Prairie Pod Transcript

Season 5, Episode 42: Sow what? Seed scarcity and how to make prairie reconstructions more diverse through targeted seed harvest and production

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Guest: Angie Miner, Ben Carlson, and Travis Issendorf (The Nature Conservancy)

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

Transcript:

((music playing - sounds of birds chirping and wind blowing))

Megan: Hey Prairie Pod listeners, I'm Megan Benage, regional ecologist with the Minnesota Department of Natural Resources.

Marissa Ahlering: And I'm Dr. Marissa Ahlering, lead scientist with the Nature Conservancy in Minnesota, North Dakota and South Dakota.

Sara Vacek: I'm Sara Vacek, wildlife biologist with the U.S. Fish Wildlife Service, based out of the Morris Wetland Management District.

Mike Worland: And I'm Mike Worland. I'm a wildlife biologist with the Minnesota DNR Nongame Wildlife Program.

Megan: We are part of the Minnesota Prairie Conservation Partnership and we are here to help you discover the prairie.

Marissa: Discover the prairie.

Sara: Discover the prairie.

Mike: Discover the prairie.

((music playing and sounds of birds chirping))

Megan: Hey welcome back to the Prairie Pod everybody. It's season 5 and we're already at episode number two and I am so excited. Today is a great prairie Tuesday because we get to introduce one of our very fabulous new members of the pod squad, our excellent new co-host Marissa. Welcome, in your new promoted role of podcast co-host. How'd it feel?

Marissa: Yeah, thank you. Great. I'm excited to be here on this beautiful summer day on the prairie.

Megan: Always a good day when we're on the prairie together. Today, I'm so super excited because we have so many guests here from the Nature Conservancy. It's a Nature Conservancy take over.

Marissa: Yes, a TNC takeover.

Megan: I know I like that. I like that alliteration. We do - -

Marissa: Taking over conservation.

(Laughter)

Megan: Hey, we're all partners together.

Marissa: Absolutely.

Megan: It takes a village working together is what prairie partnership is all about. So, you know, sometimes in our prairie partnerships, we have to talk about real life problems facing prairie practitioners. I tried to get as many P words in there as possible, real life problems facing prairie practitioners. So one of those real life problems is seed scarcity. You guys all know this, right? The tallgrass prairie landscape reduced to just under 2% of its native range in Minnesota, and less than 1% of its range in North America. It is one of the most endangered ecosystems on this continent. When you have such staggering losses, I mean, we're talking about 98% to 99% lost. And I don't want it to all be like depressing right at the beginning because we've got some solutions here for you today, that's why we brought this TNC pack together to share some good things that they're doing so that we can bring diversity back, baby. So we're putting our heads together, bringing prairie back. That's what we're trying to do. So we're going to hear about all of it. We're going to have some solutions we hope to help keep our prairies genetically fit and diverse and try to figure out how to deal with the seed scarcity problem as we're trying to connect and rebuild the landscape because it's a real issue.

Marissa: Mm-hmm. We have a need for seed.

Megan: I love it so much. This is our new, this is our new nerdy ecology bumper sticker series. Hashtag #needforseed. I love it so much.

Marissa: Need for seed. It's true, and when you think about it, when we're trying to put these prairies back on the ground, we're trying to do it with species and seed that is adapted and has enough diversity or genetic diversity it can adapt in the future, but that means getting seeds somewhat locally and, and getting a lot of it so that you can get it from different sources. And when you only have 1% to 2% of that prairie left, the sources you have for obtaining that seed, whether that's starting production plots or just

harvesting it is, is very small. And so it really is a pretty big limiting resource when it comes to restoring our, our grasslands and our prairies.

Megan: Absolutely. So now that we've depressed you, let's jump right into the help. Now, we all know that the, you know, it's going to take all of us working together, putting our big, beautiful brains together so that we can solve these problems so that prairie can persist not just now, but into the future forever and ever and ever. That is the dream, folks, and the goal. So let's introduce part of our dream team for today. Angie, we're going to start with you. Why don't you introduce yourself to the folks and tell us a little bit about what you do?

Angie: Hello, I'm Angela Miner and I'm a prairie recovery specialist with The Nature Conservancy, and I operate out of the Glacial Lakes region in central Minnesota. What I do is I work with Fish & Wildlife and DNR partners to do prairie enhancements and reconstruction projects. Lands that are owned both by The Nature Conservancy as well as by the public.

Megan: Wonderful. Travis.

Travis: Hi everyone. My name is Travis Issendorf and I'm a prairie recovery specialist here in the Agassiz Beach Ridges Landscape in northwestern Minnesota. I also work with US Fish & Wildlife Service and Minnesota DNR offices to help increase capacity on their landscapes, and also help manage our LSOHC to purchase TNC lands.

Megan: Travis, just a quick question for you. What is LSOHC?

Travis: It's Lessard-Sams Outdoor Heritage Council. Funding that comes from the state to be used for enhancement restoration on our prairies.

Megan: Beautiful. Ben, go for it.

Ben: Yeah, Ben Carlson here. I'm a field steward with the Central Minnesota Office of The Nature Conservancy, working mostly in the prairie forester border eco region, so I'm responsible for the day-to-day stewardship in the prairie preserves that we manage. Last couple years, I was also the prairie restoration specialist in the Ordway Glacial Lakes landscape, so I was leading crews of interns around collecting seeds.

Megan: Wonderful. We're going to jump right in and ask you guys some tough questions here so we can help our listeners figure out how to deal with the seed scarcity issue. Marissa, you already gave just a beautiful summary, I should say we both did, right? We both gave beautiful summary of like quick background, lots of prairie in Minnesota, so I think we can just jump right in with what is a seed collaborative or consortium. We'll pass that to you, Angie.

