Prairie Pod Transcript

Season 3, Episode 6: Farming for Pollinators

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Guest: Karin Jokela, The Xerces Society, Inc.

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

Transcript:

((sounds of birds chirping and wind blowing))

Megan: Hey welcome back to the Prairie Pod. I can't believe it, we're already on Episode 6.

Mike: Time is flying Megan. It is.

Megan: It is flying. Did you do that on purpose cause we're talking about bees today?

Mike: Oh gosh, you know.

((Laughter))

Megan: Time's flying like a bee in the wild. ((Laughter))

Mike: I wish I'd been that creative or that on the ball this morning, but I'm on my first cup of coffee you know - -

Megan: I'm really proud of you.

Mike: - - and so just give me a minute okay?

Megan: Okay. Well there's a lot to buzz about in this episode.

Mike: That's, that's an old one.

((Laughter))

Megan: It's a oldie but a goodie. I'm totally keeping it.

Mike: An oldie but a goodie.

Megan: So I know that we talked about bees during our last episode.

Mike: Mm-hmm.

Megan: Definitely everybody go check that out if you haven't heard it yet. We talked with fan favorite, Jessica Petersen and Nicole Gerjets about their work doing the Minnesota bee Survey and bees are so important. I mean they're really, really important. We're devoting another podcast just to - -

Mike: You bet.

Megan: - - the bees because they're the knees, you know bees knees. Bees - -

Mike: Can I say why this, our talk today is so important?

Megan: Sure.

Mike: I mean you know, we talk about how all these prairie critters, their populations are crashing and sometimes if feels overwhelming and like there's no hope. The stuff we're talking about today I think is, makes me think that some, turning things around is feasible.

Megan: There's a lot that we can do. There's many things that are not in our control necessarily individually because it takes a collective of people working on these, but every choice you make does matter and I feel like we're here with a very special guest today and we're going to talk about the landscape that we have in Minnesota, so we're going to talk about farming, farming for bees.

Mike: She's going to tell us how to turn things around.

Megan: Yeah. There's lots that we can do. If we're going to get there to get this landscape back in balance, we're going to have to do it together, and so that's what I like about this podcast topic that we're going to talk to Karin. Karin, do you want to introduce yourself? Because I feel weird that we're just talking about you while you're sitting right here - - do you want to say who you are, you're our guest ((laughter)).

Karin: Thanks. My name is Karin Jokela, do you want me to? I work for the Xerces Society for Invertebrate Conservation. I'm a pollinator, conservation planner, and I'm a partner biologist for the Natural Resources Conservation Service, which is the NRCS. I can explain more about the Xerces Society.

Megan: Yeah, please do. Because some people might not be familiar and we partner with them all the time and you guys are doing super fabulous work. And I feel like they're a great partnership.

Karin: Yeah. We're a nonprofit conservation organization that works to protect invertebrates and their habitat. So we're based on Portland, Oregon but we have all over the country. You might think of us kind of like the Audubon Society but for invertebrates.

Megan: That's a good analogy. I never really thought about you guys like that. I always think of you as a league of your own.

Karin: Well, maybe that too. We have the biggest pollinator conservation team in the world.

Megan: Congratulations.

Karin: Yep. Our pollinator team is like a, we call it to the Pollinator Conservation and Ag Biodiversity program, so what you might not know about the Xerces Society is that a lot of us are working hand-in-hand with farmers.

Megan: Nice.

Karin: Around the world but primarily in the United States, and that is really the bulk of my job. So as I said, I'm a partner biologist for the NRCS. The NRCS is the branch of the USDA that's responsible for helping farmers with conservation. And so my position is funded by a partnership between Xerces, NRCS, and General Mills, and yeah. And - -

Megan: I assume General Mills comes in because they make a very popular cereal with a bee on it, and so they have a little vested interest here.

Karin: Actually, you may not know this but they're quite interested in supporting regenerative agriculture, trying to get their oats producers to incorporate more pollinator habitat. They're very supportive of pollinator conservation, so doing a lot of interesting work, and yeah, so I help farmers individually with conservation planning. I do a lot of training for NRCS in Minnesota and Wisconsin too, so I'll teach NRCS staff on how to better assess pollinator habitat on farms and create habitat and better support monarchs, pollinators, beneficial insects of all kinds.

Megan: I love it, so you're not busy.

Karin: I have a few things to do.

Megan: Exactly, a few things to do, and we just did a seed mix clinic together earlier this year, which is always a special joy for me because I don't, like I'm a talker. I know you guys know this, I'm a talker, so it's really nice when I get the opportunity to share a presentation with somebody else who's also a seed mix building nerd like myself, and we get to play off of each other, and I think we do a really nice job of that together. I'm probably biased because I'm one of the presenting but I really like working with you, Karin. I think you're great.

Karin: Thanks, Megan. It's mutually.

Megan: Oh, good. Mike, we like you too. I just didn't want you to feel left out.

Mike: Yeah. Karin, let's just move on here. So when we're talking about pollinator conservation, farming is a big issue we talk about. Can you tell us why, tell us more about why farming, how it affects pollinators?

Karin: Yeah, so.

Megan: Starting off with a really big question.

