



Prairie Pod Podcast Transcript

Episode 3: Um, Where can I get that prairie seed? (Restoration Series: Seed Sourcing)

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

Transcript:

[sounds of birds chirping and wind blowing]

Megan: Hey! Welcome back to the Prairie Pod. We are doing Episode 3 today called 'Um, Where can I get that prairie seed?' This is another part of our restoration series where we are going to talk about seed sourcing. I'm here with one of my favorite people of all time, Jessica Petersen. Hey, Jess.

Jess: Hi, Megan.

Megan: How are you today?

Jess: I'm really well.

Megan: You're really well? You know people don't say 'really well' anymore. People just say 'good.'

Jess: I'm good.

Megan: I'm good. I'm fine. I'm good.

Jess: No, I'm really doing well. I've been out on the prairies and getting some sun. It feels great.

Megan: You've had your SPF 50 on though?

Jess: Right, of course. You have to have protection. You have to be safe

Megan: You got to be safe.

Jess: My tick gaiters.

Megan: And your tick gaiters and your knee-high boots. You know what works the best for ticks, I find—to prevent them, I mean. I have these knee-high rubber boots and I think they are the best thing on the planet. Because those ticks are usually on the vegetation and they can't seem to get a grip or a hold on that rubber. I love them.

Jess: Have you ever watched the ticks when they're on the grass before they get on you? Have you ever watched how they put their little legs out? They just stand there, waiting.

Megan: Jess is miming being a tick right now and I wish you could see it.

Jess: With baited anticipation of anything walking by and then you do and they just launch themselves.

Megan: You know what the number one question that I probably get asked every single year: what good is a tick? People always ask me that and I'm like well, it's population control. It's a biological control. It's a disease vector. They are part of the ecosystem.

Jess: The diseases might be part of population control, but ticks provide a lot of food for other animals.

Megan: That's true. They are an excellent food source.

Jess: Opossums. Did you know that opossums can reduce tick populations? I don't know if they seek them out or if they are just really good at eating lots of things, but opossums reduce the tick population.

Megan: Did you read this somewhere?

Jess: Of course I read it somewhere?

Megan: Did you read it on a legitimate site?

Jess: I don't know. I do believe this is a legitimate source of information. You know me and my fact-checking.

Megan: I know. Jess is like a scientist to the max. Likes literature reviews and likes to make sure everything is backed up by research. But, I want to know, do the opossums pick out certain kinds of ticks? Like, do they like dog-legged ticks?

Jess: I don't think they're that specific no.

Megan: Okay.

Jess: Speaking of fact-checking. This seed-sourcing topic that we are going to be talking about today. Today's podcast topic is seed sourcing for prairie restorations/reconstructions. We're going to talk about genetic diversity. We're going to talk about how to get seed, where to get seed, and different ways you can get prairie seed. Then we will give some guidelines about how to collect seed to best maximize genetic diversity [in your prairie]. I wrote a factsheet about seed sourcing for resilient reconstructed prairies and that was the impetus of writing this. We wanted to get the information out there and the facts behind all the things we think about with seed sourcing.

Megan: Jess, what do you mean by resilient?

Jess: Resilient to me means—we talk about this a lot on the podcast—a prairie that is able to withstand change. So, able to withstand drought, flooding, fire, climate change.

Anything that comes at it, it can be like a ninja—a prairie ninja. It's got lots of different tools to withstand any kind of stress. [Laughter].

Megan: That's perfect. When prairies are healthy just like when people are healthy, they are better able to withstand these stressors. I mean, it just makes sense.

Jess: Right.

Megan: Like if you ate nothing, but cheeseburgers every single day. My gosh, you would have good meals.

Jess: Not very resilient.

Megan: But you wouldn't be very resilient. You're not getting everything that you need--it's not a pyramid anymore, what is it? A food web?

Jess: I think it's a plate.

Megan: It's a plate. Oh yeah and now you know how old we are. We're of the days of the food pyramid.

Jess: There's no pyramid anymore.

Megan: You need to have everything in balance so that it's healthy.

Jess: Right and that goes for genetics. That goes for plant genetics. We need to have a wide variety of genetic diversity so that those specific genes—some genes may be more resilient than others—and we need those.

Megan: So, there's not inbreeding. But you're going to get there.

Jess: Yeah, we're getting ahead of ourselves.

Megan: We need to just jump right in here.

Jess: So, the first thing we want to talk about today is where to get the seed. There's lots of different ways you can get seed for prairies. We were just talking to one of our wildlife managers here in region 4 (southern Minnesota) about how he gets his seed and the evolution of seed sourcing. And, today there's lots of ways you can get seed and all these ways have plusses and minuses. One way that a lot of folks collect seed is through some sort of mechanical harvest, right? So, they go out there with some sort of tractor and machine--combine or flail vac this seed into that machine. So, lots of plusses and minuses. There are drawbacks to this method because you are getting a lot of—what is this word you use, Megan?

