



## Prairie Pod Transcript

Season 4, Episode 35: The Legacy of Restoration in Minnesota: common mistakes and lessons learned

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Guest(s): Gina Quiram (DNR) and Sue Galatowitsch (University of MN)

Podcast audio can be found online at [mndnr.gov/prairiepod](http://mndnr.gov/prairiepod)

### Transcript:

((sounds of birds chirping and wind blowing))

Megan: Hey welcome back to the Prairie Pod. Happy prairie Tuesday, everybody. Mike?

Mike: Happy prairie Tuesday, everybody. It is Tuesday? I lose track of time.

Megan: (Laughing) It's easy to lose track of time when you're on a prairie exploring, Mike.

Mike: Only when you love your job.

Megan: Or when you don't have a watch.

Mike: Yeah, you just, everyday is great, you know.

Megan: It is great. You know, I like most of my job. I'll say that. I like a lot of it. I guess I can say yeah, I like a lot of it but I mostly like when I'm outside. There are parts of it that are really hard.

Mike: Not talking to me over the computer that's not one of the highlights? It's okay.

Megan: I mean I think I'm gonna, I'm gonna plead the fifth.

Mike: Fair enough. (Laughing.)

Megan: (Laughing.)

Mike: But you know what, I'm, I'm so pumped about today's episode. I know it's a big focus of the pod and you like have been purposely keeping me in the dark on this subject. You don't want me to know.

Megan: Oh I have been purposely keeping you in the dark? Mike, you can, you can - -

Mike: It's like a big focus of the podcast and you guys - -

Megan: - - you can lead a horse to water.

Mike: (Laughing.) Okay. Anyway, I am, I am pumped and glad you're letting me in your secrets finally. On this particular subject.

Megan: (Laughing) What Mike is talking about is that today's episode is all about the legacy of restoration in Minnesota. We're going to talk about common mistakes, lessoned learned, less, lessons, lessons learned.

Mike: Plural, there you go.

Megan: Yeah, it's hard to speak sometimes, it is hard. So we have two very special guests with us today who have been actively working to evaluate reconstructions, which Mike talks about monitoring all the time and I talk about the importance of writing down what you do so that somebody later can actually know hey, this prairie looks great, what did you do? Uh we need to be able to answer that question so that we have a better understanding of what works and what doesn't, especially when we're talking about such a complex ecological system. We're never going to know it all, the prairie has mysteries. I wanted something that rhymed with mysteries but mysteries abound, but I wanted like mysteries miracles, mir, mir. (Laughing.)

Mike: You are a poet, Megan.

Megan: I wanted another M word is what I'm saying but fine. There's just mysteries unsolved. There you go. I'm pretty sure that's the show.

Mike: Anyway, you're going to be hearing lots of very basic questions out of me, so I hope you guys are prepared for that.

Megan: Well let's introduce our guests. You know, we should do that. Oh, also key tagline for everybody listening. Don't be afraid to try new things. We learn from failure. That is part of the goal. If you try something and it doesn't work out how you thought it would, guess what? We change, we adapt, we've been talking about this all season. Life is an exercise in adaptation and change and the very prairie landscape that we so love itself has to be allowed to go through change. We cannot control everything. So with that, I'm going to get off of my soapbox and actually I'm going to stay on it 'cause that's what this podcast, you know, we got to talk prairie and that's the soapbox. Anyway, so I'm going to introduce Gina, we're going to start with you.

Gina: Hi. I'm Gina Quiram and I work for the Minnesota Department of Natural Resources with the Legacy Fund Restoration Evaluation Program.

Megan: Nice. And last but certainly not least, our very special guest who has a world of information to share with us, Sue, would you like to introduce yourself?

Sue: Hi, I'm Sue Galatowitsch. I am on the faculty of the University of Minnesota in the Department of Fisheries, Wildlife, and Conservation Biology.

Megan: Nice. And we are so honored to have you both here with us today.

Mike: Welcome.

Megan: Yeah, welcome to the pod.

Mike: We've already determined that I had Sue in our landscape ecology class 22 years ago, so sorry, she was-- yeah.

Megan: What I want to know is - -

Sue: So we go way back.

Megan: You know, what was his grade? That's what I want to know. Did he, was he like a passing D or like more like an A? (Laughter)

Mike: Just say at least I'm hoping she doesn't remember, so.

Sue: I think your general counsel prevents from answering that question.

Mike: There you go, good answer. Good answer, Sue.

Megan: Nicely done. Well played. So we're going to start out just getting a little bit of a sense of you, who you are, and the work that you've done through your life and we will, we're going to start with you, Sue. I keep wanting to call you Dr. Sue because it just feels so right. I was raised in the South, so it feels strange not to call you Dr. Sue, but I'm going to do my best to just address you as Sue. So describe your role and prairie conservation and talk to us a little bit about kind of the journey through it, you know, how did you get into this field, your mentors, your family members, anything funny about what shaped you and why, what led you to this, you know, career of science and restoration.