Karin: I know, so I'm not a historian but farming practices have really changed in the last 60-70 years and whereas we used to have a lot of biodiversity on the farm, now we're

moving more and more towards really simplified landscapes where we have less crop diversity, we're through the advent of synthetic pesticides, we're able to crop more marginal areas, areas that may have never been in production before because they were too, the soil wasn't fertile enough, those are areas that used to be kind of supporting natural habitat and now they're in production.

Megan: Right. There used to be like fence rows and set aside areas around the farms that had that habitat component mixed in and now as technology has changed and our equipment has changed, and also the demands that are out there, like a lot has changed.

Karin: Right. A lot has changed not just in this country but really globally and so we're not seeing those natural areas on farms as much anymore. We're not thinking of natural areas on the farm as beneficial. It's just sort of marginal whereas I think traditional farming practices tended to see the value in some of those natural areas as being a refuge for the pollinators that pollinate their crops or a refuge for beneficial insects that are serving as natural enemies for their pest insects, so we just have a really different kind of farming landscape now where we have we're only growing a few crops and not much else, I guess.

Megan: Right.

Mike: I wonder if a prior emphasis on hunting in our farming culture. It's still there, of course, but people were probably more dependent on it 50-60 years ago, and so they wanted that habitat around their farms is for game, if that's been a factor.

Megan: Yeah. The other thing that I just want to make sure our listeners know is that we have about 27 million acres of ag land in the state of Minnesota, which is just under half of our total acreage. It's not quite half. So when we're talking about this, like if we're going to accomplish our landscape goals, we really got to do this together, and I don't think our goal is ever oh, we're just going to wipe these farms off of the, we mentioned this in our holiday episode. That's not really the goal. The goal is how can we build balance back into the system because we know that we're seeing these crash of these insects and they're not only they could be beneficial for our farms, but they're certainly beneficial for our lives. I don't want to steal Karin's thunder so I'm not going to say any more about that. But definitely everything's all connected. I won't sing the song, Mike.

Mike: Thank you.

Megan: You're welcome.

Karin: I think that's a really important point because in Minnesota, we're really blessed to have a lot of public natural areas, which you've been talking about a lot on the podcast. But we can't keep thinking of like nature is over here and our farms are over there because we need to integrate them more and create corridors for a lot of our wildlife, including bees, and really partner with nature more in our farming systems.

Megan: Right, and we all live here, so we have a vested interest in this. Like I don't think I've ever talked to a farmer who's like yeah, I'd love to have more dirty water for my family, like that's not a thing that people say, so like they want to figure out how that we

can do better together, and so I think hopefully you're going to give us some tips that we can farm better for bees here. So describe before we jump in to some changes that we can make with our farming practices, help us understand a little bit the differences between honeybees and native bees or wild bees. Sometimes people call them wild bees. I call them native bees.

Karin: Yeah. I think since we're talking about farming, the first thing I'll say is that honeybees are integral to our agriculture system as we know it now. So they are European social species, or at least that's where they originate from but they're really a global species now that are integrated into all of our global agricultural systems. But they're somewhat like a livestock species.

Mike: That's really how they're regulated, right?

Megan: Yeah.

Mike: As livestock, yeah.

Karin: Yeah. Whereas our wild bees or native bees, there's a vast diversity of them, they are native to our prairies, all ecosystems in Minnesota. We've got, what is it, like 450 plus.

Megan: Yeah.

Karin: And counting in Minnesota alone and these are bees that have a pretty different lifestyle than honeybees. They don't necessarily have a queen or a social caste system. They are doing a lot of work really independently. They're solitary for the most part and the vast majority of them are solitary. And they're visiting our crops, they're visiting our wild areas, and those are some of the big differences. They have a shorter lifecycle at least from the, not a shorter lifecycle but the adult stage, you might only see for a couple weeks or maybe a month or two, but they don't, you don't see them from April through October like you do with honeybees. Each individual native bee species you might only see for a short period and the rest of their lifecycle is kind of hidden from us.

Megan: Unless we're talking about bumblebees.

Karin: Unless, yes, bumblebees are native bees, they are one kind of social bee. They have a pretty different lifecycle than honeybees too. But yeah, for the most part, our wild bees are doing a lot of services for us but it's kind of like this rally, like tag team kind of there's some that are out for only flying for a couple of weeks in the spring and there are some that are only flying for a couple of weeks in the fall and they're just kind of, there's a phenology of them throughout the season.

Megan: And there's so much we don't know about wild bees still. I mean, I would say we know, there's still things we don't know about honeybees but we know a lot more because we're studying a single species a little bit more closely. I said this at the beekeepers meeting where I said that honeybees are never wearing pants ((laughing)) so they're just not dressed for Minnesota winter.

Karin: The key difference between honeybees.

Megan: They all just start cracking up laughing. They're like actually, that's true. So we need to help them get through Minnesota winter, probably arguably we need to help all of our wild bees by doing beneficial things for them like providing habitat. But it brought down the house and I was like yeah, they're just not wearing pants ((laughing)) they're just like what? Oh gosh, anyway, anyway.

