Prairie Pod Transcript

Season 2, Episode 1: A lost prairie butterfly gets reintroduced to Minnesota (The Dakota skipper reintroduction at Hole-in-the-Mountain Prairie)

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! It's Season 2, Episode 1. I can't even believe that we're back for Season 2. Jess, can you believe it?

Jess: I'm so excited—as always.

Megan: I know. I'm so excited and you're like new and improved Jessica Petersen.

Jess: Yep, New job title. Switched roles. Switched Divisions. I am now the Invertebrate Ecologist for the Minnesota Biological Survey. Housed in the St. Paul-Central DNR Office. 500 Lafayette Road.

Megan: Which means I get to see you less.

Jess: That's true. That's true, but we hang out on the prairie.

Megan: I know and what better place to hang out then on the prairie? I'm still in the same job. I'm not new and improved. Maybe I am new and improved because I'm learning more all the time so I'm new and improved Regional Ecologist.

Jess: There you go.

Megan: Always learning--getting better every day. And we're joined for this fabulous first episode with a very special guest. Cale, do you want to introduce yourself?

Cale: Oh. Thanks. My name's Cale Nordmeyer, Butterfly Conservation Specialist at the Minnesota Zoo. Thank you both for inviting me on Day 1 of the Prairie Podcast, Season 2.

Megan: I mean what better day could we invite you on than day 1, Cale?

Cale: I feel very important.

Megan: And we're recording at the Zoo today, which is very exciting for us. We thought we were going to get to record next to the baby Titi monkey, but instead Cale put us in a closet full of skulls. ((Laughter)). So, that's where we're at.

Cale: Just to specify we're in one of our education classrooms where there are a lot of interesting interpretive elements that we have—including animal skulls.

Megan: There's a bighorn sheep looking at me.

Jess: It's the perfect place to record.

Megan: It IS the perfect place to record.

Cale: We celebrate biology here at the Minnesota Zoo and this is just some of that.

Jess: We're not here to talk about skulls today though.

Megan: No.

Cale: Actually not vertebrates in general. ((Laughter)).

Jess: That's true.

Megan: Nice.

Jess: We're here to talk about butterflies!

Megan: I know. The episode title—and I really like this episode title, is: A lost prairie butterfly gets reintroduced to Minnesota. I just love that because how is it lost? Where did it go? Was it not wearing its leash when it was walking around with its parent and it didn't go to the right location? I just don't know! So, Cale is going to tell us all about it. So, we're going to talk about butterflies today and not just any butterflies. Cale first introduced me to these butterflies and told me that they're really just little big-eyed ones called skippers. So, we're going to talk with him. He's going to tell us all about his work with rare butterflies and the reintroduction effort that's underway at Hole-in-the-Mountain Prairie in Lincoln County, Minnesota.

So, we want to start this season off the same way that we started last season off and there's no better way to do that than with a quote from the man, the conservationist, the father of conservation, Aldo Leopold. So, this is our quote to kick off season 2: "A thing is right when it tends to preserve the integrity, the stability, and beauty of the biotic community. It is wrong when it tends otherwise."

Jess: Oooo, that's good. Resiliency. That's what comes to my mind,

Megan: Diversity! I can't help, but yell it really loud because I get excited. And part of having resiliency and diversity is making sure that you don't lose any cogs and wheels, which is how we started last season. Another Aldo Leopold quote that talks about how all the parts and pieces are all working together in the ecosystem. We don't necessarily understand what might happen if we lose some of them. So, that's why we're going to talk with Cale a little bit about these rare prairie butterflies and why it's so important to bring them back. But, before we jump in. Cale, you do so many things and so we want to hear a little bit about the work that you do.

Cale: Yeah. Well so, my position here at the Minnesota Zoo—again, I'm a prairie butterfly conservation specialist so what does that mean? The work that I do along with my colleagues in the prairie butterfly conservation project is to try to recover some of Minnesota's most imperiled butterflies by using techniques that we have at the Zoo for rearing these endangered butterflies then doing reintroduction planning to get them back out into sites that they used to occur in. But, as you mentioned before, we're working with a really interesting group of butterflies—the skippers. These are really poorly studied and we don't know much about this group of butterflies. They are in the family Hesperidae and we're kind of writing the book as we go when we're studying them. So, even though butterfly reintroduction programs are not new among zoos, working with the skippers definitely is.

Megan: See, I'm so glad that I work in MN because before I worked in MN, I thought that skipper was just Barbie's friend who couldn't wear any of her shoes because her feet were so flat. Now, I find out that they are actually these big-eyed butterflies that are super cool and way cooler than the doll, Skipper. ((Sarcastically)) Sorry, Skipper, Barbie always had it going on. Not you. Too bad. ((Laughter)). It's true. Now, the butterfly skipper sounds like it's just as cool…Well, cooler.

Jessica: Probably cooler.

Megan: Yeah, cooler. It's like the Barbie-version [of a skipper]…Ok never mind, it doesn't work. Anyway, I was trying to make a connection there and it didn't happen. Cale, how does one become (I'm bailing myself out now, see how this is. I picked up the shovel and now I'm bailing myself out) a Prairie Butterfly Conservation Specialist?