Sue: Well, you know, it was really kind of an accident that I think I ended up in restoration. I grew up in Northern Illinois in the vicinity of some really great prairies, and as a child, I had absolutely no awareness of them. I was really aware of how polluted everything was around me and I was mostly really investigated in trying to get out of Illinois and had someplace that I perceived was way more wonderful, which I decided was Minnesota, and that's where I ended up going to college and I landed in Winona. And so my awareness of prairies, you know, and really much ecological at all really didn't get started until I was in college. And I went to St. Mary's in Winona, which is nestled at the bluffs of the Mississippi River and I spent a lot of time hiking around on goat prairies and found those pretty fascinating, and that sort of wandering around goat prairies on my eventually developed over time in something a little bit more, and then I landed a Nature Conservancy internship shortly after I was done with my bachelor's degree and I was based at Weaver Dunes right after the Nature Conservancy purchased that property. That's a sand prairie along the Mississippi River. And I was hooked then. I was just excited about prairies and really not too, you know, too tracked into restoration at that point. I did my master's research there on vegetation and land use and got to know some of the families who had farmed that area for many years, and

so that was really, really interesting. After I finished my master's I moved to Colorado and I worked for the Nature Conservancy there as well as Colorado Department of Natural Resources in their Natural Areas Program. And through that, I was involved in a lot of grassland surveys and trying to establish protection agreements for many different kinds of grasslands, short grass prairie, mixed grass prairie, Great Basin and mountain grasslands as well as these kind of interesting tallgrass prairies that are kind of right up against the mountain front on the front range. And that's really where I got involved in restoration because one of the things that we needed to do was figure out how to, you know, replace ecosystems that were being lost to, you know, any number of things, mines and ski areas and all kinds of things. It became really clear to me then that really nobody knew really much of what was, how to do restoration for various kinds of ecosystems. But what I did know is that really the kind of the epicenter of the world through restoration was in the Midwest, and so I decided to head back to the Midwest for my PhD to Iowa State because I figured that in Iowa, there was really not much left there, so then that's probably a good place to work on restoration. And so I did my PhD work on prairie pothole restoration. And then after that onward back to Minnesota where I joined the faculty and I've been focused on ecological restoration both as a research, you know, kind of enterprise as well as working with lots of professionals and trying to figure out how to advance practice. And that's really kind of the long and short of it. I guess I was always attracted to I guess fixing of degraded places after my, you know, kind of childhood in, in northern Illinois and locations that really definitely needed some help, so fixing ecosystems up I guess would have some deep roots for me.

Megan: Oh, very nicely done. Would have some deep roots. Way to go. That was not lost on me. Fixing ecosystems up I think is something that I find also very attractive, so hello kindred spirit. I just really, really enjoy that too. Gina, we're going to pass the baton here, the virtual baton to you to give us a little bit of a sense of you and how you came here also.

Gina: Thank you. So I, my journey started in Minnesota where it is currently continuing. I grew up near Mankato, Minnesota and spent a lot of time outside and I think, you know, from a really young age, I was attracted to this idea of fixing up outdoor spaces. I would drag my poor dad down the river collecting garbage literally until the canoe was full, and then we would take it home and they'd have to figure out what to do with it. But it's, you know, from a really early age, I was interested in this idea of the fact that humans are interacting with these landscapes and changing them and that there are definitely some things we're doing that are maybe not the best, and we could spend some time and energy figuring out how to make them healthier, so that was an interest going into college and I did a lot of volunteer work around restorations, you know, pulled my fair share of buckthorn and cut and burned it and got my hands dirt in that way. And then after college, I ran a restoration program in Tacoma, Washington for a year and it was a super fun challenge but I realized I spent almost all of my time trying to manage invasive species with really ineffective tools. We were just doing the same thing over and over and they were coming back, and I just kept thinking there has to be a better way. So I went back to grad school and got my PhD at the University of Minnesota starting purple loosestrife and purple loosestrife control methods and kind of the short-term and long-term ways we can make those more effective. So that was a really, that

was an awesome experience. I learned a lot about the intersection of academic research and agency work and kind of on the ground nonprofit work because I partnered the DNR and some local nonprofits to think about the questions they had around invasive species management. And so when the opportunity came up to come back to the DNR and work on the Legacy Fund Restoration Evaluation Program and really start gathering those stories of what's working and how do we do the best for our landscapes in Minnesota, I couldn't say no, so here I am.

Mike: Cool. Thank you, Gina. Yeah Sue, I think let's start off with picking your brain if that's okay and hearing about some of your vast experience and knowledge with prairies. Can you just tell us a little bit about what you see as the history of prairie restoration, especially for people like me that are largely ignorant of the subject? Since as I said earlier, Megan's been keeping me in the dark on purpose about this. But yeah, just the history of prairie restoration in Minnesota and how it's changed over time in your career.