Megan: I said chaff earlier. You get a lot of chaff.

Jess: Chaff.

Megan: So, you've heard that phrase: separating the wheat from the chaff?

Jess: Right.

Megan: Basically, all they're saying is the chaff is everything that you don't want. It's the non-seed items. So, when you do any kind of mechanical harvest—this works very similar to an agricultural combine—actually that's what it's modeled off of is an agricultural combine. We're just using it in a different way to combine or harvest seed mechanically for prairies and you're cutting essentially the top of that seed-head off, which means you're getting the seed, but you're also getting the stem, maybe some leaves, or other debris and dust. That other debris, dust, leaves, and stem, that is the chaff.

Jess: Right. Couple of the drawbacks to this method is you are only getting a single cut in time. Right, so, whenever you go through that prairie with your machine, your mechanical harvester, whatever seed that is available at that time is whatever you're going to be harvesting. It's just capturing a single point in time. You may be missing some things that would have been ready to harvest before or after [you cut]. You're limiting yourself to whatever is ready at that time.

Megan: Because the other seed has already dropped. We tend to harvest in mid-season around July-August, which means you are getting a lot of the mid-season to late-season blooming plants.

Jess: Right. I think most managers are harvesting even later.

Megan: Oh yeah, you're right, it is even later. I'm thinking of hand harvest.

Jess: Around September. So, these mechanical harvesters are going through and they are probably capturing more later-season stuff. You also are going to get things you don't want—species you don't want like brome. Whatever non-native species are in there.

Megan: Thistle.

Jess: Some of the other issues with mechanical harvesters and their drawbacks is you have to have a lot of storage space to be able to put the seed out to dry it. You may need to do some seed cleaning, some seed testing. But you get a large volume of seed and that's a good thing. Good to have a lot of seed. So, another way we can get seed is to purchase seed from a vendor. How would we go about purchasing seed from a vendor, Megan?

Megan: Well, we're really lucky in the state of Minnesota. And I'm not just saying this to say it. I'm not from around here so I can say things like we're really lucky in Minnesota. Even if you're from here, you can say that too. We live in this big, beautiful, awesome state and we have amazing native seed companies who know what they're doing and are well-versed in prairie restoration. Luckily, we have options. When you have options that means you don't have monopolies and you don't just have to order from the same person and it means you get more of a fair price. So, in order to purchase from a seed vendor you first want to find out that they are a reputable and experienced in restoration and natives. You can do that just like you would check anyone's references. Ask for recommendations and see if they have a legit website. I can't list the people because we're the government so we can't show bias in recommending a company, but a quick Google search of native seed companies in Minnesota will get you some of the biggest

ones. There are commercial vendors and what that means is they tend to supply large quantities of seed. They might have a minimum dollar amount [for an order]. They might have a minimum weight or size [order] that they'll do. Usually it's a dollar amount, for example a \$100 minimum for a seed order—something like that for our commercial vendors. Then, there are others who tend to focus more on smaller areas, home gardens, individualized plants, plugs, seeds—you can order both from a seed vendor. So, the way you want to go about doing that is you want to build your seed mix. This is a podcast topic later on where we'll talk about how you put your seed mix together to get the number of species that you want, the seeds per sq. ft. of each one, and how many ounces per acre of each one that you're going to plant. That's typically how we do it. Then you solicit bids, usually from those different vendors. Sometimes they have what you want and sometimes they don't. We, as the state, we have to specify where that seed is coming from and we try to get seed that is as close to our restoration site as possible. They'll usually, on the quote or bid that they give back to us, have the lot # for each species that identifies where they are getting that seed from.

Jess: That tells us where it's coming from, where it originally came from. Oftentimes, not always, but oftentimes it is grown in a production plot on a farm essentially. Seed prairie farm, prairie seed farm.

Megan: Prairie seed farm. We're struggling. It might be harvested in Brown County and then taken back to the production plant, which may be somewhere else—in northern Minnesota for example. Then they grow that seed out so it's easier to harvest from a plot where it's a single species than it is when it's a mixed prairie dynamic, which is a lot of what the DNR (Dept. of Natural Resources) and USFWS (US Fish and Wildlife Service) do because we're working in mixed prairies as opposed to plots. So, we [DNR and USFWS] have lots of different seeds mixed together, which creates some unique challenges when you're trying to figure out how to supplement that and build your seed mix.