Karin: Can I just add one more comment about the honeybee? So from a crop pollination perspective, a lot of people think that they need honeybees to get their crops pollinated. So if you're growing, if you have an orchard or blueberries, for example, a lot of people think that you need to bring in honeybees to get that crop pollinated. And depending on the landscape that you're situated, that can be true. But there's a lot of research that shows that there's some synergy between wild bees and honeybees and when together they can actually, wild bees can actually influence crop pollination in a certain way. So wild bees can get out to the crop earlier, they can, because they are more hardy, they can get out in wetter, cooler conditions, they'll forage earlier and later in the day, they'll kind of force honeybees to move into different areas of the tree, if it's an apple tree, and so you can actually get better crop pollination if you're relying on honeybees and wild bees.

Megan: I like that.

Mike: Interesting.

Karin: Yeah. There's some definite synergy.

Megan: I like that word too. It's the word of this podcast.

Karin: I'll going with that theme.

Mike: Karin, can you help us get an idea of how we can adjust farming practices to help bees and maybe just even start, you can go in as much detail as you want here, but an easy first step that most farmers can do to help bees.

Karin: Yeah, so the first thing I would say is to if you have some habitat on the farm to recognize that habitat and conserve it.

Mike: Okay.

Karin: A lot of people think that in order to save the bees or help the bees, I need to plant a wildflower meadow, but there are a lot of habitat elements on a farm that may not be recognized as habitat. So that could be riparian corridors, it could be just even like marginal areas, fowl fields, even if they're not rich in wildflowers, if it's undisturbed soil, that's valuable nesting habitat for wild bees. So secondly, beyond recognizing existing habitat would be to reduce tillage. If you do nothing else for bees on your farm, reducing tillage is really important. They're 70% or more of our native bees are ground nesting bees and if you extend beyond bees, a lot of the beneficial insects that we want in our farms also rely on undisturbed soil, so that's another key practice on a farm. Creating new habitat would be kind of the obvious thing. A lot of people just leap to that, but there are a lot of things you can do prior to that.

Megan: Which I'm okay if they want to plant a wildflower meadow. Like I think we're okay that.

Karin: Create a new habitat. That's great. I am not trying to kind of restrain any of that.

Mike: You know, it's a really good point, though.

Karin: You can do certain things without any immediate input.

Megan: And reducing tillage, like you said, that can also increase your bottom line and your productivity, so it can help you build more organic matter, you can start you know, shifting.

Karin: A lot of reasons to do that.

Megan: Yeah, and so it benefits bees but then it also benefits your bottom line, which is all the bees that you want in the mix there. See what I did there? Bottom line, bees? All the bees.

Karin: And then it has to be said that on farms, another really important thing to do after you've conserved, well not necessarily after, but you've conserved habitat, you're reducing tillage, you're creating new habitat, we also need to create spaces that are pesticide-free, so that those bees are being protected and it's not a sink. You're not creating like a poisonous environment for bees and other invertebrates.

Megan: Yeah. I had this question the other day too where somebody asked me if insecticides are bad for bees, and I just kind of looked at them and I said well, it's an insecticide, it's designed to kill insects, so yes. I mean, that's what they're designed to do and it's a tool that we have in the toolbox that sometimes we really need in order to farm effectively, but there are also other things we can do. If we were using less insecticides, maybe we would have more lady beetles, which then prey on things like soybean aphids, so you get kind of you're building in a natural predator, like you were talking about earlier, to fight the problem for you basically.

Karin: Yes.

Megan: Okay. Tell us some other things that we can do. I feel like I cut you off.

Karin: Those are some of the big ones. I could talk about specific conservation practices, if that's what you're interested in. Every farm is a little different in terms of its landscape context and what makes sense in terms of habitat enhancements. Definitely you want to work within your landscape context and what is kind of called for on your land. So if you live on the kind of prairie forest transition, then some practices that involve trees or shrubs are really called for. I mean, hedge rows, flowering hedge rows, even some broad leaf trees can be really important for pollinators. We don't think of them as pollinator plants because we don't see pollinators on them because they're way above us, 60 feet up, and you don't see those spring emerging bees visiting maple trees but they're up there using maple pollen.

Megan: I'm going to look up more now.

Karin: There's amazing research coming out about bees and trees.

Megan: I love it.

Karin: But so - - there's kind of riparian areas if you live in a riparian quarter, that can be a really great place to enhance with like willows. Willows are a really important species for honeybees and native pollinators that there are a lot of specialist bees that require willow pollen, so that can be a really important one and really obvious one to do in any kind of wetter areas, corridors, even so we want to encourage putting in habitat that's permanent, a permanent refuge that you can keep kind of enhancing from year to year, but there are some times when habitat can be created on farms, that's just an annual thing, like a cover crop, a flower cover crop. If you just want to cover the soil because you're not using that or it's in a certain rotation, putting in something that creates short-term bloom but attracts a wide diversity of insects can be really important, like buckwheat or even annual sunflowers, lacy phacelia, there's a whole, even some brassicas, like radishes, kale, turnips, there's these various things that actually provide a lot of good short-term forage for really a broad diversity of bees.

Mike: Interesting to hear you mention the shrubs and the woody component as being important for bees and this kind of adds another emphasis, another justification for woody species. And I think we so often think about them in prairie management as something that we have to eradicate, and some of our work that we're doing with the Non-Game Program, we're finding shrubs play an important role for a lot of different species and trees, - -

Karin: Right.

Mike: - - when it comes to prairie species, what we traditionally think of as prairie species. And so it's interesting to hear that bees are another one that can benefit from shrubs and trees. So we want to control our prairies but we don't want to eliminate them.