Gina: Yeah, you know, it's really kind of amazing no matter where you go in the world, people know about restoration, you know, the initiatives, the fact that we've here in this part of the world have really been the sort of pioneers of restoration and when people hear that I'm from Minnesota, like they know this is where, you know, where we have lots of people who have, you know, experience working on seeding. They know this is where Truax drills that were, you know, developed first off. And so while the legacy certainly at the Wisconsin Arboretum and, you know, Aldo Leopold is huge in terms of starting restoration in the '30s, you know, really where I think the story becomes very Minnesota focused is really probably in the late '70s where you've got, you know, Ron Bowen starting prairie restoration as a, you know, a small company but at that point very unique in terms of a seed vendor, you know, and seed installer and then John Truax developing a drill and they were testing these things out at what is now the really big Crow-Hassan prairie, the northwest side of the Metro here in the Twin Cities. And so at that point, you know, if you think late '70s early '80s, what you've got are some of the early kinds of restorations that were coming out of Wisconsin, really small scale hand seeding, hand collecting of seed, and hand distributing seed, you know, really postage stamp sized restorations and then a scaling up, you know, once we had things like seed drills designed for prairies and more seed available, people were able to do, you know, 10, 20, 30, you know, even a half section or so. And so, you know, you see 30 years ago a restoration that was a couple hundred acres, it's a really big deal and that was really kind of a cutting edge scale, so when I think of the main change across my 30 years or so, I would say the size of what we do is now more routinely large. And so while people certainly do lots of small prairies, you know, behind schools or in neighborhoods or, you know, wherever it makes sense, it's now not such a big deal to have prairie restorations that are a few hundred acres. That's pretty routine. You know, the big deal now are, you know, more than 10,000 acres, those are the ones that are really people are really kind of awestruck at the places like Glacial Ridge and other places. And so the scale of what we do is larger. And that's possible because the network, our network of seed vendors and installers is better developed, you know, our basically plants trade in native plants is just so much more developed. We have more and better equipment of all kinds, including those seed drills that were pioneered in

Minnesota now take various forms. We have more people who know how to restore prairies. You know, we've got, you know, people who spent decades in the trade but also just many, many people who, you know, come up, you know, through consulting firms and services and nurseries and so forth, there's, you know, we have both, you know, professional capacity that just is way more than it used to be and we really have what I would say is a bona fide restoration economy in state. You know, people who are providing services and products that really drive this whole thing. And I think over that same market time, that restoration economy has been primed by a couple of things. You know, the legislation, the policy that created the environmental trust fund as well, you know, as they'll just, excuse me, The Legislative and Citizens Commission On Minnesota Resources, which has funded hundreds and hundreds of restorations in the past, you know, 30 years and now more recently the Legacy Act, which I'm sure Gina will talk about more since she's working specifically on that, and other habitat restoration initiatives at the federal and local level as well as the private sector. So we have, you know, really a restoration economy and networking here that is really kind of unparalleled and I think gives rise to all the different work that's going on. And then also gives rise to a greater variety of restorations that are happening now that happened, you know, a few decades ago, different kinds of ecosystems and attempts to restore places that are in really bad shape and need a lot of work. Typically or especially areas that we lost to invasive species attention or even the removal of contamination in say urban areas or modification of landform. You know, nobody monkeyed much around with that successfully, you know, 25-30 years ago. And that's also a function of having much greater professional capacity to do restoration in the Minnesota.

Megan: I love that overview. It was so good, like it was comprehensive, it hit all the main points, you talked about restoration economy, which is something that we just sort of take for granted and we don't really ever explain the evolution of that, and I got to tell you as you were talking, something that kind of was noodling around in my little brain here or my big brain, depending on the day, when you're talking about John Truax, so funny story for you, this restoration community, I'm always struck by how connected we are as we should be because if we're going to connect a prairie landscape, we've got to take connect with each other, see what I did there? We really do. But John Truax on my very first restoration project at Purdue University during my grad research came down and we were testing the new model of Truax drills at that time. That made me think of how small this restoration community actually is, that as you're talking about those drills being made in Minnesota, obviously I'm in West Lafayette, Indiana at Purdue and we're also demoing the same Truax drill there because we are facing the same tallgrass prairie restoration challenges, how do we do that, how do we build it back? So I just thought that was neat. Okay so Sue, you literally wrote the book multiple books on restoration, and so we have much that we can learn from you and so I just kind of want you to walk us through like what do you think are the most important things we should know when approaching a prairie restoration.