Jess: Right, so that is what all of these methods are about in my mind is supplementing. Especially this last one of hand-harvesting. Say, you've gone out with your mechanical harvester and you've gotten some really good stuff in there that you kind of know about from knowing the site, testing the seed, and then you supplement that with some purchased seed from a seed vendor. Then, you still have some gaps in maybe what you want to fulfill some of the requirements to fulfill the different [plant] guilds or what have you. So, maybe you want to go out and you want to hand-harvest., I really like hand-harvesting seed. I like going out there and you get to see so much while you're doing it. You see crazy stuff! It's awesome. Some of these things that people are really interested in hand-harvesting right now as we kind of evolve our techniques to collect seed and to plant prairies are these early-season forbs. So things like prairie phlox, prairie smoke, pasqueflower. People are really excited about going out there and collecting these seeds.

Megan: Why are those? Wait. Back up. So, those ones are they just super cool or what? Or there's a particular reason why we're targeting those?

Jess: Right, they often aren't available from seed vendors yet.

Megan: In large quantities.

Jess: In large quantities, yeah. They are missing from our reconstructions because of that and when we said earlier with the mechanical harvester if they are going out later in the season, they are not capturing those species because the seeds would have fallen and dropped [already].

Megan: Because they're early-bloomers.

Jess; Right, they're early bloomers. Oh, I didn't say that ever earlier.

Megan: I know. I was helping you out there. Yeah, they're early-bloomers. So, they are really, really important when you think about getting something in there that can compete with brome in the prairie. Getting something in there for our early-emerging pollinators for example. Pasqueflower blooms when the snow is still on the ground.

Jess: Yes, it's one of the very first blooming species out there.

Megan: It's the coolest thing ever. You see this little patch of yellow, which is the center of the flower. It's a typical ray-disk type of flower like a sun. That's what I mean, its structure is like the sun. And you're like, what is this patch of yellow on top of the snow? And it's a little pasqueflower blooming.

Jess: They're beautiful. And their seeds are so soft and fuzzy. Have you seen the seeds?

Megan: I've never touched a pasqueflower seed.

Jess: We'll put a picture of the seed, of the seed-head on the website. It's beautiful. In and of itself it is almost like a flower. The other thing I find so interesting from a biological standpoint and I don't know if anybody has looked at this—it is crazy off the wall speculation.

Megan: Is this like your opossum thing from earlier?

Jess: Kind of, yes. Pasqueflower and prairie smoke are unrelated species, but their seed-head, they bloom about the same time, and their seed-head is so similar. It's such a similar morphology.

Megan: Isn't it kind of octopus-like? That's how I think of it. It's fuzzy and it has these tendrils.

Jess: It's almost like it's got crazy hair.

Megan: Yes, it's got crazy hair. It's got these tendrils. The tendrils are the remains of the flower, but still the way it looks is kind of like a sea creature.

Jess: Yeah. It's so much fun. Maybe it's an addicting behavior this seed collection. Because it's one of those things when you go home at night, you close your eyes and you still see yourself looking for the seeds. Because it's like a big Easter egg hunt almost. You go out there and you're trying to find these very specific seeds. So, it's a lot of fun. You also need a lot of really cool equipment. You can include a lot of really cool equipment that is really basic stuff.

Megan: Cool equipment like a hair comb.

Jess: Like a hair comb. There's this [great video from the Tallgrass Prairie Center on YouTube that we'll link to on the website](#) and it goes through a lot of really different, creative things you can use that you have around your house to collect seed. You need something to get the seed [separated] from the chaff. Because if you're going through the process of hand collecting, you don't want to collect a lot of extra material. You might as well get the seed.

Megan: If you can.

Jess: If you can. They use the comb to pull it through the plant to rip the seed from the rest of the plant. It's cool. You'll have to look at it.

Megan: That works really well for certain things like little bluestem. Things that tend to separate well. My favorite part of the video is when he straight up wears the milk-jug belt.

Jess: Yeah. He's got milk jugs where the tops are cut off and they're connected with a bungee cord that he's got strapped to his pants. It's great. It's perfect because sometimes you're out there and you're collecting more than one species and you don't want to get them mixed up. So, it's a great way [to keep them separate]. You always want to make sure you're not collecting with something that's going to collect moisture. The plastic jugs are ok because the [tops] are open. Ultimately, the seeds are going to want to be put in something where they can dry like a paper bag or something similar.

Megan: A cotton sack. Something that breathes and won't have moisture stuck to it.

Jess: Right. So, these are all the things you need to consider—the equipment. Most of that stuff you are going to have around the house. Another thing I have heard folks use is a leaf vac where you're sucking seeds out. Works well on *Dicanthelium spp.* (Panic grasses)

Megan: Like you're reversing a leaf blower, basically?

Jess: Mm hm. Yeah.

Megan: So, it's kind of like when you reverse a shop vac?

Jess: Yeah, so you can go out there and suck up the panic grass (*Dicanthelium spp.*) seeds. When there's a big carpet of it, you can do it pretty easily. It's pretty cool.