Karin: And that's why I was trying to emphasize that the landscape context. So knowing what your neighbor's goals are. If you are living next to a really amazing prairie restoration, then you may consider whether or not you want to put in a lot of, an entire woody hedgerow or large conifers that may have kind of negative consequences for the prairie nearby. But one reason we often suggest flowering shrubs, native flowering shrubs in Minnesota is that the native spring blooming species in prairies tend to be pretty expensive, sometimes hard to come by in the native seed industry, and flowering shrubs tend to be more available, so you think of like dogwoods, willows, like juneberry, a lot of different species that are easier for a farmer to put in without a lot of input cost, can have really a lot of benefit. You can put in something that's a little bit more mature if you are trying to fight some weeds, for example. For example, wet area that's dominated by wheat canary grass, that may be a really hard place to get a native seed mix started. And so putting in flowering shrubs may be a really good way to fill the spring bloom gap as well as get something established relatively low cost, still have a lot of benefit for the bees that pollinate the flower, and then later on if there are berries associated, obviously that's affecting the food chain in other ways too, so you don't have to put too much emphasis on flowering shrubs on a prairie grass - -

Mike: Yeah, I agree. Right.

((Laughing))

Karin: - - but, I mean, we love seeing conservation covers, what the NRCS term is for permanent vegetation that's herbaceous, so we love doing that kind of planting on farms too. So it can really, there's a whole spectrum of kind of conservation cover. It's just permanent perennial vegetation. It can be cold season grasses, which have relatively low wildlife benefit but it covers the soil or you could have something that's a little bit more just native grasses with the small forb component, or you could go to the extreme end with something that we call a pollinator planting, which is as much as 75% wildflowers and only 25% grasses. All of those have different benefits. You may want to put those in strategically around your farm landscape if you have specific pollination services you need. If you are trying to attract certain beneficial insects, there's a lot of strategy in designing your farm landscape to have most kind of ecological benefit for the surrounding landscape but also for your farm.

Mike: Yeah, good.

Megan: I like what you said too about talking to your neighbors and kind of seeing what their goals are, even if your neighbor is the DNR or other public land. And I think that's really important because we have 1%, 2% between 1% and 2% of our remnant prairie remaining and we're trying to, again, get that landscape back in balance, and so no, I don't think anybody's saying yes, what we really need to do is just plant shrubs everywhere in the prairie. That's not the goal but it's how can we be best additive so that we're doing good things but we're also not doing things that would impact our neighbor's land in a negative way, so. I mean, I'm a sucker for a dogwood.

Karin: I do enjoy them. Communicating with our neighbors really can be the key element. I was at a farming conference this winter and I had a farmer ask me are there, do you have a plant list of wildflowers that are resistant to herbicides? Because he has replanted his prairie multiple times on the edge of his farm and he keeps getting drifted on. And I thought about that and I realized I don't have that list and we're not going to create that list. We're not going to be developing transgenic prairie species that can resist herbicides. Instead, really probably the solution for this particular case is to talk to that neighbor and really develop some strategy so that he's not going to keep throwing money at a problem that's going to continue to be there.

Mike: Yeah, good example.

Megan: That is a great example. We usually recommend that as well, having that conversation, although those can be hard conversations.

Karin: Definitely.

Megan: So tell us a little bit. I want to transition here because we're talking about all these things that you can individually do on your farm and I want to talk a little bit about crop production in Minnesota as a whole, so what we grow here. Because usually, what we hear is we hear all these terms, right, that bees contribute 3 billion or pollinators contribute $3 billion to the global food industry and then the immediate follow-up question I get from folks is but wait a minute, don't we grow corn and soybeans in Minnesota and isn't corn wind pollinated and soybeans just get the small yield bump. So

I want to know a little bit your perspective about how is crop pollination working in Minnesota and then how does that translate to our diet and the foods that we eat and what are the benefits. Give us the real, real here. I want to know it.

Karin: Well as you mentioned, yes, our major crops here in Minnesota are wind pollinated or at least not dependent on pollinators. There's evidence of bees visiting corn and collecting some pollen, more anecdotal evidence for like sweetcorn. It's certainly not affecting corn yields. It's just kind of a side thing when there's a kind of desert and there's no food and some bees will even turn to corn pollen. Soybeans can attract some pollinators because it offers nectar, so research out of Iowa State has shown that soybeans can even attract up to 40 or 50 different species of wild bees, so that is not to say that planting corn or corn and soybeans is a conservation strategy for pollinators. But they can come to visit when there isn't other habitat available.

Mike: There was a documented, like you said, a documented bump in yield in soybeans due to pollination. Is that, do I recall that?

Karin: That may be true. I would, again, be cautious, though, given that a lot of our soybeans are treated with systemic insecticides, - -

Mike: Mmm good point, yep.