Angie: So in essence, a seed collaborative or consortium is, is basically a partnership amongst local land managing agencies within a local landscape. We form a partnership and coordinate together to assist one another on, to combine time and resources like equipment, harvesting sites, staff time, or even burn crews to help prep sites for harvesting. And we'll coordinate together to harvest and share seed that can be used on new reconstructions across a local landscape.

Marissa: Very cool. So Travis, maybe you could tell us a little bit more about, you know, why we need them and where this, where this idea came from.

Travis: Sure. For, for me working with other partners and our TNC staff here in the Agassiz Beach Ridges Landscape, back in 2015, I believe, we started noticing a seed scarcity amongst a number of the, the local seed vendors. That was mainly due to competition from partners for restoration projects. Due to the amount of grant funding available here in Minnesota, it's not a bad thing. We have a lot of opportunity here in the state, and due to that funding availability, a lot of projects are being implemented in the landscape, and, and because of the amount of projects, seed scarcity has become a, a real issue and, and because of that issue, we started talking amongst partner staff and trying to figure out how we can potentially utilize, you know, our resources amongst all the offices and see what we could do to better kind of deal with this, this issue. And what we came up with was seed consortium, if you will, and what we, what we decided as a, as a group after talking with a number of offices in the landscape was that yes, we can, we can kind of build our resources and utilize our resources so that we can do more and potentially harvest a number of the burn sites on an annual basis that are remnant prairies. So we're essentially looking on an annual basis at sites and looking at how we can better serve the landscape, if you will, for the restoration needs.

Marissa: That's really cool, and I love the, the innovative thinking that you all had on this. As a follow-up, I'm wondering how many, how many seeds sort of, seed hard to say, seeds source collaboratives or consortiums are there kind of starting now around the state? And that's for either Travis or Angie, I don't know if either of you know.

Travis: As I recall, I believe there's at least three amongst different landscapes, some of the priority landscapes in the state of Minnesota right now, but that could be changing as, as everybody, you know, discusses and as this message gets out on the Prairie Podcast to let people know and, and inform people that this is a great opportunity to collaborate and utilize, you know, somewhat limited resources to, to do more for restoration purposes.

Megan: Absolutely. And we should note that there's, there's lots of different levels to this, right? Like when you say so always say consortium, this is just like a fancy word for groups of people working together. So it's possible that you could have a mini group of that where it's, let's say, an area wildlife manager working with the local landowners putting together agreements to try to get seeds that they don't have. I know several of those going on in DNR. And that may not be at the consortium level because that's just happening between landowners and, you know, one land manager, but that's also a viable option to try to combat this issue. So, you know, it's not necessarily go big or go home in this arena of how we solve these problems. There's different levels at which we could tackle it, which I really, really like. Okay, Ben, tell me a little bit about, you know, were these collaboratives driven because as Marissa really likes this phrase, I do, too, were they driven more by the need for seed or was it a concern that we were losing diversity in our prairies or, or both.

Ben: I think it was definitely a little bit of both. As Travis mentioned, you know, the original impetus was to just get more seed for restorations. But I think as, you know, restorations over the last few years, their goal has moved as far as diversity. So, you

know, several years ago, it wouldn't be uncommon to see you know, 20, 30 species in a restoration at most, and now we're trying to include many, many more species. You know, typical prairies will have more than 100 species, and so a lot of our restorations are trying to mimic that. And so trying to get that number of species in a restoration seed mix is really difficult if you're only sourcing seed from vendors. So that's kind of I think an area where this, these collaboratives have really helped is allowing land managers and people are out in the prairie to kind of share where these populations of species are and also to get greater genetic diversity within a species between different locations. You know, a lot of vendors if you get seed from them, it might just be from, you know, one location. So trying to look around the landscape and pick up seed from different areas I think is really an advantage of these consortiums.

Megan: So Ben, you said something interesting there, and I want to make sure our listeners kind of know 'cause this question comes up a lot about well, okay, so what is the potential number of plants that I'm shooting for? Like what's my target? And of course, it varies by type of prairie, right? We might be restoring a dry prairie or a mesic prairie, or a wet prairie, and there's going to be variation and differences, but across the tallgrass prairie in general, there's a possibility of about 580-ish species. So that's not to say that every prairie everywhere is going to have, you know, 583 species that makes up that prairie, right? But and it's also not to say that at the plot level, like if you're in a one meter square plot, I wouldn't expect to find 500 plants in that one meter square. But it's just an interesting thing that, you know, we started in restoration with around 30-ish, well, really we started with like 10, right? That was the, that was the target back in the day, and then we moved to somewhere around 30 species in terms of our diversity, and now we're somewhere pushing towards that 100 target, but we're still a long way away from that upper 500s. Like we need to be in the multi-hundreds as we're restoring, so that's just another, that's a whole other topic for another day, but I just think it's kind of an interesting, that's an interesting jackrabbit hole for us to go down on a different day.

Marissa: Yeah. Well, certainly the number of species is an important question and an important driver I think probably has been behind this as we try to increase the diversity of our, our prairies, so that's interesting to hear, Ben. Thanks. I, I have, so Travis, you, you kind of talked about, well, and Megan, you mentioned that there's lots of different levels and ways that these consortiums or essentially collaborations, right, can form. But I'm wondering, Travis, if you could talk a little bit about the different types of organizations and who all is involved in the collaboration that you've been working with.

Travis: Kind of touching on your point, I think that's the, that's the interesting thing about the consortium or collaborative effort here is no one model, you know, is probably going to work for, you know, each landscape. It's, it's nice that way that it can, it can kind of fit into whatever landscape and, and whatever, you know, partners have, have interest or, or need. For us in the AB, ABR Agassiz Beach Ridges landscape, the, the partners involved are The Nature Conservancy, of course, and then the US Fish & Wildlife Service, and Minnesota DNR and, and amongst Minnesota DNR, it would be the SMA program as well as the Fish & Wildlife division, so we've got a couple different area wildlife offices. We have one US Fish & Wildlife Service national wildlife refuge, and then two wetland management districts amongst the US Fish & Wildlife Service, so yeah, it's, it's kind of a litany of different partners and, and like I said, each, each,

landscape and each collaborative effort is a little bit different for each landscape depending on the need and I guess the, the landscape partners involved, so.