Sue: Well, you know, there's certainly lots of things but I'll highlight three. And some of this actually comes from evaluating the LCCMR restoration projects. And so first of all, I would say projects that don't start well don't just necessarily get better over time. And so when practitioners say well, you know, over time it'll probably be okay and nature will fix

this, maybe not. Sometimes you get lucky and sometimes you won't but it's really important to take site preparation and those first steps seriously because, you know, really many sites are degraded enough that invasive species will take hold and if you don't have good colonization and establishment of the things that you spent money putting on the ground, it's not like anything is going to make that better over time. So projects that don't start well, don't plan on them necessarily getting better just because time has passed. The second thing is, is ecosystem recovery takes time and it's not dictated by the length of your grant. Grants are typically two to three years if you've got some funding and the recovery of prairies and wetlands in Minnesota is, you know, at least a 10-year process and certainly for forests, it's much longer, and for things like peatlands, it's much longer than that even. So ecosystem recovery takes time and what that means is that there needs to be some management stewardship through that process of recovery before that ecosystem that prairie or that wetland has the capacity to have enough functioning to be able to more or less take care of him, you know, regeneration, you know, establishment of future generations of species, and so you don't need to be there with the same intensity as in the first few years but wandering off when the grant ends is usually a recipe for things really not to go fully to recovery. And then thirdly, sites that are more degraded at the start of a restoration or are within highly degraded landscapes require a great commitment of time and resources to achieve the desired ecosystem recovery. So you'll hear magical stories where people will have done a project and will come back easily, and it's not necessarily because they're also awesome, it might be because they had a giant, wonderful prairie right next to them or were not on a site that was particularly all that heavily degraded. But if we really got to really evaluate just, you know, what those starting conditions are and be honest about whether you've got the time and resources to take it on if it's a particularly challenging project. So I would say those three I think were would be at the top of my list in terms of the important things to know.

Megan: Those are perfect. Mike gets tired of me saying this but I always say that prairie seeds aren't magic beans and we need to stop treating them like they are. If you don't make the investment in the land, if there's been destruction to the soils or something else, we've got to build that back up and not expect the prairie oh, it's native, it'll figure it out. No.

Sue: Yeah, you know, and the more we know about degraded sites, the more we understand that there are things like mycorrhizal associations that really are not functioning at the beginning, and because of that, those sites are really going to favor invasive species for longer than we really want them to, and so during that time and while those sort of, you know, relationships between microbes and, you know, and vascular plants are getting going again, there's going to need to be a continued investment in management until we have, you know, situations that are going to require less of us.

Mike: Megan, I don't get tired of your magic beans analogy. It is wonderful.

Megan: You're welcome.

Mike: Anyway, so just a larger question for you, Sue. The, you know, I hear from Megan all the time, I hear this from others too that when it comes to all of our prairie

management approaches or techniques in the state, because we have less than 2% of our prairie left at this point, that reconstructions really are something that we have to emphasize and it's, you know, we've got other enhancement techniques for our existing prairies, which are certainly very important. Reconstructions are going to be key for us if we really want to restore some of the functions that prairie is important for, including like wildlife habitat, which is my bias as a wildlife biologist. But can you talk more about what, about a larger scale approach, what we need to do as a state to move the needle on prairie conservation here? If it's more prairie restorations, where we should be doing them, what kinds of places we should be doing them, for example, any of those kinds of tips.

Sue: Well I think, you know, I think the Minnesota Prairie Plan is just such a great blueprint for rallying around and really thinking strategically about where those investments ought to be, and what's really great about the Prairie Plan is there's sort of places across our entire sort of, you know, historic prairie region to make headway. You know, threshold landscapes in Southern Minnesota, there's landscapes in Northwestern Minnesota, and so no matter where you are, you know, in the prairie landscape, there's a place not too far from you where you could, you know, really be part of really, you know, implementing that prairie plan. And I guess I wish I would see more that's, you know, kind of being trumpeted to the public and more, you know, more intentional, you know, sort of an outwards base on that prairie plan to the public. I think one thing that I love about the Prairie Plan, it makes a lot of sense from an efficiency standpoint is there's an attention to the fact that we do have remnant prairies and so building off of those remnant prairies because they do offer something to any of our prairie reconstructions, they offer seeds, they offer, you know, reservoirs of prairie specialist species that will easily be able to move into those new reconstructions, so being able to expand off of our existing reserves and make those larger and really kind of build from those I think is a real win-win from a standpoint of both the base recovery of the vegetation as well as offering, you know, something really important to prairie specialists wildlife species. And so, you know, and in climate change I think as we go forward and climate change, I think the, if we can do more reconstructions in the vicinity of our native prairies, we'll be doing a good job buffering them from some of the, you know, stresses of climate change and so, you know, I would like to see more of our, you know, our natural areas and preserves that are prairie, you know, have, you know, prairie reconstructions buffers around them and make them more resilient too, so I think it's a win-win.

Mike: Those are excellent points. Megan and I are so happy that you mentioned the Prairie Plan because it's central to our work and I think it's a really good point I think that we don't think about enough that it ought to be more accessible and more advertised to the public. I mean, we work at prairie outreach, this is what we're doing now is an example of it. The Prairie Plan itself.

