

UWisconsin Sea Grant | Beetles.mp3

[MUSIC PLAYING]

SYDNEY Hi, Bonnie.

WIDELL:

BONNIE Hey, Sydney.

WILLISON:

SYDNEY The other week you were telling me about this woman you met at the conference in

WIDELL: Sault Ste Marie.

BONNIE Yeah, Molly. She's our Sea Grant outreach specialist. She does invasive species work

WILLISON: in Milwaukee right?

SYDNEY Yeah.

WIDELL:

BONNIE When I first heard about Molly, I had the impression she was training beetles. Like

WILLISON: the way you would train a dog to do a trick. And I later learned that that was not exactly what was going on.

SYDNEY Yeah, have you ever trained an animal to do something?

WIDELL:

BONNIE I've helped trained dogs. My mom trains horses for a living, so I'm familiar with that.

WILLISON: But I've definitely never done that.

SYDNEY I didn't realize she trains horses. What does she--

WIDELL:

BONNIE She's taught herself how to train horses from the time they're babies. And it's a few

WILLISON: years until horses are ready to be ridden and stuff. Like, you have to do that much work beforehand. So, have you trained something?

SYDNEY My dad has kind of trained our cat to always come under the table while he's eating

WIDELL: dinner, because he used to feed her off his plate, and then he realized that that was really annoying. But now, she is just so conditioned. But that is not exactly what

Molly is doing.

BONNIE At any point, Molly will be working with up to four different species of these beetles.

WILLISON: They're called Galerucella beetles, but people call them Cella beetles.

SYDNEY And every spring she goes out, collects them from these wetlands, and brings them

WIDELL: to her home and to her office, which I guess is a Sea Grant office, so it's probably not that crazy.

BONNIE We do have a baby sturgeon in our freezer.

WILLISON:

SYDNEY I know, she emailed me the day, when I was trying to set up a time to talk with her,

WIDELL: she emailed me. She was like, oh, yeah, I am going to be in Madison because I'm picking up some lampreys, but she never specified if they were alive or what the status on those were. It was dead, by the way. It was really dead.

Anyway, Molly came by the studio and told us more about what she's been up to.

MOLLY BODDE: I'm Molly Bodde. I am originally from Appleton area of Wisconsin. I started with Sea Grant and working with aquatic invasive species. So, I have Osaki, Milwaukee, Racine, and Kenosha Counties right now.

SYDNEY Molly has these beetles. They're called Cella beetles, or actually they're called

WIDELL: Galerucella beetles, but everyone just calls them Cella beetles, and it's really cute. Have you ever seen one?

BONNIE No, I have so many questions.

WILLISON:

MOLLY BODDE: All right, I have some photos.

BONNIE Aw. I don't know I said, aw, it's a beetle.

WILLISON:

SYDNEY It's really cute. I know, they're kind of endearing.

WIDELL:

BONNIE Yeah.

WILLISON:

SYDNEY Yeah.

WIDELL:

BONNIE Looks like brown. It's got little antennas. It's not creepy looking.

WILLISON:

SYDNEY Yeah, it's like--

WIDELL:

BONNIE Like I usually think of--

WILLISON:

SYDNEY --a really lovable little beetle.

WIDELL:

BONNIE Yeah.

WILLISON:

SYDNEY That's about, you can't really tell from that photo, that it's like the size of a pencil

WIDELL: eraser. The color--

BONNIE It's really small.

WILLISON:

SYDNEY Yeah, it's like the color of Hershey chocolate.

WIDELL:

MOLLY BODDE: I don't think they'll taste good, so don't try it.

SYDNEY OK.

WIDELL:

BONNIE She keeps them outside her apartment and behind her office in these kiddie pools

WILLISON: with like nets over them to contain them.

MOLLY BODDE: Which involved talking to my landlord and my neighbors that do the lawn care.

SYDNEY I asked her if she's ever had any other types of pets.

WIDELL:

MOLLY BODDE: I have two cats. And they're still alive. And they're 5 and 3, so, kind of. I've definitely, with this program, or this job, have gotten a lot more comfortable with being with nature.

BONNIE Oh, so she has-- she has cats and beetles in a pool in her yard.

WILLISON:

SYDNEY The cats are not in the pool. The beetles are, for clarification. Yeah, but I don't know what image you have in your mind right now of what this looks like. But it's not like some kind of ant farm operation.

WIDELL:

I don't know if you did that when you were a kid. I definitely did not, because I thought that was gross. Anyway, last summer Molly thinks she wound up with 12,000 beetles, which she then released to these area wetlands. And the program she was talking about was the Wisconsin DNR's Purple Loosestrife Biocontrol Program.

BONNIE I've heard that there's some way that you can use beetles to, and train them to eat a certain plant that we don't like.

WILLISON:

SYDNEY That's kind of, kind of what's going on here. Yeah, the story I wanted to share with you today follows the tiny little Cella beetles that Molly raises on this long, slow journey from this lab in Switzerland to Wisconsin's wetlands.