Cale: Well, I think it's just having a passion for these animals and understanding the diversity that is out at these prairie sites. My background—I'm somebody who has always just ben really enthusiastic about invertebrates and the natural world. Even as a little kid, every log I wanted to turn over to see what cool macroscopic invertebrate community was there. A venue like the Minnesota Zoo is somewhere that was very natural for me to want to get a job at because I want to tell these stories and communicate that elsewhere. The Minnesota Zoo became this great place for me to be able to really, really share this passion for invertebrates. And because this is a conservation-based organization, it's this venue to be able to study animals that really have never been studied before.

Megan: And the Zoo is part of state government right?

Cale: That's right we're a state agency.

Jess: (inaudible) Partner.

Megan: I know! Partner! Partnership. I like it.

Cale: And this is not the first conservation project that the MN Zoo has been involved with in terms of animal reintroduction and rearing with the MN DNR. This has happened before with swans, Trumpeter swans in the state. As well as reintroduction of bison at Minneopa and Blue Mounds State Park.

Jess: That's awesome.

Megan: It is awesome. I like it because I can easily find you because you're in our state email system. ((Laughter)). So, I don't have to go somewhere separate. I love when we're all together.

Jess: Logistics.

Megan: Yes, logistics. It is nice when we get to partner together because the Zoo has so much knowledge and the DNR has so much knowledge. Lisa Gelvin-Innvaer always says not one person has all the knowledge, resources, and know-how and so when we partner this is the perfect example of bringing all of that together so that we make better projects and better conservation decisions. Partnerships!

Jess: That's awesome.

Cale: Absolutely! The synergy is really important. No one person could do this alone.

Megan: Synergy! 10-point bonus word. ((Laughter)).

Jess: So, some of our listeners might be in their car. Well, maybe they are sitting at their desk, but can you describe—just paint us a picture—of what a skipper is, why they call it a skipper?

Cale: Right, we keep saying this word, skipper, butterfly. What does that mean?

Jess: What is that?

Cale: Right, so skippers are a true group of butterflies. They are one of the most diverse groups, but we oftentimes overlook them. There are over 3200 described species of skippers.

Megan: 3200!

Cale: 3200!

Megan: Oh my gosh.

Jess: In the world.

Cale: There are a lot of described species of skippers out there. They tend to be a little smaller than our other butterflies. They fly really, really fast, which is why they get that skipper name. Where they will all of a sudden jet really fast and bounce from flower to flower like they're skipping along.

Megan: How much smaller? Like, if I have a Monarch in my hand—not that I would ever put a Monarch in my hand because I don't want to injure them. Hypothetically, I have a Monarch and it's landed on me naturally and I have a skipper, what's the size difference there?

Cale: It might only be about ½ the size and maybe even a little bit smaller. A monarch might be 2.5"-3" wingspan, across from tip to tip. Some of the skippers we're studying, particularly the ones that we're going to be talking about more today-- the Powesheik skipperling and Dakota skipper are not large butterflies The Dakota skipper is a little under a 2" wingspan.

Megan: Are they about the size of a quarter when their wings are folded up?

Cale: A little bit bigger.

Megan: A little bit bigger than a quarter.

Cale: A little bit more than a quarter. That's a good analogy. Maybe a silver dollar.

Megan: A Susan B. Anthony.

Jess: They also sit really cool. Occasionally, like when they perch on a flower.

Cale: That's a really good point. Yeah, so one of the key ways to identify a skipper out in the field when they rest, is they tend to rest with their wings at kind of this 45 degree angle where the hindwings lay flat, but the forewings (the wings in the front) are perched up a little bit more so they look like a little fighter jet. That's how we'll describe it.

Megan: I love that.

Cale: They're pretty cute.

Jess: That's the way I always described it too—like a jet fighter. And they do too, they look like they're about ready to just take off!

Cale: One of my favorite features is that they have these big doll eyes. One of the synapomorphies or unique characteristics among skippers is that they've got these really big heads. Almost doll-like heads. Compared to other butterflies, their head is going to be about as wide as or sometimes even bigger than their thorax. They have these big doll-shaped eyes to match. So, they are a very, very cute butterfly.

Megan: Now, explain what a thorax is.

Cale: That's the middle part of their body where their legs and wings are attached.

Megan: Good.

Cale: You're right. I've got to be careful there, Megan. Thanks for reigning me in.

Jess: And they have one more—Cale described it as their synapomorphies, a characteristic that defines the group. They have these club-shaped antennae. Yeah?

Cale: Well, that would be true for all butterflies. True butterflies compared to the other moths…so they are in the greater order of insects, the Lepidoptera, the scaly-winged insects. [This order] includes all of your moths and butterflies. Within the butterflies that all have clubbed-antennas. So, their antennas are smooth, but rounded at the ends compared to other moths that tend to have branching or feathered antennas. Within the skippers, we've got smooth, clubbed-antennas that will flare a little bit at the tips. It's a subtle things, but oh man as an Entomologist, it's one of those things that you geek out over.

Megan: So, can you see it with the naked eye? So, you don't have to be—I'm not an Entomologist, I'm an Ecologist. Both E's, very different things. Can I see it with the naked eye if I'm looking at these perched on a flower—their clubbed antenna?

Cale: For most species. You will definitely see the clubbed-antenna.