Marissa: Yeah, and I don't know, Angie, do you, or Ben, do you guys one of you want to highlight kind of who you all have been working with in your landscape and the collaborative you guys have had going?

Angie: For the Glacial Lakes landscape, we worked very similar partners as in the ABR, and it is primarily Minnesota DNR and US Fish & Wildlife Service land managing partners that are also doing prairie reconstructions on their sites in addition to the OHF properties that TNC also manages. And OHF is the Outdoor Heritage Fund.

Megan: We're just trying to, we talk in acronyms so much, we're just so used to it because that's, there's all these, I didn't even, I just learned a new one, ABR, that's kind of fun. But so just to make sure everybody knows, too, SNA is Scientific and Natural Area, which is a program within the Department of Natural Resources, and they protect natural features, you know, of an exceptional scientific or educational value. Okay, let's talk a little bit about all the advantages and disadvantages of a seed collaborative. Maybe I shouldn't say all. Let's talk about some of the advantages and disadvantages of a seed collaborative over maybe trying to purchase some of that seed from vendors. And I think we already heard some of it is that inherently, some of that seed just may not be commercially available. Let's start with Angie and then yeah, I want to hear from all of you on this one.

Angie: There's a lot of work happening on prairie reconstructions right now. We have a very high need for seed that we need through both our local vendors as well as through our local collaborative harvests. We have to prioritize our harvested seed accordingly. We typically will prioritize our, our reconstructions that are located near remnant prairies or in areas that have high-quality areas such as prairie core areas. Those are the ones that we really want to prioritize for reseeding our locally harvested seed that is going to have great diversity of local ecotype seed. And local ecotype seed is basically seed that is originated within a certain distance of the local landscape. It is typically more genetically adapted to the local conditions than seed that has originated farther away. This can be sort of exemplified in the timing or duration of the season that will impact the flower, that will impact when the flower is adapted to bloom, you don’t want it to be blooming too early or too late in the season, such as what might occur if the plant was adapted to more southerly climates or in more northerly climates where we are here in Minnesota. Our vendors are also increasingly working to meet the needs of these local ecotype seed demands, but it is difficult because these reconstructions are basically happening all over the place, and to be able to source seed close to any particular reconstruction can be a bit of a challenge. You can also try to match your reconstruction project to the prairie front that you want to harvest from. So for example, if you have a prairie unit that is located close to your reconstruction unit that has similar soil type and moisture content, you have a pretty good chance that the seed that you're harvesting from this prairie unit will also do well in that reconstruction unit. In the end, though, many reconstructions will still rely on purchased vendor seed that is supplemented with our locally harvested seed. Locally harvested seed can increase the species diversity. We can also increase the seed count or how much seed that we're actually putting out

in the landscape. And it can also reduce the seed mix cost if we're able to acquire a lot of, you know, really hard to find species or species that tend to be more expensive or even nonexistent on the marketplace, we can add these into our mixes through our local harvests, and supplemented by the vendor mixes in order to create the best possible diverse mix that we can for our new reconstructions.

Megan: And seed sourcing is one of those things that we could talk about all day long because there's so many nuances to it and so many variables and just as you said, Angie, I mean, the real problem in all of that trying to what our vendors are essentially tasked with is trying to collect seed from very small amounts of prairie that are left in the state, and it just may so happen that you don't have a remnant near where you're planning to restore, like that's entirely possible, and so we've got to make decisions as managers about what that means and what do we do, and I, I mean, folks know this, I tend to be on the spectrum of I like things that are regionally sourced, we certainly know that there's limits with how far is too far, right? But if we're in southern Minnesota and we're doing a restoration in general, northern Iowa tends to be a similar landscape, and it's got seed that might have similar genetics. And so there's, you know, there's decisions that we have to make. I think the literature generally says you don't want to go further than 150 miles, but it also varies for every single species, right? Because there are some species that would have been widely dispersed across the prairie, especially our wind species, our wind-pollinated species like big bluestem or Indiangrass, those things are flying, you know, they don't necessarily have the same kind of restrictions. But then you start thinking about things like echinacea where they're not dispersing as far and it might be more important for those particular species to get seeds that are closer sourced to where you're restoring. So it's a, oh, man, it's just a whole complicated puzzle of things, and it's, it's difficult.

Angie: The reality is there's just, we don't know a lot about the scale of local adaptation for most species. And like you said, it's very different. It's going to be different depending on like life history characteristics and different types of mating strategies and dispersal strategies, and also like those processes, like dispersal strategies have been probably disrupted for a lot of species, right? Because of fragmentation of our prairie landscapes. If they were dispersed by bison fur, they're going to have a problem now. But so, so, so yeah, there's, there's just so many complicating factors in, in thinking about which seed and, and how to do that.

Megan: Absolutely. Travis or Ben, do you guys have any other advantages or disadvantages that you'd like to share?

Ben: Yeah, I think another advantage of vendor seed is that you don't have to dry and clean and process it. That is one thing that we do have to do a significant amount of for the seed that we collect for these collaboratives, but I think Angie talked to pretty well about, you know, even though a lot of those species we can get them cheaper and in higher abundance from vendors, there's a lot of species that, you know, we may know of a population that the timing we're familiar with that, relying on vendors to collect that, we might miss when that seed is most available, and so we're able to kind of keep an eye on these populations a little bit better and really target the collections more precisely.

Megan: To when the seed is most viable, basically. So you're harvesting at the right time.