WIDELL:

But it's also the story of the researchers and community members who've helped raise the beetles along the way, and also how the beetles have changed our understanding of what it means to call something an invasive species. Have you ever seen Loosestrife?

BONNIE I'm not sure. I'm not super good at identifying plants. But I've heard it's purple, grows in marshes.

WILLISON:

SYDNEY The plant people I talk to clarified that it's actually fuchsia. So, technicality. Here's a photo.

WIDELL:

BONNIE Oh, it's like a really pretty purple flower.

WILLISON:

SYDNEY Yeah, it's so pretty.

WIDELL:

BONNIE It's kind of long. Yeah, I feel like I've seen these in marshes, but before I knew they were invasive, I thought they were really pretty, and I wanted to go take photos in there or something like that.

WILLISON:

SYDNEY Right, yeah, they are super pretty. And that's how they got so widespread. Here is what a wetland looks like. This is a photo I found. I think this is probably a pretty extreme example.

WIDELL:

BONNIE This looks just like a flower field of purple, like a field of purple.

WILLISON:

SYDNEY Yeah, like straight DayGlo pink going on in those photos.

WIDELL:

BONNIE Sorry, I keep neglecting to say fuchsia.

WILLISON:

SYDNEY So, this is a pretty extreme example. I guess you could describe this is like a complete monoculture. People use that word to talk about agriculture when you just have one crop, but you could also use it to describe what's happening in this photo of a wetland, where you look out across this expansive space, and it's only one plant that you can really identify.

WIDELL:

Yeah, so Loosestrife is this wildly successful plant that came over with European colonists. And it freaks people out because, once it comes into a wetland, it pretty much stays there. And it's really hard to control. It nudges out plants that might have been there before, and might be either doing something really important in that ecosystem, like controlling floodwater, or offering habitat to other things that call that wetland home.

BONNIE You usually find this plant?

WILLISON:

SYDNEY Yeah, like I said in wetlands, and floodplains, and disturbed areas like construction sites, or along highways, so you probably have seen it as you're driving. It's usually

WIDELL:

around five feet tall, but I've read that I can get up to 10 feet tall.

BONNIE Oh, my God. That's way taller than I imagined any wetland plant to be.

WILLISON:

SYDNEY I know, right? If that was like a Christmas tree, my mom would have been like, no,
WIDELL: it's too tall, we can't take this one home. Loosestrife is naturalized here, meaning that it's found suitable habitat to grow without help from humans. One plant can produce more than two million seeds every year, which is like so many seeds.

BONNIE Sounds like so many.

WILLISON:

SYDNEY Tim Campbell, our Sea Grant Aquatic Invasive Species Specialist, told me more
WIDELL: about this plant, its history here in Wisconsin, and why it's something that people are worried about.

TIM CAMPBELL: So, purple loosestrife is a wetland invasive plant that could have come in ballast water, or like sediment ballast, but also it's a really pretty plant. So, I'm sure it also came over in the plant trade as well.

SYDNEY So, many modes of entry. But then as people start moving west across North
WIDELL: America, they're bringing all of those plants with them. And then fast forward 200 years, and people in garden clubs are swapping seeds with each other, and going to conventions, and, like, oh I have this seed, here you go. Like the DNR woman I talked to said that she has bought seed kits that she is fairly certain had loosestrife or other plants that we would now call invasive in them.

BONNIE Oh, wow, so they're still selling and trading this?

WILLISON:

SYDNEY Not anymore. Now that's a huge no. They're on the DNR's do not sell this plant list.
WIDELL: But that's only been a recent thing. Before this was widely circulated. And people liked it because it's beautiful and fuchsia.

TIM CAMPBELL: Within the past like 20 or 30 years, it became a really big issue across the Great Lakes region. Don't plant loosestrife.

SYDNEY One reason loosestrife is so successful here is because unlike in Europe, it doesn't
WIDELL: have too many serious pre-existing predators. So, for instance in Europe, you'd rarely see loosestrife take over in a wetland the way you would here, simply because it's been part of the environment there for such a long time that other things have evolved alongside it that can put pressure on it. And that's how--

BONNIE Do they eat it?

WILLISON:

SYDNEY Yeah, they eat it. They-- yeah.

WIDELL:

BONNIE Tasty.

WILLISON:

SYDNEY Delicious.

WIDELL:

BONNIE Eat fuchsia flowers.

WILLISON:

SYDNEY Taking a plant like loosestrife out of its ecological context, I guess you could say,
WIDELL: and then bringing it to a place where it doesn't have well-established predators or other types of pressure is how a lot of things become invasive.

So, when you take that thing, and you put it in Wisconsin, in a wetland, it can really just flourish, kind of at the expense of everything else that was already in the wetland. So, there are things that control loosestrife in a pretty significant way. But they just aren't here in America, in Wisconsin.