Jess: The little hook, maybe. Probably, if you look close enough.

Megan: They have a hook?

Jess: Yeah, this is what Cale was talking about.

Cale: It flares.

Megan: Oh, it flares. Ok. I got it. I'm with you. ((Laughter)). I thought you meant like a pirate-hook and I was concerned.

Jess: No, No, No.

Megan: I got it. I'm with you. So, they seem pretty important. What is the overall trend with butterflies in general in MN? Why is it so important to focus on skippers and to bring them back? And are they following these other trends? So, this is like 3 questions at once, but I know you can do it.

Cale: I'm going to do my best. So, unfortunately the overall trend that these butterflies and skippers are following are the same trends that we're seeing with many of our other pollinators. I'm sure many of your listeners have already heard about the declines with bees and our other vital pollinator species. Unfortunately, butterflies are following these same trends where we're losing species and population numbers faster than we can record it.

Megan: That is sad news.

Cale: It's a fairly dire situation. When we started the Prairie Butterfly Conservation Program here at the Zoo, we knew that we wanted to target Minnesota's most imperiled species. So, when we were deciding which species we wanted to focus on they were those whose populations had declined the most rapidly.

Jess: I get this question a lot. How long have Dakota skippers or how long have we known that Dakota skipper populations have been in decline?

Cale: So, I've mentioned two species so far—Dakota skipper and the Powesheik skipperling. Dakota we've been watching for a while. It's a prairie specialist species and because so much of our prairie has already been converted, only about 1-2% in the state is remaining, so we know that their populations have already dramatically declined. That's not a new thing. This conversion has happened a long time ago. What's new though is that even within the protected prairie sites-- So, the little remnants where Dakota skippers have been in, they've been disappearing. And that's only been recorded since the early 2000's. So, this is a really new thing that we're losing them now in what seems to still be good habitat.

Megan: And sufficiently sized habitat, right? These aren't small remnants that we're talking about—they are a couple thousand acres.

Cale: Even the bigger sites. And these butterflies don't need a lot of space. Jessica, you asked about how quickly we have known about these declines. Well, we've known that

there was one mass decline across the range, but even within the protected sites, that's just within the last 15-20 years. That's what's been so alarming about Dakota skipper. We never thought it was going to decline as fast as it did. And Powesheik skipperling the situation has been even worse, and even more rapid. This was probably Minnesota's most predictable butterfly species up until the last 15 years and it's really fallen off the face of the earth. To the point, that we don't know of any remnant populations left in MN. And the heart of its range used to be in the state. We actually can't even say that for any other butterfly species.

Megan: So when you say predictable you mean that we were most likely to find it?

Cale: It was like going outside and you almost expect to see a robin. You go outside this time of year and you're going to see a robin. That's just one of these things, you just know that you're going to see it. So, a lot of butterfly researchers just assumed that they were always going to be able to see Powesheik skipperlings if you went out to a prairie site. They were oftentimes in the ditches. It was one of these things that just nobody thought—wait a minute—how on earth could we lose Powesheik? To the point where now we believe they are extirpated, completely gone, from Minnesota.

Megan: Which is really, really disheartening. And they are two federally-listed species now as well.

Cale: They are now as of 2014.

Megan: Right, so the Dakota is federally threatened and the powesheik is federally endangered. Neither status is good. It means that they are declining and we have a lot of work to do to figure out why. So, enter the partnership between the MN Zoo and the Dept. of Natural Resources. Give us a little bit of background on how you do a Dakota skipper reintroduction—especially knowing what you said earlier, that we have some of these sites that seem like they are really good habitat, but [the butterflies] are [still] winking out. So, how do you launch your reintroduction knowing—or not knowing so many things?

Cale: So, I'll backup just a little bit, before we even got into the reintroduction, we had to figure out how to do this. How can we start even raising Dakota skipper butterflies at the MN Zoo? So, first even identifying that this is something that we [should] do. I think one of the most important aspects of our project was at the very beginning bringing in a lot of our other collaborators—folks with the MN DNR, USFWS, as well as other regional experts who already knew a lot about these butterflies. We also worked with an organization called the Conservation Breeding Specialist Group where they were able to help facilitate a meeting and figure out what is going to be the best conservation strategy to recover Dakota Skippers. What was identified first after going through this meeting and a structured-decision making process was to just do insurance population. So, when I say insurance population, I mean have the skippers living at a place where we can maintain genetic populations in case they blink out from more sites. Because that's what keeps happening at these sites in the field where you'll have what looks like a really healthy remnant prairie with lots of skippers in it, you have a year of surveys and they do great, and then the next year you never see them again. And because these butterflies can't really travel between prairie sites anymore—they're not like a big

Monarch that can travel hundreds of miles in its life—they are pretty much homebodies and tend to stay within the same 300 meters for their entire life. Three hundred meters is even kind of pushing it so they can't get between separated prairies. So, if they blink out from one site, they are never going to be able to recolonize without someone doing something about it. So, the very first thing we identified that we were going to need to do for our project was to establish this insurance population here at the Zoo where we could continually keep breeding them so at least, genetically, they occur somewhere. But, the overall goal was not to always have them just living in Apple Valley at the MN Zoo. We wanted to get them out. So, the program, this is a relatively new conservation program at the MN Zoo, we started this in 2012. We collected our first Dakota skipper eggs in 2013.