Ben: Right, yeah. Yeah, we watch when, you know, the, the porcupine grass is in, you know, the soft dose stage instead of milk stage. We look at when the leatris seed is starting to shatter, so we can really target our hand collection and bulk collection to when the seed is most viable.

Megan: Okay. I can't help myself, Ben. You're going to have to explain for our listeners a little bit how do they know that something that porcupine grass is in a milk stage. I've never heard this before. I'm about to learn some things.

Ben: When porcupine grass is approaching ripeness, which is usually in late June, early July, you can take, you know, the grain out of the plant and you can, you can pull it out of the, the flower before it's ripe. It'll shatter before it's ripe, but then you take the seed and you just kind of squish it with your fingernail or break it in half and if you can get a little milky juice come out of it, that's not quite ripe yet. The, the starches in that haven't solidified, so that seed is not going to be quite as viable as if you were to wait a couple more days sometimes is all it takes, and that starch solidifies into a starch, kind of like a cooked grain of rice, and that's kind of the best way I can tell if it's ripe. And the same goes for a lot of other grass species and other forbs species as well. So we're, we're out there constantly checking seed ripeness on a lot of different species.

Megan: So for seed, you know, for folks, you know, if you're milking a cow, you want there to be milk coming out of it. If the seed has milk coming out of it, that's a problem. Just as, just as a take-home message. It's not ready yet, it's not ready yet. I like it. This is so fascinating. Travis, do you have any advantages and disadvantages?

Travis: Sure. I'll just add that, you know, I think one advantage or benefit to this, this effort that we're, we're all doing in our landscapes is, is just cost. I think everybody realizes, you know, people are, are, you know, installing or restoring part of their, their lawns and things like that and they know what the cost is for, for this native seed. You know, when we start looking at the scale of, of restorations that a lot of us, us land managers are doing, you know, when we're talking 40, 80, 160-acre restorations, and, you know, we're talking diversity as well, it's, it's costly to get these projects done. So if we can, we can, you know, potentially come together amongst a number of offices and, and join, you know, not only our staff time and, and work together on some of this, whether it be burning or, or other phases of the, the effort, what if we can also bring some of our resources together, I think that's super helpful.

Marissa: Yeah, that's great. So that you guys have given us some really good background on like why, why we have, why you guys have developed these seed consortiums and partnerships, why they're important, but really what I want to get to now is like how does it work. 'Cause partnerships, partnerships are great and they're also challenging. That's a lot of people to manage and organize and how do you all get on the same page and how do you decide where the seat goes, and who's going to collect the seed, and where it gets dried or where it gets, you know, sorted, those sorts of things. So let's just start with maybe kind of high level describing how these collaboratives work. Maybe Travis, do you want to start for us?

Travis: Sure. For, for us in the Agassiz Beach Ridges landscape, it, it kind of started really kind of natural. I mean, it, it took a lot of communication, you know, really drawing on, on other partner offices and staff, you know, and, and seeing what their interest level was, and, and then coming together and kind of starting an introductory meeting and, and explaining, you know, the process, kind of our thoughts, the, the positives, and potentially the outcomes of this, and, you know, after that first meeting, everybody was onboard. I mean, everybody had interest and from there, it, it really is kind of went into just planning meetings. Normally we'll have one to two planning meetings a year, usually in February we'll start talking about burn priorities, and, and what each office is looking at for spring burning, and/or fall burning potentially, and from that list, then we start talking about, you know, restoration projects for this coming year, and it, it seems to just kind of work itself out through communication and planning. You know, if, if we're looking at specific, you know, burns come June, July, and, and we're looking at this burn list and, and we're looking at the remnants that were burned and, and, you know, a lot of us, there, there's a lot of knowledge and experience in, in these, in these groups. So we can look at, you know, these, these remnant sites and, and based upon the knowledge of some of the staff in the office, we can have a good determination of what restorations can be completed using seed from these sites, and then also we're, we're going out and doing site assessments anywhere from three to four times throughout the growing season or field season to really see how these sites that were burned are coming along for potential harvest.

Marissa: That's great, I'm wondering if you could, so you mentioned a lot about burning, and I'm wondering if you could talk a little bit about how that's playing into this. Like why, why are you all tracking burning, just so the listeners can know.

Travis: Sure, so, you know, normally with, with the native plant communities, they've, they've evolved through, through fire, and normally when you start looking at germination, just seed production overall, that following year or that following field season growing season after a burn is, is the best time to take advantage of, of harvesting seed. Germination is going to be high, production is going to be very high in, in most your native species, and that's a big reason why we're, we're doing that. Once you start looking at those successive years after a burn, you start seeing that native plant community production and just density start falling off. So we really look at that following field season after a burn to really focus our seed harvest efforts.

Megan: Ben, who tracks these acres burned or harvested?

Ben: Well, generally, each partner in their collaborative will track it themselves and kind of communicate it between the other organizations to come up with a list of all the units. And I think it's important to note that we're not only doing spring burns here but also fall and summer burns, and that can be important for seed collection as well because there's a lot of species that there's not enough time after a spring burn for them to boom, like pest flower or prairie violets. So we also track, you know, which prairies were burned the year before or the summer before at least to locate those areas of early, early seed production, which can be very vital because those are the areas that we need to focus our hand collection on and there's a very short collection window. We're not going to be going after those species with a combine, so knowing where those

seeds are going to be growing early in the season when there's a lot of other stewardship priorities to be very important.

Marissa: Yeah, it seems like a lot to keep track of, so good to have partners on that. Angie, what would you say has been the most rewarding, rewarding part of working with these seed collaboratives and partnerships?