Megan: I'm just picturing it. Are those DNR employees out there leaf-blowing the prairie? [Laughter]. What are they doing out there today? Plus, you look real cool when you're doing all this stuff.

Jess: I think it's a great way to get creative though. I think it's fun.

Megan: Hey, every day materials make the best seed collection items.

Jess: Right.

Megan: Molly here in our office has a ton of these gadgets that she's made because she does a lot of seed-collecting for Parks (DNR, Division of Parks and Trails). She has got an awesome array of milk-jug belts—fancy equipment that you too can have.

Jess: So, that is wrapping up where we get the seed and then we can move on to think about plant genetics a little bit. We'll dabble in it. We're not going to get too deep here. It's a deep subject—it can be and I'm not a geneticist. I don't play one on TV.

Megan: I'm not a geneticist either. Although, I did get an A in that back in school. I really like when you pair genes up and you found out which one was recessive and which one was dominant. Were you going to get a yellow lab or a brown lab or a black lab?

Jess: Unfortunately, it's not that easy in real life.

Megan: I know, but in class I really excelled at it.

Jess: There's kind of two schools of thought about plant genetics as far as it relates to seed for restorations. This isn't specific necessarily just to prairies. It can be about restoring any kind of [plant] community. And that's the mix or match. So, we'll go through each of these a little bit in more detail. It's basically referring to whether or not you mix seeds from a lot of different sources or you're matching the seed to the local environment. The matching theory is sometimes called the 'home-site advantage.'

Megan: I like that. Home-site advantage.

Jess: So, you're trying to get the most local seed that you possibly can. Very local seed. 20-30 miles maximum [from your site]. This has been the prevailing thought especially in prairie restoration. This has been for a long time, the prevailing thought. However, it could cause inbreeding depression. We know we've got habitat fragmentation happening where species aren't moving as far, perhaps, as they were historically. Part of the problem with solving this issue of whether or not mixing or matching is better is that we don't have a lot of information. Just like in a lot of things in restoration ecology. It's a very new field. And we have to go with what we have.

Megan: And you said this is the prevailing thought, but back at the inception or the dawn of restoration—if you take it back to the 1970's when the science is really kicking off, we used to move seed all over the place. We took it from Texas, Nebraska and a lot of our Midwestern prairies were augmented from seed that was from very far away because that's what was available at the time. It's only in the last, I don't know, 10-15 years, that we've thought OK there's something to having seed that is closer and more local. It's no different than dropping a polar bear in the middle of St. Paul. Is he going to do a good job living? You know when I teach kids or I go in to teach ecology to kids in a 5th grade class, they are like "yeah, he'll eat the people!" They just yell crazy stuff at you and you're like no, that's not what polar bears eat normally. Then you start talking to them about the climate and where does it live and would it live in somebody's house and then they start to get it. Ok, so that's not native for it and it would thrive much better in its natural environment. So, that's the same kind of idea with this home-site advantage.

Jess: You're right. It is. And you're right, in the past, we used cultivars typically, from far away. And that's a whole other topic: cultivars.

Megan: Don't get me started on cultivars.

Jess: We're not going to touch that today. I think we've, for the most part, moved beyond thinking about cultivars. We're trying to look at improving and increasing our diversity.

Megan: The sum of that because we won't go down the rabbit hole, but the sum of that is don't use a cultivar, use the actual species.

Jess: Cultivars are still the same species, but they've been artificially selected for plants that are very vigorous.

Megan: Traits. Traits that make them more vigorous. It could be flower size or color. Sometimes they are genetically modified to give them a different color. There's a lot of columbine on the market that is not red. It's a different thing.

Jess: They typically have a rapid growth rate and we don't want that.

Megan: We want them to behave as normally as possible.

Jess: So, one of the potential problems with using this matching theory is that it could cause inbreeding depression. So, if you are only choosing from plants or seed from very local populations it could have low genetic diversity and fitness due to crossing of related individuals. That's what inbreeding depression is. We don't want that because that doesn't help us with our resilience--at all. So, we don't know that necessarily. We haven't tested the genetics of every single species in the prairie--the population genetics to know whether or not they might suffer from inbreeding depression.

Megan: And every species is going to be different too in terms of how far they can be moved and still retain good genetic variability or not.

Jess: It's going to depend on a lot of factors--especially those factors related to how they are pollinated, how they grow (whether or not they grow clonally or germinate by seed)--a lot of different factors. There's not a recipe. I can't give you a recipe for which species you should move farther than others. We aren't there yet with the research. It's also difficult using this matching approach to obtain sufficient volumes of seed for restoration and for the diversity that we want in our prairies. If we are only choosing seed for our restorations from the nearest remnant, that remnant may be highly degraded and not have the complete diversity that we might want to meet our goals of the restoration that we're planting. Just another reason that maybe the mixing approach might be better or just another potential problem with the matching approach. If you've got a highly diverse native remnant prairie next door then maybe [matching] is a good approach for the most part.