Megan: Underneath the Minnesota Prairie Conservation Plan. Yeah, so this podcast was born from the Prairie Plan, it's its baby, and so it is part of that effort to make more known all of the energy that's happening around prairie in general like both as a landscape, as an individual site, and as something that has lost so much, and so in order to hit that ecological function point, we are going to have to invest in



reconstructions and building back, and what I took from what you said, Sue, was connectivity is very, very important.

Sue: Yeah. Connectivity in a landscape that's as fragmented as our prairie landscape is really crucial for just a whole lot of reasons, you know. For animal movements certainly but even things like being able to get, you know, those micronizing to be able to blow into the, you know, the new prairie reconstructions. We certainly don't know how to, you know, build all that back one piece at a time, so I think that's critical. You know, I really hope that there can be more of a visibility to, you know, the prairie plan and progress towards achieving it. I think that would be, you know, a great thing. Like right now, I don't know, we just finished the Minnesota's Natural Heritage book and I really didn't find it easy to be able to figure out do we have more reconstructed prairie right now in the State of Minnesota than we have native prairie? You know, a simple fact like that or what's the total acreage of reconstructed prairie versus what's in the Prairie Plan? Like are we 25% of the way there? Some real simple to grasp metrics that would, you know, just make it more of a statewide point of pride to be accomplishing that plan.

Megan: Absolutely. And I'm chuckling, I'm not laughing at you, I'm laughing with you as I'm chuckling because those very things are the things that we've been grappling with how we do when all of our prairie work that we do truly is a partnership. But because it's a partnership, it creates some unique challenges, you know, the DNR for example might track those acres while US Fish & Wildlife Service might track them in a different system, and then there's SWCDs doing this work and there's landowners doing this work and how do you funnel all that information into one central place so that we're really getting accurate records, and so that, that is something and much of my Mike's work in evaluating the success of the Prairie Plan, he has a couple pilot projects he's done funnel into it, but you're right, we need to do a better job of telling the story of all the work that we're doing collectively in the landscape. I'm going to shift us here to Gina. Gina, talk us through the restoration evaluation program, what is it, and how does it work, you know, how many restorations do you evaluate, you jokingly earlier said we're a two-person program, we just picked up the second person a few years ago, so we doubled in size, congratulations, good job, tell us a little bit about how it all works and what the goals are.

Gina: Yeah, absolutely. So this is a program that has come out of the Legacy Fund in Minnesota, so backing up just a little in 2008, Minnesotans voted to increase their own sales tax during a recession and to earmark that money specifically for preserving Minnesota's legacy, and a huge part of that was our natural resource legacy and improving water quality, doing restorations, and hundreds of millions of dollars have gone into restorations out of these legacy funds. In 2012, a group of lawmakers got together and said, you know, this is great, there's a lot of work happening, we can, we know how many acres are being restored, but we want to make sure that the projects being done are using the best available science and having the best outcomes for Minnesotans. So it's not enough to be doing the work. We want to be doing it well and we want to be making an impact for the people who are paying for this stuff, so the, there was a new part written into the Legacy law and the Minnesota Department of Natural Resources and Board of Water and Soil Resources were tasked with evaluating these restorations, making sure that people are meeting their goals, using good

science, identifying any problems people are having, and thinking about how to improve as we continue to spend all this money on restorations in this state. So the agencies, DNR and BWSR have two staff who go out to these sites with third party experts and see what's happened. We talk to project managers, we gather the story, we look at, you know, what seed mixes were used, what site prep was used, we get into a lot of the details and then take that information for individual projects back to our restoration evaluation panel, which is a group of six people who are experts in restorations in Minnesota, either because they've been doing them or researching them for decades. And I'm going to plug Sue here because she's actually been involved with this program from the very beginning. She is one of our panel members. So she has in her capacity as a panel member looked at 200 different evaluations since 2012. So, and they're not all prairie, there's a lot of non-prairie work happening in Minnesota but a lot of them have been prairie because early on especially, you know, I think people were capitalizing on things like the Prairie Plan, this structure that was in place and this restoration economy Sue was talking about that was building and really plugging in to use these dollars. So we've looked at 200 but we look at about 40 a year, which is a lot of restorations, but to give you a sense there's been about 6,000 different projects completed since 2012, so we're really still looking at a pretty small slice of them, but there have been some recommendations that have come out, some really good stories, and a lot of lessons learned over the past - -

Megan: We're going to ask you about all of those lessons learned. But first, I have a question really quickly. I know you referenced the cost a little bit, like how much money you were spending on these reconstructions and I just want to make a point because this is something I get asked all the time, people come to me and they say I want you to make me the best prairie ever. I want you to give me the best seed mix, it's going to be a pollinator palooza out there, it's going to be magic, and my first question is okay, what's your budget? And they usually say \$200 an acre, and I go it's not going to be a pollinator palooza. We're going to need to adjust like the point I want to make is that building something back that was built perfectly the first time costs money. There is an ecological and an economic cost to building prairie back, and there's also a benefit to doing that, that is offset by that cost, but it's way easier to just have the remnant first and not destroy it than to have to go back and try to rebuild it back, and because we're relying on 2% of an ecosystem to supply seed for everything that we're building back, and for many, many, many other reasons, but those are just a few quick ones. Okay Gina, tell us about some of those lessons learned.