Angie: I would say the most rewarding part for me has been just seeing the diversity that increase in diversity that has been put into these reconstructions, and this has been dramatically increasing over the years, as was kind of alluded to earlier, many early on reconstructions decades ago started off with maybe about 5 to 10 species of seed that we're putting into these reconstructions. And then we slowly started to increase this over time. We grouped up to 30 species currently it's, it's more, much more common to see about 40 species or even 60 species in a seed mix. But to put that into perspective, through some of our harvesting efforts here, especially in the Glacier Lakes region where we do a lot of hand harvesting, we have harvested over 240 species of plants this year of seeds. That's, that's quite a dramatic increase in what we're able to put into these reconstructions and put out onto the landscape. At the end of the day, if you don't plant it out there, it's not going to grow. To me, I, I kind of like to think about seeds sort of like sprinkles in a sense, like or I, I should say I kind of like to think about prairies in a way more like sprinkles, a single type or color is not really very festive, nor is a single type of seed useful in an ecosystem. However, a whole variety of colors, shapes, and sizes, this makes for a very dynamic array of sprinkles, and it is also great for diversity, the types, sizes, and genetic variations of the plant, and this is critical to having a dynamic and productive prairie ecosystem.

Megan: You know, I'm always fascinated that no matter how many times we do podcast episodes, it always comes back to an ice cream sundae. No matter how many episodes we do, we always find a way to make it come back to dessert, and I just, we don't even plan this, it just happens. We talk about cows and grazing, we talk about ice cream plants. So many parallels. Angie is talking about diversity, she's talking about sprinkles. All I'm thinking about over here is what a great analogy and man I need a snack. (Laughs)

Marissa: Yeah, and I never, next time I look at a big pile of seeds, I'm going to see lots of little colorful sprinkles.

Megan: I know, I love it.

Marissa: Thinking about that-- I, I know you guys have spent a lot of time on hand collection and tracking populations, which I think is amazing, but I also know that like when you're talking about the need for seed, like hand collection only gets you so far. And I'm wondering how you guys balance the hand collection and the combine harvest, and how you think about that in terms of, of diversity and, and the resources needed are different, right? So how do you balance those things?

Travis: Well, for our program, the, the mechanical harvest with the seed strippers or the combines, that's usually targeting those areas that were burned the spring before, so in the fall, they have a very high abundance of high-diversity prairie seed. And, and it

definitely does take a lot of resources in the fall, and we can kind of gauge how much time and effort we're going to need for doing that mechanical harvest usually by, you know, early September. But the rest of the year and throughout the fall, we're, we're basically spending as much time as we can doing hand harvesting. And I think our program definitely focuses more on that than the other seed collaboratives. And that's partly just because of the topography, there's a lot of steep hillsides where we can't get in combines and also some species they grow in more isolated patches or more dispersed. So if we're really trying to target one species, a combine isn't necessarily going to be able to get that, you know, prairie violets for instance, you know, they for that, we have to tie a little silk bag around the pod so we can catch the seeds. And then, you know, throughout the summer, things bloom and ripen at a lot of different times, so we're collecting something every week, a different species every week, and that's not very conducive to mechanically harvesting. So where the mechanical harvesting really comes in is when the greatest number of species is ripe in the fall, and typically there we're targeting the warm season grasses, a lot of the asters and leatris species, sunflowers that are ripe in September and October, and we try and time the mechanical harvest to when all those species are the most ripe, but obviously we, we don't hit the mark on all of them every time, but that's where the hand collection comes in.

Megan: So okay. As I'm listening to all of this, and this is great, like this is amazing to me, but I'm going to ask the question that I think most managers would ask of me if they heard this. Well, maybe I should say when they listen to this podcast, not if they heard this. Okay, so I'm going to ask the questions that most managers might ask. So we're spending all this time harvesting and there's obviously a significant amount of staff time, energy, and resources into it. And then there's a tradeoff, right? Because what I'm going to hear from managers is well, I'm not sure that I can do that because then that takes away the time I have to do XYZ management, right? So when I ask this question to Chris Helzer, he was like his response was if I put all of my energy and effort into making my prairie as diverse as possible, I need to do less management over time. So I'm just wondering, we're just going to put Chris on the hot seat, even though he's not here, do you agree with that assessment? Do you disagree with that assessment? What are your thoughts on it? I'm just curious. Because it's always a balance. We only have so much staff time and, and resources, right? Travis, what do you - -

Travis: I agree with that, I mean, I, I think, you know, the, the biggest legacy that we're all leaving as prairie managers is our restoration projects and, you know, that's, that's great and all, but we're also leaving behind potential problems and issue for the next land manager if we're not doing the right, right steps in, in restoring these prairies, so I absolutely agree with that. I think if we, if we spend the time and the investment on the front end, it's going to pay dividends on the back end with, you know, potentially less management specifically on invasives issues, you know, a number of woody issues, things like that, you know, the more diverse, the more resilient our prairies are, I think the better for us as land managers and the less management actions we're going to have to potentially take, take or conduct on those sites.

Marissa: Yeah. So I guess we asked Angie what she thought what the most rewarding part of these collaboratives were. Travis, I'm curious what's been the most challenging part of working with the partnerships and the collaborative?

Travis: So, I mean, in the end, it's, it's the people, right? I, I love working with people, I love these, these, you know, partnerships, but the more people involved, the, the more, you know, perspectives, the more opinions, the more time timelines and the more things involved, right? So it's, it's just managing all of that. It just it takes more time and I wouldn't really call it a disadvantage, but it's just, it's just something that you have to keep in mind going into this. You know, if, if you're working with two offices, that's one thing. If you're working with six or eight offices, that's, that's another, and you have to understand that there's going to be more expectations and there's, there's more needs involved and so it's just, it's just an expectation as opposed to a disadvantage.

Megan: Yeah, partnership takes work. I mean, that, it's rewarding, but it takes work, it takes relationships always take work. I should say successful relationships take work. That's what we should say. Okay, so in the interest of time, I'm just going to rapid fire some questions at you guys. So in terms of seed consortiums, seed collaboratives, we're going to gather to get with the need for seed, how long have you been doing this? Travis, go.

