versed in knowing what these things look like and the rest of us are basically Jess' minions walking a transect looking for a bumble bee that has a patch of orange on it. And if we find it, by golly, we're going to snatch that sucker and we're going to take to Jess, keeping it alive, of course. We would never - -

Jessica: They have our permits. Another thing to remember is that for some things you do need permits to be able to be nabbing them.

Megan: Yes, that's true and we're going to take it to Jess though. Very excited and I personally will do a bumble bee dance that I will invent onsite. A rusty patch bumble bee dance for you Jessica if we find it.

Jessica: I can't wait.

Megan: I am so excited. There's nothing more exciting than seeing something that you're never seen before in nature and you have that opportunity every day here in Minnesota because of our amazing public lands and our amazing resources.

Jessica and Megan: Let's Science To the Literature

Jessica: So the first paper we want to talk about today is Alex Harmon-Threatt and Steve Hendrix wrote this paper in 2015 on Prairie Restoration and Bees: The potential ability of seed mixes to foster native bee communities. And they pooled a whole bunch of data that Steve has collected from Iowa and looked at what species they were finding as really bee magnets. And they identified four species that you have to have in your restorations; *amorpha canescens*, otherwise, known as lead plant, *dalea purpurea*, purple prairie clover, *ratibida pinnata*, grey-headed cone flower and *zizia aurea*, help me out, a common name?

Megan: Golden Alexanders.

Jessica: Golden Alexanders. I almost got there. And so these, I think again can be these plants where we could do that kind of focal monitoring, focal plant monitoring where you, you sit at those plants and watch the bees that come to it.

Megan: And when, as a note, so when we say they're the most important, they're the plants that got the most number of individuals of bee visitors. So that's what, that's how we know that they're very attractive to bees. And so that's part of the, the critical part of that. We also have been talking a little bit with Ian Lane who works in the bee lab out of the University of Minnesota and he is doing some similar types of research and he, he is finding that added to that list we would have *heliopsis*, *helianthoides*, or ox-eye sunflower, stiff sunflower, *helianthus*, *pasaflores* and then *solidago rigida*, which is stiff

goldenrod. And stiff goldenrod is a beautiful goldenrod. It's very compact and then it has this very showy kind of almost pure middle flower head. It's beautiful.

Jessica: I absolutely love rigid - - stiff goldenrod, stiff goldenrod is what we're calling that. And it is a bee magnet. I mean they, like if you stand in a patch of stiff goldenrod it is, they are buzzing around you. It is incredible. I highly recommend it.

Megan: It's very excellent if you want to plant it at home or on the landscape. Definitely make sure you're including that one your seed mixes.

Jessica: So the second paper we want to talk about today is getting at some of these butterfly monitoring procedures that I discussed a little bit ago by Catherine Crawl and others. I believe it's out of North Dakota. And it's improving our science, the evolution of butterfly sampling and survey methods over time. So, the traditional butterfly sampling was this Pollard Walk, you know, where, where you kind of do. It's kind of this meander kind of thing, but you're really targeting the, the best habitat. And it talks about a variety of methods, but what I really liked about it is that it gets at this, it has a really great table that gets at these questions of what is your objective and how should you match your method to your objective. So, you know, it describes this framework of choosing a method based on the response variable that you're interested in, whether or not it's presence absence, occupancy, population estimates, whatever. It's really great. So, you should check it out. We'll put those on the website and I think it's time for Megan?

Megan: Yeah. So we mentioned a little bit these two posts by Chris Helzer that just in my own research I was kind of looking, I always like to know what he has to say about these types of things. About how do you evaluate your prairie and so we just want to mention two posts. One, his 2014 post, How Do You Evaluate Your Prairie and that's one where he's really just looking for answers for what to do. And he kind of walks you through a mental checklist that he uses when he's looking at a site to help him understand if it's going to have resilience and if it's going to be doing the things that he wants. So, one of, kind of the checklist things real quick is that he looks at how many species of pollinator plants are blooming right now and how abundant are they 'cause you can't just have just one. Are the populations of dangerous invasive species, are they increasing or decreasing. And when we say dangerous, we mean you're always going to have some invasive species, but the dangerous ones are the ones that would cause your prairie to not exist anymore. They would take it over completely. And then if there's cattle grazing, what plant species are being grazed by the cattle? Which ones are they ignoring? Are new plants germinating and establishing themselves or is the canopy so thick that it's stifling that new growth? That's another thing he looks at. And then my favorite because when we talk about diversity so much we talk about individual plants and individual abundance. And I would be remiss and Chris always does a nice job of making sure he mentions this. We're also talking about diversity in types of different heights of vegetation and different structure. Do you have thick vegetation? Do you have thin vegetation? Do you have some of really tall stuff and then kind of medium stature and short? Because all kinds of different species also need different structure.

And so not only do you need that diversity, but you need to make sure that you are getting that full spectrum of habitat. And so he kind of - -

Jessica: I would add to that list - -

Megan: Go ahead.

Jessica: Can I make an addition to his list?

Megan: Absolutely.