BONNIE So, how would you get loosestrife out of a wetland? I've heard of people going in
WILLISON: and manually picking out plants that they don't want or using chemicals to get rid of the plants.

SYDNEY I learned that managers have tried both those things on loosestrife. Like not to be
WIDELL: super pessimistic, but the loosestrife just grows back. So, it's not-- it's not sustainable or like a long-term solution.

BONNIE It's really hardy.

WILLISON:

SYDNEY It's very hardy. So, anyway, that's where Molly comes in with her Cello beetles.

WIDELL: Because in Europe, those beetles eat the loosestrife. Researchers basically were wondering what would happen if they brought these beetles back to the United States.

And the thought underlying all of this is that if you can find a predator that eats loosestrife in a big enough way to keep it in check, you can use that species to control loosestrife, which is essentially the whole principle of biocontrol. And Tim told me more about that program in Wisconsin.

TIM CAMPBELL: We realized that this beetle only feeds on purple loosestrife, so we wouldn't cause any other problems through releasing it. And what we found out here in Wisconsin, that it works really well in the community science setting, where we could work with like associations and other groups interested in protecting their wetlands.

So, they could take purple loosestrife plants, grow them in these little kiddie pools that I'm sure Molly has maybe talked about. And then with a starter kit of beetles, you can grow these beetles over the course of a few weeks. And after up to 10 weeks, you might have thousands of beetles that you can then release in your wetland. And you do that a few times.

And over time, those beetles will control the purple loosestrife for you. And so, while it doesn't completely get rid of the loosestrife, it manages it in such a way that it just kind of fades back into the ecosystem, and just becomes a part of it rather than the most dominant part of it. And really, the purple loosestrife biocontrol program is one of the most successful control programs for aquatic invasive species that we have, I think.

SYDNEY For Molly and communities across the state, the work Tim was talking about starts really early in the spring, when the loosestrife first starts to come out and the ice melts off the wetlands. And the Chello beetles, which overwinter underground, start to come out. So, before she can start raising the beetles, she has to actually go collect loosestrife. So, she's using the loosestrife to raise the beetles that eat the loosestrife, which is--

BONNIE A kind of puzzle.

WILLISON:

SYDNEY I know, it's confusing. There are a lot of-- there are a lot of parts going on. Molly will

WIDELL: pull on her waders. She'll grab a friend.

MOLLY BODDE: Your best off going on a calm day when it's sunny out.

SYDNEY And she'll head to a nearby wetland. So, she has to go out and collect this what she

WIDELL: calls propagation stock.

MOLLY BODDE: We start growing plants from rootstock in mid-spring. And once they get to about a foot and a half tall, that's what we want to get the beetles for them.

SYDNEY So, she'll go back to the wetlands. And if there are beetles there, they're going to be

WIDELL: on the loosestrife, because that is all they eat. So, she only takes the beetles from wetlands where she knows that there are enough to be self-sustaining. Because she wants to make sure that there's going to be a large enough population left to continue to control the loosestrife in those places.

BONNIE So, the beetles-- the loosestrife came over, but the beetles didn't. And so, how is she

WILLISON: going out and harvesting beetles? Is that from where humans have put them on?

SYDNEY Exactly.

WIDELL:

BONNIE Wow.

WILLISON:

SYDNEY Yeah. There are places where now the beetles, like the loosestrife, are both, I guess

WIDELL: you could say, naturalized. And they've just-- the beetles are feeding on the loosestrife. And there's enough loosestrife to sustain the beetles.

And then once there isn't, my understanding is that the beetles just die, or they go to another patch where there's loosestrife. She has the loosestrife. It's in these kiddie pools. And then she'll take the beetles home. She'll put the beetles in the kiddie pools with the loosestrife. And then, she'll leave the beetles there for most of the summer. And then in about seven weeks--

MOLLY BODDE: You can release those by the hundreds or thousands into different stands. So they can actually make an impact. And spread them where they normally wouldn't be able to spread themselves.

SYDNEY So I asked Molly what the most rewarding part of her work was.

WIDELL:

MOLLY BODDE: I think for me, it's when I was releasing them out into the public, or getting ready to release them, and having people talk and actually be really interested in what we're doing overall to fight invasive species. The hope is that, obviously, we can get volunteers involved and get donations of potting materials, so that we can actually have those available for the public for use and have an education basis with it as well. So, I'm working on that. Not quite there yet. But I started this-- starting this from the ground up.

BONNIE Yeah, if I saw someone with a kiddie pool with plants growing in it, and like, is there a
WILLISON: net over it or something?

SYDNEY Yeah.

WIDELL:

BONNIE I'd be like, what's going on there. Maybe I should ask my neighbor what they're
WILLISON: doing.

SYDNEY I know, Molly said that that was kind of her experience. But also that people were
WIDELL: really open to it and excited about the work she was doing. But anyway, so these beetles that Molly has, if all goes well, they'll start to nibble back on the loosestrife. And then that'll open up space for more plants and other wetland habitat can come back.