Megan: Where did you collect those eggs from?

Cale: So, the original founders that we have actually came from some site in northeast South Dakota, north of Watertown. That's what started our population here. Raising them up and learning a lot about them [as we went along]. It's kind of interesting with the Dakota skipper is that the caterpillars have never been observed in the wild. So, a lot of what we now know about these skippers we've had to learn about here at the Zoo to figure out what their needs are and how to optimize rearing protocols for these skippers. So, the first three years of this program was just learning about how to do it.

Megan: So, I remember Cale, when this first got started, was attending one of our native plant community trainings. I think, Jess, this might have even been pre-Jess, PJ, pre-Jessica. Cale was attending day one and everything was fine. Totally normal. Totally happy to be out on the prairie learning prairie plants. Day 2 you just see the Zoo-mobile and Cale waving, "I've got to go! The caterpillars have EMERGED!" ((Laughter)). Just on his way out because all predictions as far as I can tell, they weren't supposed to emerge until much later and he thought he had plenty of time. All of a sudden they surprised him and you're trying to learn as you go with one of the rarest butterflies in the world. So, that's no pressure, Cale. No pressure.

Cale: It's a humbling experience and it is sort of horrifying to think about. In some cases, a 1/3 of a species potentially [is] in our lap.

Megan: How do you feel about having the weight of that on your shoulders? Feel pretty good about it?

Cale: It varies on the day.

Megan: That's why there's lots of you. It's not just you, there's Eric as well.

Cale: Absolutely. There's Emily [Royer] who is also part of our team along with Dr. Erik Runquist. So, we're a three person team here at the Zoo,

Megan: And there's Robert Dana, Butterfly Specialist Extraordinaire.

Jess: Right.

Megan: At the Department of Natural Resources and now Jessica Petersen.

Jess: Yeah, we're excited to continue this work through this summer and beyond. It's fun stuff.

Cale: So, now to circle back to your question. Now, where are we going with the reintroduction, so really after the first few years figuring out this process, figuring out what we need for the Dakota skipper and to rear them in a zoo setting. What is amazing, is it has been successful! We have been able to grow our populations every year. Dakota skipper is one generation per year, it takes them a whole year to go from a caterpillar, they overwinter as a half grown caterpillar out in the Minnesota prairie. Here at the Minnesota Zoo, we replicate that condition. Actually in a refrigerator, it looks very weird, but it has been working for us. ((Laughter)).

Megan: You are cooling your butterflies. ((Laughter)).

Cale: That is right!

Jess: If it is not broke don't fix it. ((Laughter)).

Cale: We wake them up in the spring. They finish their development and become a chrysalis about mid-June and become an adult butterfly in the middle of the summer. We are currently going into the next generation now, with the new hatchlings.

Megan: Didn't you show us? Sorry I get so distracted. I just get so excited!

Cale: I love that you are so excited!

Megan: I think it was two years ago you invited us and some other Dept. of Natural Resources folks to the Zoo and we were able to see all the work you have been doing/done and actually see it in action! We got to see little caterpillars. I would like to say they were doing lots of exciting things, but they were mostly sitting on the bottom of prairie grasses eating, right. So, they just spend their time at the base of prairie dropseed and bluestem just munching away! Are they very mobile?

Cale: I don't know what else you would expect them to do? ((Laughter)).

Megan: I just…

Cale: They are cute enough as it is Megan!

Megan: I mean they are chubby and cute. The cutest description of a caterpillar that I have ever heard. I just wanted to sit and watch them all day long. They pulled down the stem of the grass, so instead of actually having to move—at all. They just used their little hands, I mean they are not hands, to pull down the grass and sit there and put it into their mouths and munch on it-- not moving at all. They are like chubby prairie couch potatoes.

Cale: That is a wonderful way to put it.

Megan: I love them.

Cale: And they are adorable. You just mentioned that they are grass feeders they eat native bunch grasses: prairie dropseed, little bluestem and side-oats grama. One of their favorites in the lab is porcupine grass.

Megan: Also, just for the people to know, not to get too botany nerd here, but, [porcupine grass is] an early cool season grass that is super duper important to have on your dry prairie sites as well as prairie dropseed, which is a bunch grass. It creates lots of space and it is also home to chubby little caterpillars!

Cale: That's right! So, they are a shelter builder. The larva/caterpillars spin a volcano shaped tube that they live in, right at the base of the grasses. It only gets to be about an inch tall. This is what is protecting them from predators and it becomes very difficult to find them when they are in there. Occasionally, you will see them grab a little grass blade, like you said before Megan ((Laughter)), snip it at the base and drag it into their little shelter. Ideally, they don't have to leave the shelter and you will see this little grass blade slowly descend into their shelter as they eat it.

Megan: This is the best thing ever!

Cale: They are pretty cute.

Megan: What do they make their shelter out of?

Cale: The dead grasses right where they live, but like most other butterfly caterpillars they make silk from glands in their mouth. So, they will stich that together with the silk they are producing. And they will make 3-4 different shelters as they grow and get bigger. But they will be in shelters the whole time.

Jess: So talk to us about the release. You have grown these guys up and you are ready to let them go out into the wild. What happens? Talk to us about that.