Jessica: I would add bare ground. So for our invertebrates that next in the ground or live in the ground, that bare ground is really important. So, again, getting at the structure, but adding, adding the lowest level, bare ground.

Megan: I love it. And you need that for nesting bees. Seventy percent are ground nesters. See? That was your fun fact for the day, Jess. (Laughs) I knew you knew it, but I just wanted to throw it out there.

Jessica: Hey, Megan?

Megan: Yeah, Jess?

Jessica: Take a hike.

Megan: I think I will. Gosh, after all that monitoring talk I, there's nothing else I want to do but get out there and take a hike and look at what the heck is happening on the landscape. So, today, we decided because it's just me and Jess and it's no nice to just be me and Jess, 'cause Megan and Jess time is very important. On the prairie, in the office, wherever. And so, today, we decided we would just do our top two picks for this episode. Now they're not our top two of all prairies ever, but they're our top two for today. So, my pick is my very favorite, Upper Sioux Agency State Park. This state park is located in Yellow Medicine County and I have to tell you, it is gorgeous. So when you access it, you're going to go down this winding, kind of gravel drive and what you're looking for is the first big hill that you see. You'll basically come through kind of a little oak woodlands and some other areas and then you'll see this big, giant hill. And on that hill is dry hill prairie and it is gorgeous. It's also very steep. But thankfully they have a mowed trail that they mow along the edges so that you can go up it and walk and it's just great. Last year I did a tour there with a group and we hiked up to the top and you can kind of see the whole river valley there. It gives this nice picture where you're up so high and I, in 10 minutes, 'cause I was doing my, you know, you're doing your kind of prep and you want to make sure you know stuff, and so you want to make sure of valuing all the things that are out there. In under 10 minutes I had a list of 50 species.

Jessica: Wow.

Megan: And that was just real quick, writing them down because I knew that folks were, and these were things that were right by that trail that I could see that people were going to ask me about. Because we weren't planning to go off trail. We were just going to hike up that trail and go around through that hillside prairie. There's a couple benches there too, which is always really nice. I enjoy that. But the park was established in 1963 and I got to tell you, it's magical. It has vistas, Jess. It's got vistas.

Jessica: It sounds really nice.

Megan: It is really nice.

Jessica: I haven't been there.

Megan: It's, I would also call it a prairie knoll. Didn't we learn about knolls from Curt earlier? Here we learned about knolls. (Laughs).

Jessica: Coolies, no we learned about coolies.

Megan: We learned about coolies. We knew about knolls. We didn't know about coolies. I was trying to remember what it was. I was like I feel like I knew about knolls, but I didn't know what a coolie was. Yeah, so - - and people talk to about in the wintertime, so the park's not just for summer. There's a huge sliding hill for winter fun as well, so I wanted to just, just put that plug in there for it. But it's really a nice park. 1,280 acres. You get bluffs, you get wooded slopes. There's a super nice, like if you continue on the prairie trail, it goes into an oak woodlands with really large, mature oaks. It's very, very, very nice. And a nice shade break too if it's summertime.

Jessica: Well, my pick is one that's closest to my house now, Grey Cloud Dunes Scientific and Natural Area. It has two access points, one from the north and one's from the south, which is kind of nice 'cause you can get different perspectives. And you can find all sorts of wonderful plants there. You can find both species of violets, prairie violets, the pedata and the palmata, just so that you remember because I often forget. Pedata is beardless and palmata has a beard, the flower.

Megan: What do you mean by beardless? Okay, the flower's got a beard or (inaudible).

Jessica: The flower has a little beard.

Megan: Regardless of whether it's mustache movember.

Jessica: Yes, right all the time. So it's got a host of species of milkweeds, pask flower, prairie smoke, blazing star, goldenrod. Two species of ground cherries. And with any of our, well, I think almost all, maybe, probably not all, but as many of our (inaudible) are really great checklist of birds and plants on the website that you can print out and do your own meander walk as you're out there on the prairie.

Megan: I like it. Do your own meander walk. Get your checklist, go out there. I love it. Prairies are great. I'm sad that today's episode's done. But, I mean, I kind of, I'm inspired after all this, like I said, all this talk of walking and I just want to go out and visit some cool sites. Well, today's over, but we're not done with the Prairie Pod yet. We're going to catch us, we hope that you catch us next Tuesday on the Prairie Pod on Prairie Tuesday. We are going to be talking about burn, baby, burn. So, as you know, prairies are a disturbance-based habitat, which means they need that disturbance in order to persist. So without it, they'll change into a forest moving through successional process and/or they will be invaded by non-prairie species, which means we'd lose those beautiful prairie vistas and all the critters that depend on these valuable habitats. We'll be chatting with two of my favs, Joe Blastick and Chris Smith who are going to share their experiences with fire management and how we can use this tool to more effectively manage our prairies so that we can have a diversity of wildlife using and living in them. As always, you can check out all the resources we talked about today on our website at mndnr.gov/prairiepod. Catch you next week. Bye Jess.

Jessica: See you later.

((sounds of birds chirping and wind blowing))