Gina: Yeah, for sure. So one of the things that was emphasized really early on and continues to be a huge message from the program is we can't learn from what we're doing if we don't know what we did. We have to document what's been happening and no one wants to talk about more documentation, right? Like no one who maybe there's a couple people out there, I just haven't met them, but like no one goes back to the office and they're like man, I wish I had another five forms to fill out tonight. But if we go out to a prairie and we know it used to be, you know, real crop agriculture and it is pollinator palooza, that's awesome, but we don't know how to get more of that on the landscape if we don't know how someone did it. So, you know, that's really one of the lessons is the value of that documentation and we've seen examples where people are

getting dividends back on their own documentation, they're getting additional funding because they're able to tell their story so well, so you know, it's beneficial for learning lessons, it's beneficial for the programs, and it's the way that we're going to learn from each other, especially I'm going to go on one of my soapboxes about climate change. People are trying lots of stuff right now, people are desperate for guidance about how to build climate-resilient ecosystems and there's a lot of ideas and people are trying a variety of different things, but unfortunately, there's not super clear science to guide some of these decisions about exactly where seeds should be sourced from, should we get them from further away, should we be increasing, you know, the range at which we look at where to get seeds. There is some good guidance and information out there but the best way we're going to learn is by practitioners documenting what they're doing, why they did it, and how it worked, so we can keep doing the stuff that's working and not keep repeating stuff that's not. So documentation is just such an important piece of this and I think I'm going to pause there 'cause I feel like I just gave three lessons under the heading of documentation.

Megan: I feel like they were great lessons. Mike would call them adaptive like we talked about this in an earlier episode of this season, the how not the cow, but where we talked about the importance of being able to adapt and what you're talking about with climate change is we have more questions than we have answers, which is true with much of our prairie work, we know a lot more than we did but we're going to have to keep learning to get better at it, hopefully the learning will never stop as we get better at it, but we're going to have to be adaptive and be flexible to change, especially changes that are somewhat out of our control like climate change.

Mike: Gina, the things you said about tracking, about being able to talk about, you know, when we look at something and find a success or a failure and having some knowledge about how we got there, that was wonderful, and you did an excellent job of communicating that, you should do that full time just communicating that message, we're being slightly facetious. Yeah, as far as specifics on what we're doing well and what we aren't, you know, Megan talks a lot about diversity and the importance of diversity in our restorations. I know something that's both you and Sue perhaps can comment on this. Are we, not say we, I mean, as a state all the prairie practitioners in the state, are we doing a better job of planting diverse prairies? Is it enough? Those kinds of questions. Can you answer any of those?

Gina: Oh, I'm not going to go down the road of is it enough because I want to say it's never enough but that's not probably the best answer. You know, I think what we've seen that there is more of an emphasis on diversity. When we look at project goals for projects that we're evaluating, we're seeing diversity, species diversity and things about pollinators and the diverse, you know, plants they need for their whole life cycle, not just a food source, and that is something that definitely has been more common in legacy funded restorations. And you know, as we talk to practitioners who have been doing this for decades and get their stories about what they've changed, a lot of the focus for prairie restoration has been on kind of moving away from this idea of a wall of grass as the prairie restoration and, you know, we'll have practitioners take us to a restoration they've done and they're super excited about it and then they'll say, you know, do you have 10 minutes? Let's go down the road and they'll take us to a wall of Indiangrass

and big bluestem, and it's a huge challenge because it's so densely populated by these really strong species that they're struggling to get some of that diversity back into there. So I would say there has been a change. Sue, do you think that's a fair assessment?

Sue: Yeah, you know, I think some of the issues with the grass dominated, you know, really came up during the mid to late '80s during the Conservation Reserve program because it was going in so fast and it was going in, you know, at a really sort of low rate of funding, so you have these big switchgrass fields. I think that one thing that's, you know, we have state standard mixes and they are really much better than a lot of other options, you know, that people might just try to kind of do on their own, and those in some ways have been key to improving the quality of prairie restoration. One interesting aspect, though, is that if everybody were to follow those state standard mixes, that would create more uniformity in your prairie conservation than would have existed historically, and that's not the intention of those state standard mixes by any stretch, but I think it's really important for there to be different kinds of goals in prairie restoration, so people will begin with those state standard mixes but then say yeah, we want this to be a pollinator palooza and that means we're going to throw in a few more pounds per acre of forbs and we're going to, you know, maybe intercede some of our older restorations. And so I think being mindful of a good base quality like you get with state standard mixes but then also really thinking about opportunities to have really interesting goals when you do restoration, prairie restoration, and then tuning, you know, your seed mixes to that and, you know, trying new things as you guys have emphasized and keeping track of what you're doing, I think it's worth it to be wanting to strive more for more, you know, more diversity in our prairie restorations, not 'cause we're doing something bad, but because prairies are so amazing, they were very diverse, and that's where we're at in sort of the state of the practice right now. We can go there now, you know, we're good at what we're doing, let's, that would be one arena to do it even better.