Megan: There's also wait times for harvesting seed from a remnant. You don't want to necessarily harvest every single year at the exact same time. I know there's mixed research on this.

Jess: We'll get to that.

Megan: I just get so excited.

Jess: Ok, so, that's basically the basis for matching. There are advantages to it potentially—especially because you don't want to have outcrossing problems. Outbreeding depression. So, if you are moving seeds too far, you can have outbreeding depression. That's part of the reason the matching might be a good thing. The mixing approach is where you mix populations and you can create seed sourcing zones. That's what they've done in Iowa. They have 3 seed sourcing zones where they mix seed from multiple populations to create these certified source zones. Another term that people often talk about with seed sourcing is local ecotype. There's not a terribly good definition for this term. There's a lot of different definitions for it so it doesn't necessarily refer to a certain distance that you should move seed or that seed has been moved—people use it interchangeably. In Iowa, they use this term, local ecotype to refer to these seed sourcing zones. We don't have something similar here in Minnesota. We haven't gotten there.

Megan: We don't have zones where we mix seeds like that. The DNR and BWSR (Board of Water and Soil Resources)—well the state, has seed sourcing zones in terms of where we recommend how far you're going to source your seed from, but it's not the same system that Iowa has done where they are actually mixing seed across areas. We do source in southern Minnesota, for a lot of our restorations, we will source seed from Iowa because that northern seed zone in Iowa is very similar to our southern counties—Jackson County. That's actually very close.

Jess: With this mixing of populations there's a greater potential for seeds or individuals to self-sort. If you have a wide variety of genetics then individuals that are best suited to live in that environment will grow. Those that aren't, won't. You are getting, potentially, better establishment if you have seeds that are able to grow in that area—that are best able to grow in that area. You also, in contrast to the matching, you might be able to achieve a higher diversity of established prairie because more seed is available to you. It also facilitates out-crossing because you are mixing seed from lots of different genetics and you're off-setting that inbreeding depression potential as opposed to only relying on local seed. However, it [mixing] could cause outbreeding depression. It could cause a problem when distantly related plants cross and create offspring that aren't as fit.

Megan: Why would that happen?

Jess: Well, if their genetics just aren't compatible.

Megan: OK. I got it.

Jess: So, that's possible. If you move seed too far, you may have outbreeding depression.

Megan: Well, and you can also, like we found when we were moving seed from Texas, you can have seeds do incredibly well and overtake your native communities. Nebraska 28 switchgrass for example.

Jess: That's a cultivar.

Megan: Yes, and sure it will establish quick and give you an 'instant prairie', but it's not what you want in terms of a diverse and resilient prairie. We don't want monocultures.

Jess: Right. There's this question of how far is too far? [And the answer] is really widely unknown, I think, from the literature. There is ongoing research in Minnesota that is looking to ask this question. They're looking at a lot of morphological and phenological traits in plants through a reciprocal common garden experiment. This is the holy grail of understanding how far we can move seed. So, they took seed from populations in different parts of the state and planted them reciprocally in all of the other parts of the state in a common garden--in the same place, together. They are measuring different traits--when they bloom, how long they bloom, how big they are, how big their seeds are. I'm not sure what all other things they're measuring.

Megan: This is like the old nature vs. nurture, but with plants.

Jess: Yeah.

Megan: To see how it all plays out. Yeah, that makes sense.

Jess: So, that will be cool. But again, there are so many species in prairies and so many families in prairies that we can't know everything about every species in a prairie.

Megan: That's why we have good rules of thumb. I mean you have good rules of thumb that we're about to jump into for seed collection guidelines, but we also have a **seed sourcing map**. If you're not familiar with this, there is a seed sourcing map. BWSR has one and DNR has one. We're working, hopefully, that we can get them merged and get one because it's just easier when we're all speaking with the same voice. And we feel very similar about it. The whole point of these maps--we basically looked at ecological differences across the state. So, we looked at ecological provinces and sections for example, this is the Prairie Parkland Province then there's the Eastern Broadleaf Forest Province. They tried to set zones within that that were reasonable for where somebody would get seed from [to match their site]. It goes in this sequence--if seed is not available directly adjacent or [from] the next county then you can move through the sequencing.

Jess: Yeah, you zoom out.