And like Tim said, the program has been super effective. So, in the wetlands that had been dominated by loosestrife, Tim and the other people I talked to said that you are starting to see rare and native plants regenerate, which is significant because those are often the first that get displaced when you an invasive come in.

Introducing biocontrol, like the beetles creates this pathway for more diversity in these wetlands. And the plant specialists that I talked to emphasized that diverse

wetlands are also the most resilient wetlands.

So, in the biocontrol scenario, the purple loosestrife doesn't always go away. But it's not the only thing left in the wetlands.

[MUSIC PLAYING]

BONNIE WILLISON: So, we're bringing in-- we're bringing in beetles from Europe to tackle this plant that we don't-- is invasive here. But what about the beetles? They're adding something new to the ecosystem. And they're not supposed to live here. What if they start eating plants that we don't want them to eat?

SYDNEY WIDELL: Yeah, that was a huge question on my mind as well. We couldn't have timed this story better, because the person who is probably uniquely qualified to answer that question is retiring. I think he retired now, by now. So, he doesn't come to his Madison office very often anymore. But I was really lucky to have the chance to talk to him and the really incredible woman who's taking over for him a few weeks ago.

BROCK WOODS: Brock Woods, I have been the Wetland Invasive Species Control Coordinator for the last 15, 20 years. Loosestrife has been a big part of my work. I got involved in the early research to try to make sure that it would be safe and effective in the state before we were able to release insects statewide.

JEANNE SCHERER: So, I'm Jeanne Scherer. And I have big waders to fill, because I'm taking on the statewide biocontrol project for purple loosestrife. So, I'm excited to be taking it on, so he can ride off into the purple sunset.

BONNIE WILLISON: These are like the people, like the state people that are working on this project.

SYDNEY WIDELL: Oh, yeah, they're the big ones.

BONNIE WILLISON: They sound amazing.

SYDNEY WIDELL: I know. Brock remembers going out to this place called Rome Pond. Have you ever been there? It's kind of in your own stomping grounds.

BONNIE No, where's Rome Pond?

WILLISON:

SYDNEY I will show you. Here it is on a map. I guess it's not a pond as much as it's like a
WIDELL: flowage. It's on the Bark River.

BONNIE It looks kind of big.

WILLISON:

SYDNEY Yeah.

WIDELL:

BONNIE I'm from South Central Wisconsin. So, this is around there?

WILLISON:

SYDNEY This is around there. Sullivan is really close to that. And then Highway 18 just skirts
WIDELL: it from the north. It's very close.

BONNIE I've driven past this.

WILLISON:

SYDNEY Close to Jefferson. Yeah, it's super pretty.

WIDELL:

BONNIE There's like a little fence on the road. And you can see the pond. It looks like it has
WILLISON: some marsh and wetlands. This is like also a nice fall picture, so the colors are pretty.

SYDNEY Brock was going out there right when this program started.

WIDELL:

BROCK Rome Pond had loosestrife that was well over my head in height. I used to have to
WOODS: take a ladder out to get up high enough to get above the loosestrife to take a picture of the site.

BONNIE Oh, my god, that's crazy.

WILLISON:

SYDNEY I know. I can't even imagine.

WIDELL:

BONNIE You have to bring your ladder to inspect your plants.

WILLISON:

SYDNEY Yeah.

WIDELL:

BONNIE So, I can see why he was going to Rome Pond.

WILLISON:

SYDNEY He picked Rome Pond as a test site because it was kind of small. It's like remote-ish, so if something went really wrong, it would be easier to contain. And it was also easy to monitor. Except it actually sounds really hard to monitor, because he had to get up on a ladder to even see what was going on out there.

BONNIE Where did they even get this idea? Have people done this before?

WILLISON:

SYDNEY Oh, yes, there is a long history of people doing this. And sometimes it works better than others. But in this case, Brock was the one actually out in the field doing those tests.

BROCK We did this for research purposes. So, we had to go-- we had to wade through this stuff and set up 40 by 40 meter grids using tapes and metal conduit posts for the corners, and put in quadrants and everything. But then you let them go along one end of the grid.

SYDNEY Them being the beetles.

WIDELL:

BROCK And then you follow them, and see what they do, where they go, and so forth. And that's-- frankly, that's the most exciting part of a research project, is you're doing this, and you're going, I don't know what's going to happen. I know what I hope happens. But you try to

BONNIE Keep an open mind. And you just think, OK, there's risk in everything you do.

WILLISON: Walking across the street or releasing biocontrol insects that you've tested, and retested, and tested again. This worked out beautifully. And it's really a poster child, I think, for effective classic biocontrol.

BONNIE Oh, I love that image of them releasing beetles on one side of a grid, and just
WILLISON: following the bugs, just follow them, see what they do.

SYDNEY And not knowing.

WIDELL:

BONNIE Brock is taking risk by crossing the street, and the beetles are crossing a new pond
WILLISON: in a new country.