Megan: But you don't release them as caterpillar's right?

Cale: No, and we still do not know what they are doing as caterpillars. The first few years of the program was just growing up our population here at the Zoo and now we feel like we have enough that we can start dispositioning them back into the wild.

Megan: Dispositioning.

Jess: Dispositioning, I like that.

Cale: So, start planning for this reintroduction process. The first part went into identifying a place. So, we still don't know exactly why they have disappeared from these prairie sites that they went from. So, in some ways this is a guessing game. But, we are trying to make our best guesses in ways we can make this as successful as possible. And release them into areas [where] we have reasons why we think they might have disappeared from those first locations. And went through another series of criteria that we wanted to meet for our first reintroduction site. So, for our very first reintroduction site, you guys already said this at the beginning of the podcast, you mentioned, Hole-in-the-Mountain Prairie Reserve just south of Lake Benton, Minnesota. For our very first reintroduction site that we know Dakota skippers are doing very, very well at. Up until 2008 was the last time we knew they were seen there. And then surveys did not happen for a few years, surveys did not pick up again until 2012. So, somewhere between 2008 and 2012 the butterflies totally disappeared from that location and we are still trying to study and figure out what happened there. But we

chose this site because it's one we knew butterflies were gone from and we did not want to disrupt any other existing population.

Jess: Sure.

Megan: Right.

Cale: We wanted to make sure there were good floral communities there. Right now the floral communities and the grass composition is at a high plant diversity level still occur at the Hole-in-the-Mountain Prairie Reserve. Which is fabulous! [We] Have a wonderful relationship with The Nature Conservancy that is managing the actual unit that they're on. [The property also] neighbors with the DNR that is also nearby because we want this to grow into populations. The other neighbor that was really important to work with was the City of Lake Benton itself. So, one of the things that ranked the site so high was the cooperation with the locally community and people taking an interest in Lake Benton. So, all of those things added up to the calculus of pick Hole-in-the-Mountain as our very first spot. And again this just started in 2017.

Jess: So, you talked about the grasses these caterpillars need. You also touched base a little about the floral community. Could you talk about the biology? Like, what adult floral species do the caterpillars need?

Cale: So, for a lot of butterflies they are really, really specific as caterpillars on what they can eat but, not too specific on what flowers they can visit [as adults]. Dakotas seemed to be almost the opposite of this. We know they can eat a number of different grass species. So, having a high diversity of grasses in the environment seems to be very, very important. What also seems really important is to have the right flowers at the site. In our part of the range narrow leaf purple coneflower [*Echinacea angustifolia*] seems to be the most important species for these butterflies. Not just the presence of it, but having high concentrations is really important for Dakota Skippers.

Megan: For the botany nerds out there that's *Echinacea angustifolia*. ((Laughter)). There are three different species of purple coneflower. So, I just want to make it clear that the MINNESOTA one is *Echinacea angustifolia.*

Cale: That's our only true native.

Megan: Native purple coneflower.

Jess: So, I have been always really fascinated about this. What is it about the nectar that is so fascinating to them [Dakota skippers]?

Cale: We still don't know exactly what that is or why this one flower seems to be the most important in this part of the range.

Jess: Right.

Cale: Now, Part of the Dakota Skipper range is just slightly outside of *E. angustifolia* range. Further north into North Dakota you end up getting into a whole different type of habitat where they seem to prefer Black-eyed Susan's. At least here at the Zoo we know they don't.

Jess: Totally different plant.

Megan: Yeah! Totally different plant! ((Laughter)). HERE'S MY THEORY! I just developed it, just now. This is my theory…

Cale: All theories are valid Megan.

Megan: They are kind of an orange/yellow butterfly and so purple coneflower has an orange center part. As you move out into North Dakota range for Black-eyed Susan's, they have more of an orange/yellow tint to the cap. MAYBE THEY ARE CAMOUFLAGING!! This has nothing to do with nectar.

Jess: Not only do they use the plants for nectar but, they also perch.

Cale: Right.

Jess: On these flowers.

Cale: Something that is really interesting. The male skippers are really territorial they almost have this lekking behavior. Where the males will guard one little patch and most likely breed with all of the females. If they are able to successfully defend that patch. So, it may just be that they can feed on a variety of flowers, but there is something about coneflowers that they have said "Hey everybody! This is where we are going to congregate to and hang out at the coneflower patch and this way we can find each other on the landscape" Because historically the prairies would be changing from season to season with new disturbances like bison roaming through, or fire coming through and burning certain patches. Then you get differences in the floral compositions and the butterflies are probably following these disturbances. So, coneflower must be the signal, "Hey, everybody lets gather here." So, they just don't disperse and never find one another. During their relatively short, two and a half week adult flying period.

Megan: It's a long life.

Cale: We are hoping to--. ((Laughter)).

Megan: Sarcasm. ((Laughter)).

Cale: Well you say that sarcastically.

Jess: It's a year!

Megan: I know! I know! But as a winged adult, you have to say wingED. So, people know there is an 'ed' on the end.

Cale: I know you already mentioned ((Laughter)) prairie couch potato phase.

Megan: Right.

Cale: That was almost a year that sounds like an amazing thing.