Karin: - - which can - - it still may attract the bees to the flower but that flower may be offering essentially toxic nectar, so it could still be creating a yield bump but it certainly isn't good for the bees. So yeah, a lot of our landscape is dominated by crops that don't require pollinators. But a lot of our most nutritious and interesting foods are dependent on pollinators. So anything, if you're like me, if you like a colorful diet with strawberries and blueberries and apples and broccoli and squash and pumpkins and coffee and chocolate and oils, these are all things. Right. All of these, even if we're importing them from other places, we need healthy bee populations in those areas. We need healthy bee populations everywhere, frankly, but we need to care about pollinator conservation if we want to eat any of those foods and furthermore, if you want some of those foods to be produced locally, then we need our native pollinators, some of our native pollinators are specialists on our crops. The classic example is the native squash bee that is really the best pollinator of pumpkins and squash plants. So yeah, I would like to have more of those things in our diet and in our cropping systems here in Minnesota.

Megan: Well, I just think like every Friday night, see I'm calling myself out here but like is pizza night where I would love it to be pizza night. Probably as Mike said, like as I get older, I'm getting bigger, something like somebody shouldn't - -

Mike: Wait, I didn't say that.

Megan: - - have pizza night every Friday. I'm pretty sure you said that.

Mike: I did not.

Megan: So tomatoes, okay, I'm bringing this back. Tomatoes are buzz pollinated by bumblebees, that would be, - -

Karin: Right.

Megan: - - which my pizza has sauce on it, so there's lots of connections to the whole food that we eat too that's contributing to a delicious meal like pizza, and I just because we mentioned chocolate, I want to just say that that's pollinated by a fly, so like you said we need all pollinators and I know that always trips people up because they're like now I have to care about flies too. You're telling me I have to care about flies but yes, yes you do.

Karin: I think one really cool thing about flies and fly conservation is that they're doing multiple services for us sometimes. So I know I'm going to lift up flies.

Megan: Quick shoutout for flies.

Karin: Flies can be a crop pollinator like for chocolate and then at the other parts of its life, its larval stage, they may be really important natural enemies for our crop pests, whereas bees, they're just pollinating our flowers and then doing other work on the side. You're getting multiple services out of certain flies, so I would definitely think of flies when you think about invertebrate conservation.

Megan: This podcast we like to lift flies up without bringing bees down. I was not sure that that was achieved.

Mike: And to continue on that theme, when I'm in the prairie taking photographs of insects on flowers, I probably see 20 flies for every bee I see on flowers.

Megan: I feel like this is going down a real bad road because bees are super important, I feel like we're throwing them a little bit of shade and I'm not just appreciative of it, so I'm going to bring us back on to the rails here 'cause we're, we're shade.

Mike: Okay.

Megan: - - So what, okay, so I'm summary, what I'm hearing you say is that our pollinators in Minnesota and our bees specifically, they may not be super important for our largest commercial crops in terms of pollination, but they're super important for the whole system of our farm in terms of what they're providing from not just aesthetics, but also from predation and managing the cycle there, keeping our hab-, hello, we all like drink water and breathe air, so they're certainly providing pollination services for all of the plants in that environment. Well, not all of them, I shouldn't say all but a lot of the plants in that environment, which contributes to our clean air. So they're doing other things that contribute on the farm, if not necessarily for that very specific role of pollination.

Karin: Right. And I think the case that can sometimes be more compelling for farmers is we may design conservation programs under the title of pollinators, like a monarch habitat planting or a bee pollinator planting, which indeed benefits those species, but it's also bringing along all these other beneficial insects that can really serve those crop farmers who are growing something that doesn't require a pollinator but you're bringing all of these other invertebrates along that can provide really important services. Like less than 2% of all invertebrates in the world are pests. The rest are doing something beneficial for us.

Megan: That's a great fact. I love that.

Karin: And so that I think is a more inherently compelling reason to put in habitat for a farmer who's not necessarily growing something that is pollinator dependent.

Megan: I used to say insects make the world go round. I think I'm going to change it and fancy it up and say invertebrates make the world go round because we learned about mussels and they're in that class, and so they're basically making the whole stream system work and then our insects on land are making it work. So I think I'm just going to broaden it and say invertebrates make the world go round.

Karin: You know, there's actually you should put in, in the show note this paper from E.O. Wilson, *The Little Things that Run the World*. It's one of the first kind of calls for invertebrate conservation that bees are, when we think about wildlife conservation, a lot of us think about some kind of vertebrate animal, a tropical tree frog, a bird, a panda, but they are such a small sliver of our animal biodiversity out there. So if we want to be thinking about wildlife conservation, we need to start conjuring up images of insects.

Mike: Another benefit, I think it's just important to point out, Megan, you said, both of you said 450 species and counting in the state, so we have these values like pollination benefits. We also have these other values that are less - - they're more difficult to define or quantify, and here we're talking about the research on these animals. And just the ways that they enrich our habitat, enrich our experience outdoors, these are things that are difficult to quantify in that we don't really understand yet. We're just now learning how many species are in the state.

Megan: Oh, so you're talking about how we don't fully know all of the roles that they're playing.

Mike: Yes.

Megan: In the ecosystem.

Mike: Yeah, I'm talking about that and also this idea of wonder, this idea of that we don't know what these species are that are out there, and so it's a real shame if we're losing species and we haven't even documented them yet.

Megan: Or begun to understand their role. I know. This is real deep, it got real deep.

Karin: I'm with you totally.

Megan: I mean, I'm with you too. I just at first when you said they're providing benefits that are hard to quantify, I got confused because I was like well, many of the benefits are easy to quantify like the amount of soil erosion that's being trapped by the plants that they're pollinating that's then holding that soil in place, like the clean water, trapping of nutrient and sediments, all of these types of things, weed seed reduction, filtering nutrients and pesticides, like I was thinking along a very, I don't know, black and white like quantification.