Megan: Yes, you zoom out. Then, you, as the land manager have the ability to decide how far you want to go, but generally speaking we're talking about Minnesota. The seed sourcing map for all of that is restricted to Minnesota and just a little bit over the border in each direction. We tend to not source seed from Canada and it's nothing against Canada. It's only because a lot of times when we get that seed it is just labeled as 'Canada' or 'Ontario.' It's difficult for us to know where exactly that is and if it is close to my site or isn't it because those places are huge. If you are just talking Ontario, Ontario is very large and the seed could be coming from anywhere. How close is it to me actually? That's why I said earlier we tend to get quite a bit of seed down here from Northern Iowa because ecologically, it's very similar to southern Minnesota.

Jess: Yeah. So, there are some general seed collecting guidelines that you can use when you're thinking about harvesting seed by hand or mechanically or purchasing from

vendors. These are some general rules, general guidelines to follow. If you're out there with a machine or otherwise, collecting across the entire site. Make sure you're not focusing on just one hillside even though that might be easier because you don't have to walk up and down the hills. Collect across an entire site. One of the rules of thumb that I really liked was harvest from bad sites in bad years.

Megan: Which seems really weird. Because if the prairie's having a bad year and you go out and harvest it seems like, why would you do that? Explain it to me, Jess.

Jess: It does seem counterintuitive, but it gets back to this whole resilience idea. You want your planted prairie to be able to live in those bad years. "Bad years"—droughts, floods, whatever. You want those hearty species that are still alive and producing seed. Those are the best ones.

Megan: Right, those individuals are making it. They've got good genetics.

Jess: They've got good genes.

Megan: [Laughing] They've got good jeans. Hey, side-oats, I like your jeans.

Jess: You also want to collect across time. Species—even within a population—some individuals are going to bloom earlier than others. You want to get the ends of the bell curve basically.

Megan: Early, Late.

Jess: Collect across time and collect across sites. Don't just focus on one population. This, in and of itself, is going to allow for some creativity. This is a good opportunity to get to know your neighbors. Partner up with other agencies. There's some really cool collaborations happening among TNC (The Nature Conservancy, USFWS, DNR, and other partners associated with the Minnesota Prairie Conservation Plan to get together, collect seed, and share it. You don't always have what you need and maybe you have more of what you need of one thing. So, it's a great opportunity to share.

Megan: And we're all in this together. That's what the Prairie Plan is all about. We agree that prairie is important. We want to protect it and restore it and make the best prairies possible. The conservation community in Minnesota is amazing. I love it.

Jess: Yep. This is a good way—partnering up with other organizations or neighboring landowners is another way to get people interested in prairie. It's [also] a good way to collect across sites and to mix a lot of seed from a lot of different places.

Megan: Landowners are great about this. I can't think of a single example of a landowner that I've spoken to and said hey, would you mind if we collect? [where they've said no]. They have normal questions like what do you mean you're going to collect? Why? What for? You end up having these really great conversations about prairie and how awesome it is and what they've got on their property. They are excited. They're interested and helpful.

Jess: People often want to know what's out there. So, while you're out there you can make a list of the species that you're finding and what you're doing. That's a benefit to a private landowner as well.

Megan: Landowners are why we have prairies in Minnesota.

Jess: Yes. So, lots of different ways to collect seed. These guidelines again suggest that you should try to hit the ends of the bell—collect across and entire site, across time, across sites, harvest from the bad sites in bad years. Finally, there's some concern about overharvesting from our remnants. So, there is some work that we'll highlight here in a little bit and the recommendation is to only collect every 3-5 years—especially for short-lived, non-clonal species. Some of these other species like Canada anemone or goldenrods (not all species of goldenrod are clonal, I don't think), but these are examples of clonal species. Those are probably less likely to be harmed by collecting under short time frames. But, some of the species like prairie violets were found in this study by Justin Meissen to actually improve their abundance or increase their abundance through seed collection.

Megan: That is very interesting. Like they got more vigorous in response to it. Kind of like when you have an annual and you snip the buds off to trick the plant into thinking it hasn't bloomed yet and it puts out more flowers.

Jess: I don't know what the mechanism is. I don't know that Justin necessarily hypothesized what the mechanism is. That's one potential mechanism. Maybe as you're collecting, you are also dropping some.

Megan: Ok, that could be too. So, you're like a baby bison crossing the prairie. Everybody wants to be compared to a bison.

Jess: I'm not sure what the mechanism was necessarily, but lots of different choices there.

Megan: Since we're speaking of that we should probably...

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

Jess: So, we're going to highlight a couple of things here today. One is this really great paper that is highly accessible to anybody to read. It's not a very technical paper. It's by Erin Espeland and others. Some of the authors here are from Minnesota or are in Minnesota. The title is: Evolution of plant materials for ecological restoration: insights from the applied and basic literature. That's where a lot of these guidelines that I referenced a little bit ago came from. This isn't specific to prairies necessarily. They're talking about forests as well as prairies [and other habitats too]. It's not specific to prairies. They talk about 6 practices and a lot of these I just covered. It's basically promoting gene flow through your collection. Not wanting to decrease that genetic diversity that's out there—[it talks about] ways we can increase it by collecting through time, multiple collections in space, etc. So, we don't want to do any harm.