Megan: I know! So, they are only active for 2 ½ weeks. I mean this is the best exercise plan on the planet. I am going to be a chubby couch potato caterpillar ((Laughter)) for the better part of a year and then for 2 ½ weeks I am going to move and get some things done and then make more butterflies.

Jess: But, this is the part of the huge challenge with this species and other insects that we know very little about the rest of their life. Aside from that 2 ½ weeks we can see them very easily and that looks like that is the only time they are active. But, really they are doing all this other stuff. That we just done even understand.

Megan: Oh which cool stuff, don't get me wrong.

Jess: I know!

Megan: I am just saying it is fascinating. ((Laughter)). They will make their little hut. I could talk to you (Cale) and Jess and nerd out about butterflies and insects all day, but we are running out of time. So, we can't. Tell us really quickly some of the interesting things you are finding out and what do you think the future holds for rare butterflies in the state of Minnesota? I know big ending questions for this first section!

Cale: Those are really important questions. This is a really new program here at the Minnesota Zoo, that we just started. Involving a lot of partners, but we have learned a ton in this short time that we have been doing this with Dakota skippers and right now the overall plan is to get Dakota skippers back into all of these sites that they have disappeared from. Right now in Minnesota there is one natural growing site that we know they are still at. The goal is to reintroduce them back to all of [their previously known] locations.

Jess: That is a very lofty goal!

Cale: That is a lofty goal.

Megan: How many sites is that?

Cale: I don't know exactly. ((Laughter)).

Megan: Okay…it seems like a lot!! To be one of the most, as you described earlier "It would be like going outside and seeing a Robin", to be a Robin in the butterfly world and now you are going to repopulate them to everywhere. If you are thinking about it in terms of a Robin that everywhere a Robin once was and everywhere a Poweshiek. That's crazy!

Cale: You have to aim big!

Megan: YEAH!

Jess: I do know this about Cale--that he has high standards. It's a good thing.

Megan: I like it! I think it is great! I am impressed!

Cale: People will ask, do you think we will be able to do this? I think with all of our partners as long as we will be able to work together to solve these problems. Absolutely! I know that sounds super idealistic.

Megan: NO! I just love it!

Cale: Almost dismissively so. ((Laughter)).

Megan: You have to be POSITIVE in this field or we are not going to get anywhere.

Cale: Right.

Megan: Because there are so many things that I think we don't understand and so many data gaps. When people ask what the cause of this was? It isn't usually just one thing because ecosystems are complicated so it is a lot of interacting things that can cause decline or problems.

Cale: Right.

Megan: So, I like that you are saying, but it has to be lots of us working together and try and fix those problems.

Cale: We know from other reintroduction programs that we have been able to recover other species here in Minnesota. So, I think there is a great future for Dakota Skippers and Poweshiek Skipperling.

Megan: I like it. Jess do you think it is time to move too…

Jess: Yep, I do.

Jess and Megan: LETS SCIENCES: TO THE LITERATURE!

Megan: Oh my gosh, we have so many things we can science about today! So this is the part of the podcast where we recommend a book, a blog or a paper, or all three! And we will have Jess cover the science about Skippers and rare butterflies and butterflies in general and Cale will be a commentator on that. Jess take it away!

Jess: So, we have covered some of the biology of this species. We have barely talked about the Poweshiek Skipperling, but there are a couple fact sheets out there. There is one from the U.S. Fish and Wildlife service and a Dakota Skipper fact sheet. There are also fact sheets from the Zoo.

Cale: I am going to encourage you to check out the minnesotazoo.org and click on the conservation link to learn more about the work we are doing here for these imperiled Skippers.

Jess: So, the second paper I want to talk about today is a freely accessible journal called Plos Biology. The title is: Resurrection and Resilience of the Rarest Butterflies. I am really interested in getting Cale's perspective on this paper today. The author is Nick Haddad. I saw Nick speak a couple years at the University, he is a really great speaker and he studies some of the rarest butterflies, in North America—probably the world. This paper is more of a commentary, he is really just chit chatting about his thoughts on rare butterflies. He talks about stamp collecting a little bit and a whole gamut of things in this paper. ((Laughter)) So he looked at rare butterflies and discovered some interesting trends among the rare butterflies. He was looking at them at the species level. Rare butterflies are becoming rarer, that is the first thing he noted. I think that would be the case for these butterflies, especially Dakota Skippers. They have always been rare, but are becoming rarer. Not so much for Poweshiek Skipperling. Many of the rare species of butterflies that he found through his literature searching are species that depend on habitat that requires disturbance. Again, these species require disturbance. We have not talked about management at all yet today. You will find some of that in the fact

sheets—some management implications. Nick noted some things in the paper like fire, flooding, and grazing are all natural disturbances. We are not talking about putting in a subdivision here. Natural disturbances that a prairie requires to not become a forest. So, again that is important there is a lot of literature that talks about if fire impacts this species. I think that the jury is still out in part. For example a hot fire went through a prairie during a really vulnerable part of the species life, it could kill some of them. They also require the effects of a fire, which often increases the forbs for their survival. So, this is that butterfly paradox that people often talk about.

Cale: So, often the case with disturbance is that you get this goldilocks zone. Too much is bad, too little is bad, you need just the right amount.