Travis: Our program started in 2016.

Megan: Nice, look at that. Angie, go.

Angie: It's, it's been going on for quite some time now in the Glacial Lakes areas. I, I can't say exactly when the collaborative itself started, it was probably about five or six years ago, but it started at a small scale and it's been growing pretty rapidly throughout the years, and it's been a longtime effort from many folks across the landscape is what I can say.

Megan: You've just been leveling up through that longtime effort, I love it. Ben.

Ben: Well, I think our TNC office has had a dedicated seed collection crew since about 2015 or 2016, and I've been doing it for the past three years.

Marissa: Okay. We want to hear some stats and we're going to do a round robin. So how many species have you collected over the partnership? Angie?

Angie: It's been this past year, we have broken a new record. We have harvested over 240 species just in this past year.

Marissa: Wow, impressive.

Ben: I should point out that's, that's with the hand collection. So if there, there's probably species that we've gotten in the mechanical harvest that aren't in that 241 number either.

Marissa: Yeah. Conservative, conservative estimates. I like it. Travis?

Travis: For a mechanical harvest, I'd imagine somewhere in the name of probably 70 to 80 species on an annual basis. We're harvesting probably 35 to 45 species.

Marissa: Pretty good. Pounds of seed collected. How many pounds of seed do you collect generally on any year? So let's start with you, Travis.

Travis: I'm glad you asked this, Marissa. On an annual basis, I would say usually in that 15,000 to 20,000 pound range. Since inception, since 2016, we've harvested a little over 146,000 pounds.

Marissa: That is amazing. Didn't you tell me something?

Megan: It's extra amazing when you think about we measure forbs in ounces because they're so small and you're holy bananas, these are big numbers.

Marissa: Didn't you tell me something about stacking up those bags at some point?

Travis: Yeah, that's, that's a good point. I believe, I believe I used one of the largest buildings in the United States and I believe if we stacked up all of the seed in our 35-pound bags, it would be about eight times as tall as the tallest building in the United States.

Megan: And what is the tallest building in the United States?

Travis: I can't recollect.

Marissa: 1 World Trade Center maybe. I don't know anymore.

Travis: It may have been, yeah, it may have been.

Marissa: Yeah. Pounds of seed collected, Ben.

Ben: So this year we weren't nearly as much as Travis, but we still got nearly two tons of seed. It was over 3,700 pounds of seed with mechanical collection with the combines and seed strippers, and we had a nearly 350 pounds of seed collected by hand. And last year, it was about the same amount collected by hand, but not nearly as much with the mechanical harvesting last year. Also, the Lac qui Parle seed collaborative, they've collected quite a bit this year, too. Let me see if I can pull up that number. They had 1,800 pounds collected by combine and mechanical harvest as well this year.

Marissa: That is also amazing. But it also strikes that like that's maybe one of those differences, right? Like Angie and Ben, you are like blowing them out of the water on species, and Travis is blowing you out of the water on, on pounds, and so that's maybe highlights maybe that tradeoff that we've got, right? Between hand collection and focusing on diversity and amount of seed with combine harvest, so interesting. So now I want to get to cost per acre. I'm curious, Travis, you mentioned this earlier about one of the advantages being cost, and so I'm wondering if you have some estimates or numbers that you could share on what it's now costing you at this consortium to, to plant.

Travis: Yes. After the 2021 harvest, I, I ran some numbers and, and it looks like right now we're at $74.24 per acre for our restorations and, of course, that wouldn't include any partner seed costs to actually do the seeding itself but when you start looking at what an average restoration costs anywhere from $400 to $500 and if you, if you're looking at 100-plus, you know, species, you're, you're probably doubling that. So at, at that rate, we're, we're pretty fortunate to, to, you know, complete the type of restorations that we are.

Megan: Okay. I have a couple follow-up questions. So that $74 per acre, that's just seed is what it's not like the cost of site prep or the cost of management or anything, that's just your seed cost. Man, so here's another thing because people listening are going to ask this, they're going to say but what about calculating the cost that it took like how many hours it took to collect that seed. Because when you buy seed from a vendor, that's incorporated into that cost, and for a super diverse let's call it like a really nice Cadillac version of a prairie, we're talking anywhere upwards of $750 an acre per seed, and more commonly around $1,200 per acre per seed mix for a really nice, high-quality. I mean, that's kind of where we're at. Does that number, if you had to incorporate 'cause, I mean, I get it, you don't have to, there's no billable cost, right, out to a seed vendor, but what's the estimated hours, I guess, of staff time to collect the seed? Because that's part of the cost, too.

Travis: Right. We, we didn't, you know, we definitely didn't delve into that as, as deep. You know, if, if you want to start looking at, you know, what the costs were for the prescribed burn to, you know, prepare the site potentially for harvest, those, those are numbers that we would have to incorporate as well. We did incorporate staff time, whether it be the site assessment to look at these harvest sites, the, the back and forth meeting with contractors, we're hauling seed trailers back and forth to offices, the drying time, you know, electricity costs for drying that seed. So we've incorporated a lot of those numbers, but yes, staff time to a greater degree could be added to this to increase that cost. But I think we're, you know, conservatively, I, we'd still be under $100 an acre.

Megan: That's amazing.

Marissa: Yeah. Angie or Ben, do you guys have an estimate for, for your cost per acre on your landscape?

Ben: We actually haven't calculated that out like Travis has, so it's kind of hard to say, and because we spend so much time hand harvesting, I think the time factor would significantly increase the cost for us. But to put it in perspective, there's a lot of species that we're collecting many ounces of. And if you look in a catalog, and eighth ounce of seed for a lot of these species costs at least $10, if not 20 or more. And, you know, so that can add up when you add a lot of those ounces together.