Megan: First, do no harm.

Jess: We don't want to do any harm and it's hard to know if you're doing harm when we don't have the research to necessarily support it. We might think we're doing no harm by only collecting very local seed by choosing this matching approach, but in the end, maybe that is harm. The good thing and the good news is that a lot of different players are doing a lot of different things with regard to seed sourcing.

Megan: There's mixing and matching. We're hedging our bets.

Jess: We're hedging our bets with our practices inherently. So, somebody's going to be the winner.

Megan: That's the best thing you can do. It's like having managers make different choices and not everybody making the same chocolate cake out there on the landscape. That's good.

Jess: It's a good thing.

Megan: That's a good thing because it means that you're going to get different structures and different kinds of prairies and somebody is going to make the right choice. Lots of people will make the right choices.

Jess: Lots of people will. That's kind of the cool thing about prairies. You have an opportunity to be creative. You don't have to follow a recipe. There's components that need to be there.

Megan: There are pieces to the pie that have to be there. Sugar! You need the sugar and the flour and the eggs, but maybe you want to add some vanilla or a little chili spice. I don't know how you're making your cake, but you need those basic things and then all the extras that make that cake special are what changes the landscape and makes that landscape special and unique and have different structure.

Jess: I like that. The 3,000 foot view.

Megan: Yes, as you look down.

Jess: It's also diverse.

Megan: That's how it should be. Diversity all around.

Jess: So, this second paper that I already referenced when talking about harvesting is by Justin Meissen and others.

Megan: We have to call him Doctor Justin Meissen now.

Jess: That is true. Doctor Meissen. This work was done here in Minnesota. The title is: Risks of overharvesting seed from native tallgrass prairies. His recommendation and the multiple authors here, their recommendation was to wild harvest—that's referring to harvesting these remnants—every 3-5 years. This is probably compatible with maintaining populations of most species in the prairie—especially those that are short-lived, non-clonal species. We should be most careful with those species to ensure that we're maintaining health populations post-harvest. Hand harvest—typically hand-harvest. The third thing I'd like to reference is there are a lot of really great resources on the Tallgrass Prairie Center website, including the YouTube [video] that we talked about earlier.

Megan: Jess, you've got to say the YouTube video where they show the milk jug belt! Where they show how to do your seed harvest. That is what you've got to watch. That video is like 14 minutes long. It's worth it.

Jess: I know what I'm going to get you for your birthday!

Megan: Oh my gosh! Are you going to get me a milk-jug belt?!

Jess: I am.

Megan: I just threw my hands in the air, I got so excited. I want 5 milk jugs on there because you know this is customizable.

Jess: Center and two sides.

Megan: Yeah, exactly.

Jess: I can do that. Maybe color code it.

Megan: I need 5 on there so I can put different seeds in there. It's going to be great. Awesome. What am I going to get you for your birthday? I tell you what I'm going to get you one of those combs!

[Laughter].

Jess: So, the other cool thing on the Tallgrass Prairie Center website is a really great guide that **Greg Houseal put together that is a technical guide for seed collecting and what it shows is timing of when certain species are blooming and ready to harvest. So, it's great. It's really comprehensive. We'll link to that on the website as well.** Megan has used it. I've been sending it to her.

Megan: I have used it. I love that guide. The thing you have to keep in mind is that that guide was made for Iowa. So, if you are talking about counties that are very close to the border—southern Minnesota, northern Iowa—it's going to be very close. As you move north in Minnesota, as you all know, it gets snowier and colder, and the season gets shorter so there is no substitute for a site visit.

Jess: You're going to have to shift.

Megan: Yes, you're going to have to shift it to your own climate conditions that you're working under.

Jess: Well, and even this year about all summer long we've been about 3-weeks behind.

Megan: This is such a weird year.

Jess: Such a weird spring that we have had.

Megan: Yeah, it's a very weird spring—delayed and then it got hot really quick with almost no spring temperatures then it decided to get cold again. It's just been very strange. So, every year is a little bit different too. It's a great guide in terms of getting you on track if you're wondering am I thinking about [harvesting] in June? August?

Jess: Right. What are we looking at? So, it's a really great handy-dandy guide you can keep on your desktop. That about wraps it up for our science. Hey, Megan?

Megan: Yeah, Jess.

Jess: Take a hike.

Megan: I think I will. Ok this is the part of our podcast where we are going to highlight some of your amazing public lands and we get to go through and think about when you're going to visit some prairies. We talked to our fabulous consultant, Cory Netland, who is one of our Area Wildlife Managers up in the Spicer area. I guess he is up in the Spicer area.

Jess: Yeah, Willmar.