Jess: That is really good. So, my favorite quote from this paper is, “Restricting disturbance to prevent harm is akin, to Mice of Men, Lenny squeezing a puppy.”

Megan: Loving populations to death.

Jess: So, if we want to care and protect these butterflies really carefully, please don’t burn them! But, we have to use some sort of disturbance to protect the habitat that they so depend on. I like the goldilocks—that is really good. Okay, the last paper I want to talk about today is Dearborn and Westwood in 2014, ‘Predicting Adult Emergence of Dakota Skippers and Poweshiek Skipperling.’ We have talked about that they have a really short adult life span, so if you want to go out and monitor these guys, you have to catch that window—two and half weeks. Plus it varies by two weeks! To start emergence. You are just guessing, right? Unless, we use some math. And you know I love math!

Megan: I LOVE MATH!! I could not help that, I really do!

Jess: Knowing when to survey is a challenge. We would have to do some math, we can use these degree models. There are a lot of variables that go into these models, so read the paper and judge for yourself. The paper talks about what they did in Manitoba, along with a similar study that was done, not published yet, in Minnesota to update degree day models. So you can get all kinds of information from there, if you want to learn and go out and search for these guys. You should get yourself a degree day model. Cale uses degree day models.

Cale: We do use degree day models.

Jess: That is awesome.

Cale: I have to plan our entire summer where I am simultaneously doing Dakota Skipper and Poweshiek Skipperling reintroduction and collecting Dakota Skipper and Poweshiek Skipperling eggs from the field, over a span of 1500 miles ((Laughter)) including 6 different states also including Manitoba. We only have about 2 weeks to do all of that. We have to plan all of this out, so having a good model in place, is just good planning.

Megan: My guess is that you have a model and a spreadsheet. ((Laughter))

Cale: A lot of gent charts going.

Jess: And it is three people. ((Laughter)).

Megan: Three people! ((Laughter)).

Cale: We have to simultaneously try to be in multiple places at once.

Jess: Right. Clone yourselves. In general, what a degree model does, it takes the degree for every day that is above a certain threshold. Where the average temperature is above a certain threshold. Then you would know given that threshold when to go out.

Cale: The theory behind these things and why they work is because a lot of insect development is highly correlated with temperature.

Jess: Right. Thanks for that Cale. Megan?

Megan: Yeah, Jess?

Jess: Take a hike!

Megan: I THINK I WILL! ((Laughter)). What better place to start a hike then at the Minnesota Zoo. From here I am going to leave and go to the PRAIRIE! ((Laughter)) So, we have mentioned two of the prairies we talked about today before, but it's worth mentioning again because now you know all the awesome butterfly conservation work that is happening in this area. The one I am going to start out with is the Hole-in-the-Mountain Prairies. We did mention that on season 1 episode 5, what goes in the mix, makes the cake! That was our restoration series building a seed mix hollaback to season 1. We want to spend as much time at Hole-in-the-Mountain. It is actually two units, managed by two different entities. But, all a part of your public lands! So as always the prairies we are going to mention today are a part of your rich Minnesota natural heritage and we encourage you to get out anytime and go visit them. Because they are yours, you are a landowner, you own it. And you might also see a rare prairie butterfly while you are out walking. So the Hole-in-the-Mountain Wildlife Management Area is in Lincoln County, it is about 638 acres of grassland, it has remnant prairies and wetlands it has all kinds of cool stuff going on out there. As Jess likes to say, VISTAS, it has the VISTAS.

Jess: It is absolutely beautiful.

Megan: It's really hill prairie at its finest! You are going to need some sturdy shoes, a LOT of water and sun block. The thing about being on a hill prairie is that it is windy, which is nice and breezy, but you get dehydrated before you even realize it. So if you have a headache get some water! ((Laughter)). People stay safe out there on the prairie. So right next door to that is the Hole-in-the-Mountain… Lack of water is important what is wrong with that? You need to stay hydrated while hiking, safety first. ((Laughter))

Jess: That is very important. ((Laughter)).

Megan: So, right next to the Hole-in-the-Mountain Wildlife Management Area is The Nature Conservancy preserve. This is where the butterfly work is happening. We should mention over at the DNR site there are also regal fritillaries. So, we have all kinds of rare butterflies hanging out—doing their thing. But, The Nature Conservancy site is

about 1,364 acres—it is a large prairie remnant. It is on a steep valley along the outer edge of a glacial escarpment, known as the Prairie Coteau.

Jess: Coteau.

Megan: Oh, you say it so much better than I do. Say it again!

Jess: I am not going to say it again!

Megan: Oh my gosh.

Jess: One time only.

Megan: How I am I supposed to learn? I wanted to clap it out with you. ((Laughter)) Just like we do when we pronounce our words in grade school. ((Clapping)). Well, well, well, you can find that site on The Nature Conservancy preserve website. It has lots of wildflowers during the summer, undulating terrain—for sure, prairie dependent insects, 25 species of butterflies, waterfowl and grassland birds. IT'S GOT IT ALL PEOPLE!!

Jess: Love it! ((Laughter)). Well, I love it. It is absolutely beautiful.

Megan: Jess was stunned with that dramatic pause there for everybody to take it all in. We were imagining our time out at Hole-in-the-Mountain last year. It was a pretty good time.