Mike: Well, and we should focus a lot on those.

Megan: And then when you were in the wonder, I'm sad to say I wasn't there yet with you along your train of thought. Now I am. Now I'm with you, but first I was thinking of those very quantifiable things.

Mike: I think as conservationists, we can't get away from those benefits. Sometimes we do. We focus on the very quantifiable benefits that are related to food or whatever that we require.

Karin: Services to us, it's really good like - -

Mike: Ecosystem services.

Karin: - - human-oriented reason for the conservation.

Megan: Yeah, how are they here for me, like what are they doing for me?

Karin: Yeah.

Mike: And that's okay to have that perspective, that's a natural thing to do, of course, but sometimes what they're doing for us, what there is, is not quantified as food output. Sometimes what they're doing for us is enriching our lives in a way that it's hard to quantify.

Karin: Totally. The natural areas that are most awe-inspiring to me that kind of take my breath away are sustained by pollinators.

Mike: Mm-hmm, yeah.

Karin: And they are clearly still teaching us lessons about how these environments work and yeah.

Mike: Yeah, that's well put. Yeah.

Megan: I'm fascinated by them. Like I haven't stopped being fascinated by them, like bees just, I don't know, they're adorable and they're doing so many things and they come in so many sizes, shapes, and colors, and I could talk about them all day but I think we have to move to our next section.

Mike: Indeed.

Megan, Mike, and Jess: (Pre-recorded) LET'S SCIENCE: TO THE LITERATURE! Science!

Megan: All right. So we've been talking about some of the wonder and now I think we need to talk about some of the science, which certainly could capture some of that wonder, but like always, this is the Prairie Podcast, we're going to recommend a book, a blog, or paper, or in this case, many things, so that you can enhance your knowledge about bees because certainly, we're not going to be able to cover all of it in 45 minutes. So I want to start with this Berenbaum paper. She's an entomologist and Jess Petersen sent this to me because I always ask her to factcheck all of my presentations before I give them about pollinators just to make sure that I'm spreading truth out there about what's going on with our bees and what's really happening. So this paper is called *Reality Bites* and it was published in the American Entomologist in 2018. I'm still not used to saying I want to say last, the year before or last year. I'm still not like fully in 2020, I'm going to work on it.

Mike: Understood.

Megan: Yeah. We're halfway through and I'm still not fully in it. I need to jump into the decade soon. So what I like about this paper is she's basically debunking the myth where we use this phrase a lot, one in three bites of food that bees or in some cases, we say pollinators in general are responsible for every one in three bites of food. And so what she's actually saying is that this was a misquote from other papers and it largely depends on what you're eating, right? Like how much bees or other pollinators are contributing to your diet. So the real paper was in 1976 and what they concluded was that possibly one-third of our diet is because of animal or insect pollination. Well again, so if you're an American, here's pop quiz time, she also says this in article, what's the number one vegetable that you think we're eating?

Mike: And it's not corn.

Megan: It's not corn, it's not. Think about like going - -

Mike: McDonald's?

Megan: Yeah. I was going to think golden arches, think McDonald's, what are you eating?

Mike: French fries.

Megan: Potatoes, you're on it, Mike, so the number one vegetable that we eat are potatoes, which, of course, do not require a pollinator. And then the number one fruit that we're eating are bananas, which are grown as kind of like propagated from sterile pods, so it's kind of depressing when you're reading this because it's like oh, if the majority of the American diet is potatoes and bananas, that's not really saying a whole lot. Of course, like Karin mentioned, everybody's eating different things, like that's not going to be true. For me, I eat mostly a fruit and vegetable diet, so my diet.

Mike: Karin, what was the story you had about a friend, a colleague.

Karin: Yeah. A coworker of mine, I'm not going to take any credit for this game, she developed it, and I just think it's genius. She and her family and friends have developed this game where they try to integrate as many different plant families into their meal as possible.

Megan: Like their holiday meal.

Karin: So for example, you could get really into this game and do it for every meal and have a whole database.

Megan: Mike and I should do this for like a whole.

Karin: But it was really amazing, so she, this last Thanksgiving without even trying, they added up 40 different plant families that they were eating at their meal, - -

Megan: Wow.

Karin: - - and then they got really competitive about it and decided to set a goal for next year to have 200 different plant families represented, which is amazing, you know. - -

Megan: That is amazing.

Karin: - - You and I, Megan, often think about adding a lot of plant family diversity to a seed mix because ecosystems need this diversity for their health, well so do we. I mean, if you think about all the different culinary herbs and, I mean, this is the way that we could be really changing farming landscapes if we were regarding our food in this way and thinking about trying to consume a lot of different plants, a lot of diversity. And inevitably, some of those would be pollinator-dependent and therefore have trickle-down effects on farms where it would have farms that really need to support their native pollinators. I mean, it's an amazing game and if we were all thinking like this, it would be so fun.

Mike: This should be a social media competition.