Megan: We keep him hidden, tucked away in Kandiyohi County.

Jess: Like a gem.

Megan: He's a hidden gem. That Cory Netland is a hidden gem. He is, but he hooked us up today and he gave us some of your amazing public lands. These are all ones that have a seed sourcing connection. So, Jess walk us through some of these.

Jess: These first two are not ones that Megan and I have been to, but they sound real cool.

Megan: I want to go after talking to Cory.

Jess: I do too. These are in Pope and Kandiyohi Counties. The first one is Oleander Wildlife Management Area. It's got a whole bunch of different things on it. It's got some native prairie, non-native prairie grass (restoration), remnant, old farm grove with an adjacent woody-cover planting. Cory talks about these as islands of mature hardwood species including: bur oak, basswood, maple, hackberry, and walnut.

Megan: Is that like your Cory voice?

Jess: No, I can't do a Cory voice.

Megan: It was good. You did a different voice when you said basswood, bur oak. It must be your tree voice for when you talk about trees.

Jess: I just thought it seemed very eloquent. So, what Cory was telling us is that some of these old brome fields that are on the property, he is going to seed them down with some seed that's been collected through this seed collective where different partners are sharing seed.

Megan: They're working together to mix seed and then share it. I like that.

Jess: And he's doing some really cool stuff in partnership again with The Nature Conservancy and others too, to look at ways to start incorporating some of these early-season forbs. That's really exciting, up and coming stuff. If you want to visit this Oleander maybe do it now while [parts of it] are still brome and come back in a couple years to see what happens after he seeds that brome field down. So, that's the first one. Across the street is the Randall Waterfowl Production Area (WPA). This is a USFWS site. Cory was telling us that they've been doing grazing with goats for the sumac. It's always great to see goats out on the prairie.

Megan: I always want to name them things like 'honeysuckle assassin' and 'sumac...assassin.' I couldn't think of a name that rhymed or anything else like 'sumac serial killer.' Something because they are out there doing great conservation work. Goats will eat anything.

Jess: Which is a blessing and a curse, right.

Megan: Yes, it is.

Jess: I think goats are a great management tool, but we've got to watch them. We have to make sure they don't get out of control. The third [site] which is just up the road north on 104 about 10 minutes not too far over into Pope County is Ordway Prairie. This is a patchwork of prairies.

Megan: It's beautiful.

Jess: It's owned by The Nature Conservancy. The Ordway Prairie Preserve, The Nature Conservancy property. It's just absolutely beautiful. The vistas are wonderful. You've got to watch out for the poison ivy a little bit.

Megan: You do. It's on the hillsides there and it's taller than me. It's Megan-height, which is not ideal. However, we do a plant identification training and every couple years we go back to Ordway and I would say it's one of our most attended sessions. It could be because of the fabulous land manager who comes, Matt Graeve, he always comes and he does a great job talking about the work they're doing at Ordway. But, I think it might not be Matt, it might just be how awesome Ordway is. Maybe it's both.

Jess: Probably a combination.

Megan: It's probably both.

Jess: So, part of the reason I love this Glacial Lakes area is these rolling, glacially deposited hills. They are so cool. You've got the dry glacial hilltops and then the swales and it just makes for a beautiful vista.

Megan: And this is another one where you can walk down the hillside and you are walking through different plant communities as you go. You're going, like you said, from dry to mesic to wet in some cases. You can feel that transition. It's just really neat to walk in some of the low ground and then, there's even wetlands, little pocket wetlands there and you pop back up and you're in a dry, sandy area. It's nature's paintbrush at work in its finest hour.

Jess: All year long too. You can go there in the spring and see [prairie] blue-eyed grass and later you have some [prairie] phlox blooming. It's just beautiful.

Megan: It is beautiful. All year long.

Jess: All year long.

Megan: So, don't forget you can check-out all of these public lands on the DNR's Recreation Compass. You can find The Nature Conservancy's Ordway prairie on their [web] site. You just type in Ordway Prairie and they'll tell you how to get there, more

about the site, the history, and why The Conservancy is conserving it. That's how you can access all of these amazing prairies.

And we will catch you next week on the Prairie Pod where we are going to talk with the legend, the man, the conservationist, former bear biologist, Dave Trauba who is now the Regional Manager for the DNR's Southern Region Division of Fish and Wildlife. He was the Wildlife Manager for a very, very long time, we won't say how long because that's a teaser for next episode, at Lac qui Parle and you are going to learn a lot from Dave. We're going to learn a lot from Dave next week.

Jess: I'm excited. I really want to find out how Dave pronounces Lac qui Parle.

Megan: I know we're going to solve the mystery next week on the Prairie Pod. See you later, Jess.

Jess: Bye, Megan.

[sounds of birds chirping and wind blowing]