Marissa: Yeah, and you guys are collecting as much as you do, it probably comes out in the end in your favor. Well, I guess the only other question I had on the rapid fire here would be acres harvested, and I don't know if you guys have estimates for that or not. Acres of, of seed that you harvest, especially the hand collected, that might be hard.

Ben: Yeah, for the hand harvesting, it's, it's impossible to say how many acres we harvest 'cause we, we collect from across the site, you know, so, you know, a 500-acre prairie, we could, that's a pretty big prairie for central Minnesota. But even a 40-acre prairie, we're collecting from, you know, across that whole 40 acres, but we're collecting only from little patches here and there across that, so when you're collecting from individual patches or individual plants, it's hard to guess the number of acres. As far as mechanical harvesting, we harvested on about 30 acres, 37 acres for the combine, and a little over 20 acres with the seed stripper.

Marissa: Travis, I imagine that equates somewhat with the poundage of, of seed that you all have, right?

Travis: Right, so we've, we've harvested mechanically 1,399 acres since 2016, and if you take that and, and look at, you know, your seed tests that are done for each individual seed mix, that equates to 5,825 acres that we can potentially restore with that seed, so, it's definitely scalable.

Marissa: Definitely scalable. When we think about how little we have left, that amount of acreage can make a big, a big difference in the landscape for sure.

Megan: A huge difference. At this point, people always ask me I don't know if you guys get this question, but I get this question a lot. How big does my prairie need to be to be helpful and useful? And my response is always however big you feel you can make it. Because at this point with the landscape that we're dealing with, every little bit helps. And arguably, the bigger you can make a prairie, the more connected it's going to be across landscape, the more species it can support certainly, that is certainly true, but at this point, weighing all those little pieces working together, so I, no prairie is too small in my opinion to be worthwhile in this fight that we're all in. Gosh, we've got to move on to our next section because we're just running out of time and I love seed, and I can talk about it all day 'cause it's just I think it's fascinating to me, I love, Angie, that you described it as sprinkles because for whatever reason, maybe it's the math that's involved, yes, I do like math where you have to figure all this stuff out, and how much are you going to plan to now you guys have the added thing of how much did we collect and where are we going to put all of that, as I'm designing these seed mixes and I'm thinking about where all these things are going to go, I'm imagining the prairie that is going to live on after me. And it makes it the most exciting part for me because in my mind, I'm just imagining what this is all going to look like and, of course, because it's nature, it never looks like what I planned in my mind, but it always is special regardless. It always turns out, and so it just I think it's a really magical part of restoration, so I applaud the work you're doing to try to make our prairies more diverse, our prairie reconstructions more diverse, I should say.

Marissa: Me too. I just want to add to that and say I am super grateful for the work that you all are doing and the partnerships that you all are putting into this because I think it has huge importance and impact in our prairies and our landscapes, so just huge props to you all and, and partners and, and thank you.

LET'S SCIENCE: To the Literature!

Science!

Megan: Okay, this is the part of the podcast where we recommend a book, a blog, or a paper, and Angie, we're going to start with you. What are your picks for the day?

Angie: Yeah, resource I would like to highlight would be a tool that can be used to determine which county's individual species are native to when we are doing reconstructions is, it is important to understand that's not all prairies contain the same species. Some species are more adapted to some regions of the country or even within the state than others. So some of the resources that I like to look at are the historic

range maps that can be found on plants.usda.gov or the minnesotawildflowers.info, which are both excellent websites, and they get a lot of their information as well from the Minnesota Bell Museum Herbarium records. But there you can find where these species historically had their ranges, where they historically were.

Megan: and I have to put in a plug for the DNR's MNTaxa, which also has range maps and that's where Minnesota Wildflowers pulls their range maps from, from MNTaxa, and we use the Flora of North America as our reference on that. So I just had to put in that plug there. See what I did there? Put in that plug for plants because it's a plug? Okay. Ben, go ahead.

Ben: Yeah, so kind of going off of what Angie said, knowing where to find species is also important. So I recommend the Flora of Minnesota, which also uses the Flora of North America as a source, and this volume is by Steven Chadde, and it's, it's, it's more than just a technical key, it's more than just a field guide. It's got maps of where each species can be found in the state of Minnesota, it's got drawings of what the species looks like, and most importantly, it's got habitat preference and the bloom season for each species. I'm talking about every species in Minnesota. So it's, it's really quite a detailed resource.

Megan: You know, build muscle as you're carrying it through the prairie. It's a big book. Travis.

Travis: Couple different resources that. One would be the USDA's web soil survey, that's really helpful when you're getting started in looking at a project site to really determine the different types of soils that you may be working with, and that in itself will help kind of direct you on what species potentially that you'll want to utilize in your seed mix and what kind of prairie that you potentially want to restore. And then the other resource is Chris Helzer's Prairie Ecologist Blog. That's been really beneficial to me reading his blogs over the years kind of looking at managing and, and restoration in a different way and kind of helps me think in a little bit different perspective. He's been very helpful and beneficial to me and my restoration work.

Megan: You had three articles in particular you wanted to call out for this.

Travis: Yeah, yeah. So three different blog posts that he had. One was from April of 2015, and that was a Visual Illustration of Plant Diversity Importance. Another is from June of 2020, and that was entitled Celebrating Color, Movement, and Noise in an Evolving Prairie. And the last blog post was from March of 2021, and that was entitled Seed Sourcing Strategies for a Changing Climate. Each one of these looks at restoration and, and prairie diversity in a little bit different, and I think anybody that reads the post can gain something.

Megan: I like it, and there's also some, Ben, I apologize, there's one more that you had too, which was the Tallgrass Prairie Center, which is based out of the University of Northern Iowa, and they've got a whole bunch of guidebooks, tools, tips, factsheets. They've even got a, oh, what is it called? It's a seed phenology, like when a seed ready to be harvested or when are things flowering chart. Of course, it's for Iowa, so you have

to extrapolate a little bit, especially as you move north in Minnesota, but really good references on that website also.