SYDNEY Right. Anyway, this story starts actually long before Brock is out there shoulder deep
WIDELL: in the loosestrife in Rome Pond. It actually starts years before in the early '90s in Switzerland, where this team of researchers contracted by the US government were meticulously testing and retesting beetle, after beetle, after beetle, trying to find just the right one to let loose here in Wisconsin.

So, the research that happened early on in the beetles home range and the loosestrife home range was to identify what insect was only going to eat loosestrife. But it's hard to know when you're in Europe because there are plants here that that beetle has never seen before.

So it's, possible that the beetle is going to be fine, and it's going to come over and do its job. Or it's possible that it's going to be like salad bar, and go wild, and eat stuff. Like, that beetle has never seen wild rice before. Like, who knows what would happen.

BONNIE So, they were just looking at each individual beetle, being like, what do you prefer
WILLISON: to eat? What do you prefer to eat?

SYDNEY Yes, exactly. That's called host shifting.

WIDELL:

BONNIE What, there's a word for that?

WILLISON:

SYDNEY It's something that could be disaster. Biocontrol has gone horribly wrong in the past.

WIDELL: Like, this is not new. For example, there's this poisonous frog called the Cane Toad. I actually think it's a toad.

BONNIE Yeah, that sounds like a good go bad.

WILLISON:

SYDNEY You have no idea. It's native to parts of South and Central America. And it eats this weevil that is like mega destructive in sugar cane crops. So, in Florida, at one point, they were trying to grow a lot of sugar. And they had this weevil. And they're like, oh--

WIDELL:

BONNIE Is that like a little bug?

WILLISON:

SYDNEY Yeah, yeah. Yeah, so, it eats this weevil that can harm the sugar cane crops. And in the '30s, people were like, hey, we have this weevil in our sugar cane. And we know that these toads will eat it. So, we're just going to take a bunch of toads and set them loose.

WIDELL:

BONNIE Feral toads.

WILLISON:

SYDNEY Yeah, exactly. Yeah, so, you can see where that was going. And the toads really did take off. And now, like it's like a huge problem. It's still a problem. Like 90 years later, there's still these toads just running around in Florida. And they're super poisonous. And things eat them, and get really sick and die. Like dogs eat them. It's this major problem, and it just in hindsight seems so avoidable.

WIDELL:

BONNIE Right.

WILLISON:

SYDNEY Like, you could have-- you could have figured out that this is going to happen, maybe a little bit.

WIDELL:

BONNIE Did it take away their weevil problem?

WILLISON:

SYDNEY Yeah, it's effective, but like at what cost?

WIDELL:

BONNIE Yeah.

WILLISON:

SYDNEY And so, it's the same question that applies to the Cello beetles. Brock explained how researchers and agency people partnered across two continents to find answers to that question. And actually, you can replicate this test on your own, like basically the same test they're doing. Actually, not the same test, but kind of similar. And it's part of this activity that Brock does with kids in schools around Wisconsin. And he calls it beetle smorgasbord.

BROCK If you take a Petri dish or some kind enclosable container, and put samples of lettuce, and broccoli, and *decodon verticillatus*, this water willow, a native that's closely related to loosestrife, around in the Petri dish, and maybe a sprig of loosestrife leaf. And then you take some of the details that we send out that are really hungry, because they just came off their winter sleep.

And you let them go right in the middle. And then you follow them to see what they eat. And I'll clue you in. The only thing they have ever eaten in any of these setups that I've heard of is the loosestrife. So, in theory, kids can do original biological research if they test a plant which no one has ever tested before. And that's relatively easy. I don't think anybody's ever tested kohlrabi.

SYDNEY So, the tests they did in Europe were kind of like that. That's like the gist. And so they started with a ton of possible insect candidates. But then they winnowed it down to a few select species. And then they sent those species over to this lab at Cornell.

And they kept them under quarantine. There was this big thing because they shipped them these beetles. There was a lot of uncertainty. And Brock had to talk to a lot of different people from a lot of different agencies.

BROCK Individuals have to get together. And as a group, then, they have to be convinced that the safety coming from introducing a potential control organism is ensured enough that they can sign off on it.

SYDNEY WIDELL: Jeanne explained what it is about the beetles that actually did make people feel like, oh, it's OK, we can let you free here.

JEANNE SCHERER: They're not eating anything but the loosestrife. So, say one of the species being tested had been-- it would eat all the loosestrife until it had pretty much eaten itself out of house and home, and then it jumped over and attacked the native loosestrife, then you've got a really big problem. Because then it is an invasive. But it's very host specific. It's not going to go and attack other things. They'll just die.

BROCK WOODS: It's a co-evolution of the insects and the plants, which has been interesting and why I got involved in the first place, really. It's that co-evolution which makes the relationship between what is initially our troublesome exotic invader plant and the thing that controls it, it makes the relationship so tight, assuming that it has developed that way. As I say, classic biocontrol is basically built on plants and the insects which feed on them.

BONNIE WILLISON: Pretty convincing.