Megan: I was also glad that you brought up the word diversity in this context. I'm a little jealous that I didn't say it first but I'm really glad that you did because you're right. Like diversity is super important. On a remnant prairie, it's very important what we're trying to recreate that landscape, which we're not close to yet, and then of course, it's going to be important with what we eat and put into our bodies too. I just, I need to, right now I'm like tallying everything that I ate for Thanksgiving and I'm trying to see where I'm at. I don't think I'm anywhere close to 200, so I maybe need to reevaluate like what's my meal. Mike did say I have the best stuffing that he's ever eaten, which did have plants in it. And I think four different kinds of plants, so I'm already all right, game on. We're going to do this. It's going to be a great competition.

Mike: Mm-hmm.

Megan: All right, Karin. Give me your couple picks from you here.

Karin: Okay, the first one is not a blog, a paper, or a book. It's a tool that I really love and actually, it's sort of a summary of a whole bunch of research, including peer-reviewed research. It is called *The Ecoregional Revegetation Application.* Kind of a mouthful. It was developed by the Federal Highway Administration. And what it does is pool together all these plant databases from across the country and pull, extracted a bunch of information from insect museums and bug guide and a lot of different papers to basically connect which plants are supporting which pollinators. And so basically, this is a tool that you can use, you can download plant lists for your region, it's exhaustive too. It has every plant that occurs in your area. And for every plant, it also lists various fields, kind of characters about that plant species, whether or not it tolerates salt in the soil, whether it tolerates shade. I mean, it's like exhaustive number of characters that it quantifies.

Mike: I checked it out this morning and I was impressed.

Karin: It's really pretty neat and if you're kind of an Excel junkie, even better. Because you can filter all these different fields and really put together a list that is maximizing pollinator value. It even has a field that's called workhorse pollinator plants. These are species that are commercially available, known to be hardy, also have like a lot of records that it's supporting a lot of different pollinator species, and this isn't just honeybees but you can even filter out which ones are best for honeybees, which ones

are best for bumblebees, lists all these different moth species that plants support, so it is really quite a tool for nerds who like to design seed mixes.

Megan: My afternoon is full. I better clear all of my appointments.

Karin: It's a relatively new tool and I think a lot of land managers aren't aware of it yet, so, and it really does incorporate a lot of research, so that's one to check out and play around with. Spend some time with that. The Ecoregional Revegetation Application.

Megan: We'll put the link up.

Karin: And two other books that I guess I'd like to highlight. One is called *Attracting Native Pollinators: Protecting North America's Bees and Butterflies*. This is a book that the Xerces Society published and it's about nine years old now but it really was my first inspiration to get into this field. It kind of covers the basics of pollinator conservation and how this work can be done on private land, on farms, integrating in a working way, so we're really collaborating with nature. It shows kind of how to install habitat, selects different species, it kind of gives a high-level overview of some of our native bees. It has a lot of beautiful pictures, and a lot of examples of how pollinator habitat looks, what it can look like on farms, so a lot of pictures for you to, photos for you to kind of imagine how it could be incorporated on to your own farm. And then a companion book to that is another book that the Xerces Society published, *Farming With Native Beneficial Insects*. And again, I think the case for beneficial insects can be sometimes more compelling for certain farmers. And the habitat can often look really similar, so whether or not you're doing it for the beneficial insects or the pollinators, you may be having pretty much the same effect, but there are some unique strategies for particular native beneficial insects in this other book. And that also goes over kind of the high-level overview of some of the predators, the parasitoids, beneficial insects that we maybe aren't even looking at and seeing as farming partners, so I would point you towards those two books. There's a lot of references in those books to other literature for you to kind of delve deeper.

Megan: I like that. And there's also a factsheet that you guys put out or a factsheet, four-page document, I don't know what you want to call it, *Farming for Bees*. So if you feel like you can't just read a whole book and it really seems daunting, you can read this factsheet. I empower you, Mike and I empower you. You can do it.

Karin: The Xerces Society really puts in a lot of effort to develop publications that are beautiful and useful and research-based and that will help you succeed with your restoration plantings.

Megan: I have all of these books and I love them.

Karin: And I should note that the only two that actually cost money are these two books that I highlighted, but we have hundreds of other resources on our website and our publication library, all downloadable for free as PDFs that you can widely distribute, so definitely check that out too.

Megan: They're really great. My goal I think in 2018 was to read one chapter of the *Attractive Native Pollinators* book. We got five chapters in, so I felt like that was really

successful year for me before I had to do other things but each one was very good and I really enjoyed it.

Mike: Hey Megan.

Megan: Yeah, Mike?

Mike: Why don't you take a hike?

Megan: Let's all hike together and let's look for some bees while we're doing.

Mike: I'm game.

Megan: So we love to start with our guests for this. Karin, we like to go hiking, we like to explore our public lands, we certainly are exploring prairie. Give us your pick for where we're going today.

Karin: I really want to go hike at Frenchman's Bluff SNA. It's up by Menomin in Northwestern Minnesota, and the reason I chose this is that I stumbled upon this site a few years ago and it was late in the season, like in October, and I just happen to spend an hour exploring the area and most of the plant community was senesced, so most of the flowers were in seed form, and but I could already tell even though it was sort of a quiet time on the prairie, so to speak, there was so much diversity there. The understory - - it just had, it was a carpet of prairie smoke, botrychium, moonwort there, it's up on the hill, it's one of the highest points in Northwestern Minnesota. It has this beautiful composition of just small bunchgrasses and in between those spaces are all, it's really fast wildflower diversity and really conservative plants and abundance, and I vowed to go back there someday during the growing season so I could see who is visiting all those plants, and so that is where I want to go hike today.