Jess: I was not there.

Megan: Oh.

Jess: You and Cale were there.

Megan: Oh, that is right. I was imagining my time with Cale last summer! ((Laughter)) Not with Jessica! ((Laughter)). For a second you guys were interchangeable.

Jess: I was moving.

Megan: Yeah, you were moving.

Jess: I was moving to St.Paul.

Megan: So, Cale and I had to enjoy it for you, which we did. As always, we ask our guests to pick out their favorite prairie from public lands. Cale, what would your pick be?

Cale: To be honest I feel a little Sophie's choice here because there are so many amazing underappreciated prairie sites here in Minnesota. I just want everyone to get out and enjoy and appreciate their subtle beauty. But, because Jessica and Megan had such a bad experience at this one site, I want to revisit. ((Laughter)). I love this location! Glacial Lakes State Park.

Megan: You would!

Jess: He doesn't want to leave it with a bad name.

Cale: No!

Megan: We did not say it has a bad name! We are not going to camp there! ((Laughter)) Glacial Lakes State Park is fabulous—it is very beautiful. A lot of fishers. ((Laughter)) A lot of fishers. ((Laughter)).

Cale: So, a few things to add to that. I have camped at the site many times. ((Laughter)) It is a wonderful, beautiful site to camp at! I have never once seen a fisher! I would be actually really excited to see a fisher there! We have fisher here at the Minnesota Zoo. They are amazing really cool animals! I love to watch them and I would be honored if one came to visit me. But, I love Glacial Lakes it is an amazing site and is really well managed. Beautiful rolling hills, great floral communities and another site with really rare insects at, as an enthusiast—oh man it's a great site to geek out at! And appreciate what Minnesota used to look like. You just feel like you are somewhere—in another time.

Jess: That is right. You can squint a little bit and then you do not see the roads.

Cale: It is so beautiful with the site, you don't even need to do that.

Jess: That is true.

Cale: When you are in these valleys and caves at this site. You do not need to squint. You are just in this amazing prairie.

Jess: Love it!

Cale: It is a fabulous site. I would recommend that everyone check out Glacial Lakes State Park.

Megan: I have two things I want to say! Number one, the fishers at the Zoo are behind a wall, if I am not mistaken! ((Laughter)) And you are not having an up-close encounter with them. Number two, fishers are amazing, I am turning this into a three thing. They are not outside my tent trying to eat me, which I don't think they could do because they're too small. So ((Laughter)). Number three.

Cale: But of course, everyone should offer a respectful space to a fisher. If you are fortunate enough to see one in the wild.

Jess and Megan: That is correct

Megan: Yes, I will learn and think of that as being fortunate. You know what is funny, is the year after that, we were at a prairie training again in northwest Minnesota. And a family of fishers ran across the road. Jess and I were driving and we were like, THEY KNOW WHERE WE ARE!

Jess: They followed us.

Megan: They know where we are! They're everywhere! We talked to people at the training and they are like we have never seen that, you guys are so lucky. And they had babies with them and we got to see them really close.

Cale: Awww.

Megan: They are adorable!

Jess: Great from inside the car.

Megan: Yeah, from inside the car it was magical!

Cale: I mean probably not quite skipper cute, but baby fishers are cute.

Megan: It was a magical experience.

Jess: They looked like inch worms.

Megan: It was magical. Number three…

Cale: We love inch worms too!

Jess: That is true! ((Laughter)). Inch worms are really awesome. ((Laughter)).

Megan: Number three, I want to say a shout out to Glacial [Lakes} state park's staff-- they are amazing! As well as all of our Minnesota state park staff. I am always impressed no matter what experiences I have at a state park-- with a fisher or without a fisher. Our state parks are some of the best in the nation! The people who work there make sure that your experience is going to be excellent. That is something that makes me proud to live in this state.

Jess: We also have to give a shout out to the funding source to the project so Dakota Skippers and imperiled butterflies, reintroduction, butterflies and monitoring. All was funded by the Minnesota Environment Natural Resources trust fund. And the start up for the Zoo's rearing [came from the] Legacy Amendment. All of these wonderful Minnesota dollars going to fabulous projects.

Megan: More things that make this state one of the best in the nation. We are the best! That is why we moved here. Transplanting into Minnesota—can't help myself! As always you can catch all the resources that we have talked about today including the Let's Science section and our Take a Hikes on our website at mndnr.gov/prairiepod. And we are not done, we are just getting started! Season two ON A ROLL! From the Minnesota Zoo, next week where will we be? Probably in a regular office. ((Laughter)) So, we will catch you next time on Prairie Tuesday on the Prairie Pod. We will be talking about long-term management for restorations and answer some of your most burning questions! We tool do I use? How often? Can't I just leave that prairie alone? We are going to be joined by Assistant Regional Wildlife Manager, Joe Stangel and Area Wildlife Manager, Jeanine Vorland. We guarantee you won't want to miss it! Because it will be at least fair to middlin' ((Laughter)). Catch you next time on the Prairie Pod!

Jess: Alright! Let's go check out the fishers.

Megan: Alright, Cale show us the way!

Cale: Alright!

Jess: Check you later! ((Laughter)).

Megan: Bye!

((sounds of birds chirping and wind blowing))