SYDNEY WIDELL: I'm convinced. So, yeah, after all this testing, there were just for insect species that they decided it was going to be OK to release in the US. And actually, there is going to be one more, but they in this process they discovered that it had this parasite. And so, the beetle wasn't doing this behavior they call host shifting.

But they had no idea what the parasite was going to do. And they didn't have a way to test that in a way that they felt confident enough about. So, that's like the level of meticulous detail that they're thinking about. It's not just like the beetle, it's like what is the beetle going to bring.

BONNIE WILLISON: Yeah, totally. So, the other four insects, were those-- those aren't Cello beetles, those are different kinds and they eat--

SYDNEY WIDELL: No, those are all Cello beetles.

BONNIE WILLISON: Oh, they're just different--

SYDNEY They're different types. Yeah, so the beetles, Brock compares them to guild of birds

WIDELL: on a tree . Some of them forage on the leaves. And some of them are on the stems. And some of them are like down in the roots. And also, their roles shift at different points in their life cycle.

BROCK Once the population gets going, assuming there's enough plant material there to

WOODS: sustain a population large enough to keep going, yeah, they should stay around.

SYDNEY So finally, Brock gets a few batches of beetles from this lab in New York here in

WIDELL: Madison. And he takes them out to a couple select sites and in Wisconsin, including Rome Pond on the Bark River. And for years, he goes back to Rome Pond to check up on the beetles, see what they're up to.

And he would talk to people who spend a lot of time out there also, and see if they've observed anything going on. And basically, he's just keeping track of all the ways that the ecosystem is changing. And after years, everyone starts to agree that the beetles are going to work, and that they actually are effective. And that it's time to expand the program statewide and bring the beetles to more wetlands.

So, at this point, though, it's Brock and this very small group of people. And what they have to figure out is how does this small team, with very limited funding, produce literally millions of beetles, and then move them to these very remote locations around Wisconsin. Which he was describing this. I was like that is so daunting. But it worked out.

BROCK Turned out, using that citizen resource is the best way to go.

WOODS:

JEANNE We have wonderful volunteers throughout the state doing various types of

SCHERER: monitoring, including for invasive species. And sometimes, the question is, well now what, after you've collected all that information data. And purple loosestrife is a perfect example of, well, this is now what.

BONNIE So, they get volunteers to help them go out and put beetles in different places and

WILLISON: see if it's working.

SYDNEY Yeah, exactly. They realized that engaging communities across the state was going

WIDELL: to be super effective way of spreading the beetles around the state and actually making an impact in wetlands. And Jeanne said that having these beetles is kind of magical.

JEANNE They're just--

SCHERER:

BROCK They're charming little critters.

WOODS:

JEANNE They are. People end up falling in love with them.

SCHERER:

BONNIE Charming little critters, aw.

WILLISON:

SYDNEY I know. So, at peak times there have been upwards of 80 rearing sites-- that's like the kiddie pool, yeah-- established by partners across state. And Brock said that enlisting people to help is the easy part. He explained what some of his encounters in the field have been like.

WIDELL:

BROCK I sometimes used to walk into gas stations. You're fueling up your state car. And I'd have around my neck something that's called an aspirator. It's a rubber tube that ends in a little vial. And people would look at it and go, what the heck is that thing? And I'd say, it's an aspirator.

WOODS:

They'd say what? I'd say, well, you pull off one tube, put it in your mouth, and hold the other end of the little tube coming out of vial by a beetle, and you suck on the tube, and the beetle gets drawn into the vial. And they go, what the heck?

I said, this is all for raising beetles. Wait, you raise beetles? I said, yeah, does that sound odd? They say, well, yes it does, why on Earth do you do this? Well, because we have an invasive plant that has been uncontrollable with chemicals. And it turns out that the most feasible way to deal with this plant over the long term is to reduce its size, and to some degree numbers, by virtue of bringing the predators that control it in its home range, here.

And in order to do that, really, you have to produce a lot of beetles and get them

out all over the state. And so, we have people locally who raise beetles for us. And often they would say, can I do that? And so, recruiting volunteers for the most part has been-- it's been a lot of fun.

**SYDNEY
WIDELL:**

So Brock supplies the propagation stock, like the plant and the beetles. And then if you give the beetles a home, the beetles do the rest. And then, at long last you can release the beetles in their thousands into a wetland.

The final step, though, is after you've done all this, you still have to think about what is going in the wetland. And you might have to like reintroduce plants that lost habitat after the beetles-- or after the loosestrife came in. Brock said that if you eliminate the loosestrife, but then you don't actually do anything else, you really haven't accomplished anything. Like, if you don't see the plants come back in, you might as well just have you loosestrife, because at least it's something.

Again, the goal here is to promote diverse and flourishing wetlands. And cutting back the intervening plants is only half the work.

**BROCK
WOODS:**

That's my long-winded sort of introduction to the program.

**SYDNEY
WIDELL:**

After the break, we're going to Rome Pond, check up on the beetles, and see what's happened since.