Megan: Mike?

Mike: Santee Scientific and Natural Area. It's a complex. It's attached to Wambach, if I'm pronouncing it correctly, I don't think I've ever heard it pronounced. Wambach Wildlife Management Area. It forms a nice, big contiguous chunk of prairie. It's special for me because I think it was the first place in Minnesota where I heard a prairie chicken. Yeah, so it's where my former position with the DNR was long-term prairie monitoring of what we call SPICE, and the acronym SPICE, and it's a great acronym, Megan.

Megan: Oh yeah. We're going to talk about that in a future episode.

Mike: Good.

Megan: Next time.

Mike: Okay. Anyway, that was a site we went to every year for monitoring, so I became pretty familiar with it, and it's a gorgeous area with a lot of really interesting wildlife. I've never actually did a pollinator survey there but I think it's probably very good for pollinators. Did you ever go there for bee surveys, Karin?

Karin: I did, yeah. I love that site.

Mike: Okay, good. I like it too.

Karin: Let's go.

Megan: See, there you go. Stamp of approval. Well, I am feeling pretty lazy today so I'm going to take us to a place to hike, which is just really right in my backyard here in good old New Ulm. Yeah, exotic New Ulm.

Mike: What is it, two miles away from us right now probably?

Megan: We are going to go, yeah, ish, yeah. We're going to like to Flandrau State Park and I know that this is state park that I feel like people kind of overlook sometimes because we had a regional meeting once and everybody went around and they mentioned their favorite natural area, and a lot of people said Flandrau, but then when they said the reason why, it was for the sand bottom swimming pool that's there, and that's actually not my favorite feature. One, because you can see a lot of coworkers there in swimsuits, which is just not, and then two, it's just there's a lot of people there and when I go to a state park, like I want to go to the parts of it where I feel like I can really explore and it's just me, and so my favorite part they have this beautiful overlook trail that goes up. They do a remnant prairie, they have a whole mosaic. It definitely is wooded in parts of it. But it's this nice complex, it's got some terrain, and when you go up this overlook trail, parks and trails is doing a really nice job of restoring the prairie there, removing some of the invasive plants, and there's this beautiful burr oak savannah that they're working on. And sometimes, I'm like the weird person that's there like trimming invasive species in the middle of that trail because.

Mike: It's not weird.

Megan: Well, it's very soothing but I really feel like I should probably check with park staff before I'm just out there weeding as like a rogue ecologist. But it feels really nice. The trail overlooks the Cottonwood River, so you get those really great river bluffs, which just, I don't know, it speaks to me. And then there's some hillside prairies there that are in the process of being restored, so Parks and Trails is really doing a lot of good work. They have goats there as a management strategy because we have a lot of invasive species there that we need to deal with, but there's also really nice habitat there too. And I like it because it's right in my backyard and I feel very fortunate that I can go there. I can go there in any season. They have some of the best groomed cross country ski trails, so it's really nice.

Mike: Just another example that you don't have to go very far to prairie, as you say, we use prairie as a verb.

Megan: I know, to prairie. I'm going to prairie now. It's just I feel like in Minnesota, sometimes we might take this for granted but we're really blessed with a vast amount of public lands and that's all because of people working together to make that happen, so they might be managed by the DNR, the might be managed by the Nature Conservancy, Pheasants Forever, whomever. But we're in partnership doing that work so that we can provide these opportunities to prairie. I like it. I like it. Oh, my gosh. So don't forget to check out the DNR recreation compass so you can find more of your amazing public lands. I actually used it today to think about what my pick was going to

be, so even I use that compass all the time. So next week and Mike already gave you a teaser, we're going to be talking on Prairie Tuesday giving you an insight into SPICE, like Mike mentioned, where the prairie is going to get a health checkup. That's right, prairies get physicals, too. Physical. Okay. Turns out there's a whole team of scientists that are invested in assessing the health of Minnesota's prairies, so we're going to talk about the grassland monitoring team and then we're also going to talk about their larger work as this SPICE acronym that Mike keeps trying to push on to me. He just wants my life - -

Mike: You'll come around.

Megan: Someday. You know, next podcast you guys are going to convince me. I'm going to embrace it. I can already feel that.

Mike: Me too.

Megan: I'll be convinced. Oh, boy. It's going to happen. This episode was produced by the Minnesota Department of Natural Resources Southern Region under the Minnesota Prairie Conservation Partnership. It was edited by Dan Ruiter and engineered by Jed Becher. As always, you can find all of the resources we talked about today on our website at mndnr.gov/prairiepod. Karin, thank you so much.

Mike: Yeah, thanks so much.

Karin: My pleasure. Thank you for having me.

Megan: This was great.

Mike: It was really good conversation.

Megan: I know. I feel like we should end it with like a yay bees. Karin's like no, we're not doing that.

Karin: I'm all for say yay bees.

Megan: Okay. Ready we'll do it. One, two, three. Yay bees.

Karin: Yay bees.

Mike: Yay bees.

Megan: Mike is so - -

((sounds of birds chirping and wind blowing))