Mike: Gotcha.

Megan: Absolutely. And other states are doing it differently, like I talked to some, Gina and I did a field day together two years ago and the folks from Iowa came up because we were right on the Minnesota border and they said something in our small group where they were like well yeah, well we just plant like 150 species mixes, you know, most of the time when we're seeding our sites and everybody from Minnesota was like what? Like because it was just an incredible amount of diversity that they're able to get into their systems, which then led to this really rich I would say diverse conversation about, you know, how do you do that, what are you doing, Iowa, let's learn from each other. We're going to have Chris Helzer on later in this season in some of our prep conversations we've had with him, he's talking about seeding 200 species each time and it's all about how we prioritize our resources and our time to get to those points so that we can build that diversity in, and it is complicated and it's going to involve stretching our brain, so I like what you said there. Okay, we've got - -

Sue: Can I do one more point on that? You know, like I said though it's not kind of how many species you seed, it's how many make it.

Megan: Oh yes.

Sue: And because it can be a really expensive thing to put down a lot of seed and if you're not managing it or there's, it's so rare and there's so few of them, that might not happen. You know, they might not establish, and so there has to be a bit of a balance there on spending all that money on those forbs but then also paying attention to which ones actually can establish at the beginning point of a restoration. I don't think we know as much as we need to about that.

Megan: Yeah, absolutely. And that's another thing we'll get into later with later in the season with Chris Helzer because he told me that was his second point. He was like not only am I planting 200 species but they are making it through time and that's when I then was like okay, now we got to chat, it's going to be longer than the 45 minutes, we got a lot of questions. How are you doing that? Because you're absolutely right. There's what you get initially but how do you retain it through time. Okay, so really fast, before we move to our next section, Gina, can you just give us like three tips, if you were limited to three, what are three things that help make a project successful that you see as you're evaluating all of these restorations?

Gina: Okay, three things. Partnerships. Partnerships with other practitioners, partnerships with local seed vendors, partnerships with local interest groups, these landscapes are not just sitting out there by themselves, they're part of a matrix in Minnesota and if practitioners are partnering with everyone around them and really thinking about what's worked, what hasn't, and what are the needs for the landscape as a whole, restorations seem to have a longer lasting time and do really well. And I think another thing that is really a common theme for these successful restorations is going back to the restoration economy Sue was talking about, having skilled and trained practitioners who are experts in this, having people who know how to run the equipment, who have done this work, it's a particular skillset and being able to tap into those people and to get the right people out to do the right piece of the restoration project is incredibly important. You gotta tell your stories. If you don't talk about what you've been doing, what's been working, share your successes, tell people why prairie is valuable, get them out there, share the prairie with everyone, there's not going to be support for this work and it won't continue.

Mike: That's great.

Megan: Share the prairie with everyone.

Gina: Everyone.

Megan: That is - that's my new life motto. Well we have to got to move to our next section. I could talk to both of you all day. You know, Mike questionable not sure but I could definitely talk to Sue and Gina all time. Just kidding, Mike, you know I love talking to you.

Mike: Likewise, yeah.

(Music)

LET'S SCIENCE! TO THE LITERATURE!

SCIENCE!

Megan: This is the part of the podcast where we recommend a book, a blog or a paper and we have multiple offerings for you today. Sue, take it away.

Sue: Let's see. What I would recommend for further reading, we've recently, Julia Bowman and I recently published a paper in Restoration Ecology that was based on evaluations, statewide evaluations of a whole bunch of restorations. It's called predicting restoration outcomes based on organizational and ecological factors and it goes into some of the themes that we talked about today including what the reasons you should keep good records and how many people are keeping good records or how many people aren't and what happens when people, when organizations partner adequately versus not and basically how important is organizational, are organizational factors versus ecological ones in restoration success, so that would be my pick of something for you to follow up on. And then also the new edition of Minnesota's Natural Heritage is out. Whole chapter on prairies and we added sections in every chapter about conservation and restoration, and so we go into the history of restoration a bit for every biome in Minnesota.

Mike: Nice. I will check both those out. Thanks, Sue. Gina, what are your pics?

Gina: So I couldn't help myself. I picked a paper about soil. Prairies, - -

Mike: Nice job.