[MUSIC PLAYING]

So Brock returned to Rome Pond for years. And he documented everything that was going on there. Jeanne's been back too, and she said the beetles are still out there.

**JEANNE
SCHERER:**

I've seen them.

**BROCK
WOODS:**

Yeah, they are.

**JEANNE
SCHERER:**

I've gone to some of his original places. And that purple loosestrife is still maybe three to four feet tall. The flowers are all wimpy. You can still see beetle damage on them, all these years later. It's plus 25 years now for some of those sites. So, they're

working, and they're not bothering anything else.

BONNIE WILLISON: Well, 25 years later it seems a lot different. Like, no longer do you have to stand on ladders to see it.

SYDNEY WIDELL: There are definitely challenges. For one thing, whether has a really, really big impact on the beetles.

BONNIE WILLISON: Oh, really?

JEANNE SCHERER: The beetles go into the soil over winter. And then if by the time they're ready to come back out for spring, if we get a polar vortex come down or extreme flood events, you could lose your beetle populations that are supposed to be up there feeding on it, and getting in check, and laying eggs. And larvae then would eat more of the plants, and go on to be adults to overwinter for the next winter. So, if your winters are crazy, like we've been having last couple of years, then you're going to lose those beetles.

BONNIE WILLISON: So, the beetles are sensitive to extreme winters or whatever weird weather things we could have.

SYDNEY WIDELL: Rainstorms, or just really unpredictable weather, I guess, is harmful to the beetles. More intense rainstorms can really impact the way these populations function.

BROCK WOODS: When you put all your eggs in one basket--

SYDNEY WIDELL: Like the eggs being beetles.

BROCK WOODS: --can go wrong quickly. But when they're all down in the soil, if that wetland then floods and is underwater for even as short as a couple of days, you could lose your entire population. And so these summer huge rain events we've been getting have really hit some of these populations pretty hard, I think.

And while it may not eliminate them all, it may drop the numbers down to where they can no longer get by the bottlenecks that populations are subject to. And they

may disappear. Or they may stay there, but their numbers are so low that it takes a long time to build them back up.

JEANNE So we have to give them a booster shot once in a while.

SCHERER:

BROCK Add a few more beetles, et cetera, et cetera.

WOODS:

JEANNE And, well, Brock's found-- he's got one site near Madison where he's always collected beetles and root stock. And it's hard to even get into it now because it's almost always under deeper water.

SCHERER:

BROCK Climate in the last-- oh, boy, two, three, four years, has really started to affect this project.

WOODS:

SYDNEY And Jeanne mentioned that seasonal changes, when the ice melts, when the loosestrife starts growing, when spring starts, versus when the beetles start being active, they're aligned under certain conditions. But if you start changing like the timing on some of those, you could take that delicate relationship out of balance.

WIDELL:

And then-- and then we don't really-- she said nobody really knows what will happen or how those changes will play out. And also, as climate change intensifies, Brock emphasized that maintaining diverse wetlands is more critical than ever.

BROCK So, diversity is crucial. Research has shown over and over in the ecological literature, the communities that are most diverse are generally the most stable, especially in light of disturbances. And with climate change here, any community that's made up of one species is likely to run into a problem that doesn't let it maintain itself.

WOODS:

If you have a community of 100 species, OK, things change, maybe you'll lose one or two. But in that mix, there are going to be enough there that will maintain the habitat the way it should be and continue to support a wide diversity of animals of different sorts. So, diversity really is key.

You can argue, philosophically, that every species has a right to exist. And so, to let one plant dominate so thoroughly over the others that it pushes all the others out is

really unacceptable from a philosophical point of view. Sometimes, there is one plant species that might do the lion's share of carbon sequestration, perhaps.

But having a much broader variety of them there, one plant's going to be really good at this. Another plant's going to be good at that. One plant may really suck up and hold a lot of water to reduce flooding downstream. The other one may not be as good at doing that, but it feeds pollinators better than the other one.

So, you get a wide variety of services if you have a diverse community. And increasingly, I think that is going to be more and more important, if you look at the way the climate seems to be changing.

**SYDNEY
WIDELL:**

As climate changes, Wisconsin's wetlands are going to change to, and in ways that Brock and other people can't even predict. And these places can increasingly become home to species that haven't really interacted before. Loosestrife and the Cella beetle are definitely examples of that.

But they're also only a tiny part of that story. In the future scenario, some of those plants could be like loosestrife, which were brought here unintentionally, intentionally by humans. Some of those species could be like the Cella beetle which were brought here like super intentionally by humans. And some of them might just creep on in as the ranges shift. But they're all going to be here, maybe.

**BONNIE
WILLISON:**

We don't know how they're going to interact.

**SYDNEY
WIDELL:**

Right, right. So, that's like the huge challenge. Brock used to go walking with Grant Cottam, this plant ecologist who did a lot of the foundational work on the botany of Wisconsin in the 1950s.