Ben: Yeah. When I was first starting out with prairie reconstructions and collecting seed, I studied a lot of those resources, they were very helpful.

Marissa: Hey Megan.

Megan: Yeah Marissa?

Marissa: I think we should go on a lovely stroll and hike across the prairie.

Megan: I love how you say this. See, Mike, I just, Mike always says it like why don't you take a hike, and you just say it so nice, like we're all going to hike together. Partnership, and what, I mean - -

Marissa: Why not?

Megan: - - I love it 'cause this is a whole episode about partnerships and seed collaboratives. So we're hiking together, we let Angie, Ben, and Travis pick, they're going to tell you all about them. Ben, let's start with you.

Ben: Yeah, we got a highlight, The Nature Conservancy preserves 'cause we work for The Nature Conservancy. So the Ordway Glacial Lakes landscape north of Sunburg, Minnesota has got a really great cluster of prairies, and the furthest west of those is Sheepberry Fen Preserve. And I think right now that's my favorite preserve in that area. It changes every year and every season, but at Sheepberry Fen, you go hike a half mile out from the gravel road, it's a little bit off the beaten path, but you get out there and you're in these rolling hills and you have a great view of the surrounding landscape, and that's as close as I've come to imagining what the landscape looked like 150 years ago. There's a lot of great prairies there, too. But if you really want high diversity, you got to check out Ordway Prairie, which is just two miles east of there on Highway 104. And I think there's definitely over 300 species there, if not more than that because there's, there's forests, there's wetlands, there's prairies, mesic and dry prairies, it's a great site, highly diverse.

Megan: I love the word mosaic. It's a whole mosaic of different habitat types. That's my million dollar word for the day. Angie, where are we hiking?

Angie: Yeah. I would like to highlight another one of TNC's preserves, this one is also located close to the Sheepberry Fen and Ordway units that Ben highlighted. Lake Johanna Esker is a beautiful preserve that is located at the heart of the Glacial Lakes Prairie Core area. And it has a large variety of great habitats to explore. It does contain a very prominent remnant of the glacial era known as a glacial esker. Eskers are a ridge of sand and gravel that are, that are basically deposited by meltwater streams flowing from within the retreating glaciers. When you climb on top of this large serpentine esker ridge, you will be rewarded with a commanding view of a mosaic of prairie oaks and wetlands and component this ancient landscape.

Megan: We didn't even plan that and we both said mosaic. We also learned about eskers. Great job.

Marissa: I also, I have to give a plug there because I think Lake Johanna is especially beautiful in the fall. I like prairies in the fall in general but I think Lake Johanna is particularly beautiful in the fall.

Megan: I really like it. Travis. Where are we hiking with you?

Travis: So I've got a couple different destinations. One is Frenchman's Bluff SNA. This is a scientific and natural area located in southeastern Norman County. This is a little gem of a dry hill prairie. You know, it's hard to find topography in northwestern Minnesota, and if you want to find a nice steep hill and gain a nice vista, this is one you need to stop at. It's got some high-quality dry native plant communities and like I said, the topography found here is one of the highest points in Norman County and it's definitely worth the stop. Another one would be our TNC's Blazing Star Prairie Complex. And not only TNC but some of the other partners in this complex that, that have some very high-quality prairies include the Minnesota DNR and US Fish and Wildlife Service. This complex is west of Ulen, Minnesota about seven miles, right along Highway 34 and, and within this complex, you can find some very nice remnants of dry prairie to mesic prairie, and even wet prairie on, on the Flicker Tail Prairie WPA just east of, of the majority of the complex. The nice, the nice part about this complex is that it has some very good examples of some of the beach-rich prairies that you would find on the easternmost edge of Glacial Lake Agassiz.

Megan: Really, really nice. I like hiking all these places. And I should mention that normally we, we will post all of these on our website, and normally you can just go to the Minnesota DNR recreation compass, type that into your Google machine, and you can find all of these sites. The Nature Conservancy preserves are not listed in the DNR's recreation compass because they are not classified as public lands, but they are publicly accessible to you and yours, and The Nature Conservancy does a great job of putting maps and resources on their website, and we will link to all of that so that we can make sure you, you get to these great hiking locations. I can't believe that we're already at the end of another episode. I have so many more questions I want to ask. We did have, we could do this in like three parts, Marissa, because I want to know even more about the need for seed.

Marissa: I know, the need for seed. There's so much, and there's so many questions we didn't get to, but we learned a lot.

Megan: We did learn a lot. And so next week, we're going to keep that learning train just woo, woo through the prairie. We have discovered a fungus among us. We talk about diversity, we talked about diversity today, we always talk about it above, well, I shouldn't say we always talk about it. We talk about it typically above ground in prairie ecosystems. Next week, we're going underground to uncover the role of arbuscular mycorrhizal fungi, or fungi, depending on who you are. If that is too much of a mouthful, you can just call them AMF, and so we're going to look at those fungus and figure out what they're doing to make our prairie restorations, prairie reconstructions successful. We're going to be joined by Dr. Diane Larsen, who's a research biologist with USGS and Dr. Laura Aldridge-Wolff, who's an associate professor at the Department of Biological Sciences at North Dakota State University, and they are going to share their work with this fascinating fungus. You all know I like good alliteration. As always, you

can find all of the links that we talked about today in the podcast on our website at mndnr.gov/prairiepod. This episode was produced by the Minnesota Department of Natural Resources Southern Region under the Minnesota Prairie Conservation Partnership. It was edited by the magnificent Dan Ruiter and engineered by the fabulous Jed Becher. Should we all sign off and just be like need for seed?

Marissa: You need a countdown.

Megan: 3 2 1. Need for seed.

Everyone: Need for seed.

Megan: That was beautiful. (Laughs)

((sounds of birds chirping and wind blowing))