Gina: - - soil, so this is a, it's a really cool study that just came out, out of Carlton College actually and basically they're looking at the legacy of the benefits of restoring prairie, so over decades how these prairies are sequestering and accumulating things like carbon and nitrogen and building healthy soils back into Minnesota's systems, and it was, one of the reasons this paper was so neat is that sometimes it's really hard to find prairies that you can track over time, and so people will often, you know look at like one prairie that was put in five years ago and one that was put in 10 years ago and they have to make a lot of assumptions about how it started, but these researchers really they tracked the same prairies for 20 years and documented just how much carbon and nitrogen was going into that soil and how much healthier it was getting, so I wanted to put in a plug for that paper and the value of soil because it's something we're learning more about all the time in prairies.

Megan: Nice pun, plug. About a soil paper, I wanted to put in a plug.

Mike: That to me that's very interesting because so often at least I and I think many people think about the soil being required for a prairie but you're working you're kind of in the study has kind of switched it, it is saying that prairie is very important for the soil and for driving those functional benefits out of soil, so I like that. That's a really good way to think about it.

Megan: Mike, prairie is the beaver ecosystem and what I mean by that is beavers like us are the only other animal that manipulates the environment to suit itself and prairies manipulate literally the ground that they are growing in to suit themselves. They are the beaver.

Mike: Wow, I like that. I'll remember that, yeah.

Megan: Good, I'm so glad.

Mike: Put it on terms of wildlife biologist can understand, I like it.

Megan: You're welcome.

Mike: Hey Megan.

Megan: Yeah Mike.

Mike: Let's go take a hike at Carleton College and check out the, and check out the soils there.

Megan: I'll do that if we can go get cupcakes at that cupcake place.

Mike: Fair enough. Once again you're going to the desserts, there you go.

Megan: Let's have a hike and a cupcake, I'm there with you, buddy. Well we are so excited as we do when we get to this Take a Hike section each time to introduce you to some of your fabulous public lands. Congratulations, you're still a public landowner and we're so proud for you, and so Gina, lead us through a pick. Like what is one of your favorite public prairies. Did you see, public prairie places, and why did you pick it?

Gina: So I chose Ottawa Bluff. It is down by St. Peter, Minnesota, St. Peter and Mankato area and it's a Nature Conservancy property and I just have all these really great memories of not only learning so much about prairie ecology there early on in my career but also dragging dozens of my friends out of bed in the morning in college to go cut buckthorn on the frozen prairie, and they have a really robust volunteer program there to manage some of these woody invasives that are encroaching and I have so many great memories about, you know, working in that landscape and bringing people out there who would never have gone out there otherwise and just connecting them to this really scenic, very beautiful bluff that is public land.

Mike: All right. I've got to get there. That sounds cool, Gina.

Megan: You do need to get there, Mike.

Gina: And there's an Indian burial mound there on the top of the bluff and you can kind of stand and appreciate why it was placed there in the landscape. It's very moving.

Mike: Cool. Thanks Gina, Sue, tell us about your pick.

Sue: Well my pick I guess is based on good memories as well. I pick Weaver Dunes where I was a Nature Conservancy intern and did my master's degree. What's awesome about Weaver Dunes is just all the cool plants in that sand prairie and the old ancient dunes and all the peculiar, you know, sand prairie wildflowers that occur there, and Blanding's turtles and raptors and all sorts of things. And when we live there, my son used to sit on a, you know, in the sand prairie while I was collecting my data and he ate a whole lot of sand and he's still a biologist. And so, you know, it takes me back to, yeah, you know, trying to achieve work/life balance as a very young biologist. Yeah, go to Weaver Dunes, I like in the springtime especially, you know, all those mayflowers.

Mike: Weaver Dunes is a wonderful place, it's really cool.

Megan: I have never been there. I need to get there. Maybe I should eat some sand because when we have been chatting with some soil scientists, they actually recommended as a way to get some of our micronutrients, so maybe that's why your son is so super smart.

Sue: Well, you know, super healthy and so yes, I say feed your kids sand from a Weaver Dune.

Megan: Quick caveat, this is not a medical podcast. (Laughter) Plenty of this at your own will. We are purely prairie experts, not medical doctors. This has been such a hoot, it's so much fun on Prairie Pod. Next week we're going to chat about the importance of prairie structure with a very special guest, if you are paying attention in this episode, we left some little clues for who that is. This person has never been on the podcast before but we reference them all the time, they may have gotten the most Let's Science article mentions, I don't know, but all we can tell you is we promise the episode is going to be swellzer. All right, you can find all of the resources that we talked about today on our website at [mndnr.gov/prairiepod](http://mndnr.gov/prairiepod). This episode was produced by the Minnesota Department of Natural Resources Southern Region under the Minnesota Prairie Conservation Partnership, which is a function of the Minnesota Prairie Conservation Plan. It was edited by Dan Ruiter and engineered by Jed Becher.

Mike: It was awesome. Thanks so much, Gina and Sue. That was great.

Sue: Yeah, thanks for having us.

Mike: Unlock the secrets of restorations finally. Megan wouldn't tell me anything but you guys did.

((sounds of birds chirping and wind blowing))