**BROCK
WOODS:**

We'd go into the Elvehjem woods in the arboretum, where they planted all these pine trees. The pine trees were finally getting old, about the time Grant was getting old. And, in fact, he'd walk through there, and whenever he saw one they had died, he'd go over and push on it. And he was famous for knocking over dead trees.

His students were like, why does he do that? And just, that was just Grant. Well, he knew they were going to go anyway. They were going to go anyway. But you could look at it and go, OK, so these native trees that we planted in here are dying, what's

this forest going to look like in 20 years, 50 years, 100 years?

And he was also famous for saying, I don't have a clue. And then you'd go, what do you mean? You worked with John Curtis. You helped write Curtis's bible on Wisconsin plants. He said, well, look at what's replacing it, buckthorn, honeysuckle, Norway maples, Callery pear. We have no idea how these things are going to interact in the future.

They aren't going to interact if we lose all the native things because we let a few exotic things dominate. What we need to do is figure out how to keep the native stuff while that exotic stuff is here and is never going to go away, thank you. Integrate amicably somehow. And what those new communities are going to look like, I don't know.

SYDNEY Brock calls those new communities novel ecosystems.

WIDELL:

BROCK But as long as all these species are here and you maintain that diversity, you maintain stability in the light of environmental change, you give yourself as many options as possible to keep functioning biological community-- biological communities that can keep functioning in some way. Exotics are going to be too many places.

WOODS:

And for some of them, it's already that way. You need to figure out how to let this integrate, but as long as that integration is happening, just it's more diversity. This is a never ending struggle unless we get smarter, figure out better ways, non-chemical ways in particular to control things.

BONNIE So, the fact that we're using biocontrol is pretty promising, that we're learning how to do that.

WILLISON:

SYDNEY That was what I took away from this conversation with him. For Brock, biocontrol offers a longer term way to return balance to ecosystems that might have been at one point compromised by invasive species. Purple loosestrife maybe isn't eliminated from the wetland under a biocontrol scenario, but its population goes down enough that everything else, maybe it can come back a little bit. And it's not going to be the same wetland that it was when you started, like pre-loosestrife. The

WIDELL:

loosestrife is going to be there, but now it's just integrated into the wetland.

BONNIE OK.

WILLISON:

SYDNEY So, those other plants can start filling in the gaps.

WIDELL:

BROCK When people come to me and say, oh, you're going to get rid of that beautiful plant,
WOODS: my response is no, not at all. But instead of seeing a field of DayGlo pink-purple--

JEANNE Nothing but it.

SCHERER:

BROCK It'll probably stay in your wetland, but it'll be a splash of color there, and a splash of
WOODS: color there, interspersed with blues, and yellows, and reds, and all the diversity.
Diversity really is the spice of life.

JEANNE It becomes part of the mosaic. If we can get it under control, like Brock says, where
SCHERER: it's not going to absolutely be a monoculture, if it's just a little here, a little there, we
could be giving other species a chance to survive.

SYDNEY Brock was telling me about a site up in Navarino. Do you know where that is?

WIDELL:

BONNIE No.

WILLISON:

SYDNEY It's up by Sawno. It's this wetland that at one point was like completely overrun with
WIDELL: loosestrife. But Brock introduced Cella beetles there, around the same time he was
out at Rome Pond. He has been back to that site, and he described some of the
changes he's seen since then.

BROCK When I first got to this site, I had to drive my car way back in on a mud road, all the
WOODS: way back in by this flowage. And there was a sea of purple, pink-purple, and there
were native things in there, but they seemed few and far between, and small, and
obviously beleaguered from the tall loosestrife.

So, we put beetles in, and within three years, the loosestrife had gotten much

shorter. There's just a blossoming of native things. We've got native stuff coming back. The loosestrife is still there. And it will be fun-- and maybe in retirement I'll do this, I'll have time to go back and look at some of these sites where we put beetles in. And if they stayed around, to see what in the long term we've gotten. What is this-- what do we want that to look like?

BONNIE I just want to be proud, and to go back to his ponds in retirement and see the
WILLISON: loosestrife is balanced and controlled.

SYDNEY He's so hopeful about it. And it seems like something that you could talk yourself
WIDELL: into being really, really pessimistic about. Like, oh, we're never going to get rid of this plant, we really screwed up, we messed up. These wetlands are never going to be the same. And Brock's just kind of like they're not, but change happens, and we can adapt.

So, if you think you've spotted loosestrife in a place where maybe you haven't seen it before, you should definitely contact your local DNR agent or a county conservation coordinator and let them know, because that data is really important. You should also contact us, because we would be interested to know. And if you want to participate in a biocontrol program, also contact a DNR agent in your county or at Sea Grant. We can help set you up.

BONNIE All of that contact information will be linked on our website. And also, the
WILLISON: curriculum that Brock developed, the beetle smorgasbord, and way more, that's free, and available online. And we've linked it as well.

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[MUSIC PLAYING]