BONNIE WILLISON: Hey, this is Bonnie. Sydney and I are busy working on season two of Introduced, which will come out next week. In the meantime, check out this episode of a podcast called Teach me about the Great Lakes by our friends at Illinois and Indiana Sea Grant. We're really big fans.

They invited us on their show and we had a ton of fun talking about crayfish and Introduced with them. Enjoy.

CREW: Teach me about the Great Lakes. Teach me about the Great Lakes.

STUART CARLTON: Welcome back to teach me about the Great Lakes and exactly twice monthly podcast in which I, a Great Lakes novice, ask people who are smarter and harder than working-- smarter and harder working than I am, and sometimes more eloquent.

To teach me all about the Great Lakes, I'm joined today by Carolyn Foley, research coordinator at Illinois, Indiana Sea Grant. Carolyn, what's up?

CAROLYN FOLEY: My cat is currently trying to attack my headphones, so that's what's up right now.

STUART CARLTON: And so do you have a long cord that is being clawed, is that the deal?

CAROLYN FOLEY: Yeah, I keep one out so that I can hear my kids.

STUART CARLTON: There you go.

CAROLYN FOLEY: Yep.

STUART CARLTON: I keep them both on so I can't hear my kids. That's may be a difference in our parenting style. So everybody you can look down on your show notes. Carolyn will send me a photo of the cat, because the rule of recording is if there's a cat, you have to have a picture. And what is the cat's name?

CAROLYN FOLEY: Optimus Prime.

STUART CARLTON: Optimus Prime.

CAROLYN FOLEY: Yes.

STUART CARLTON: Named after the famous transformer, I would imagine.

CAROLYN FOLEY: Indeed. Yeah.

STUART CARLTON: It's not just a coincidence.

CAROLYN FOLEY: No.

STUART CARLTON: Good. Well, speaking of famous things, we're going to be talking today again about a famous invader that may be Optimus Prime could talk about. We're going to talk today all about invasive species and more. It's a huge issue that we work with.

And so we've got a bunch of guests line up. This is actually an action. Like an episode of transformers, this is an action packed Teach me about the Great Lakes. So maybe we should just jump right in, if that's cool with you.

CAROLYN FOLEY: Sure.

STUART CARLTON: Great. Transitional music. Oh since this is invasive related, we have this special inside joke transitional music. Here we go.

[MUSIC PLAYING]

This one called crawdads whole. Looks like an old-- I apologize to our listeners and our guests. Great. Our guests, today we're joined by two people right now. First is an old friend of the show, Dr. Brian Roth, an associate professor at the Department of Fisheries and Wildlife at Michigan State University. Brian, how are you today?

BRIAN ROTH: I am doing great. How are you?

STUART CARLTON: I'm feeling good. We're rolling, it's 9:30 in the morning, the coffee is kicking in. It's good. And we're also joined by Illinois, Indiana speaker Greg Hitzroth. He's our aquatic invasive species outreach specialist. Greg, what's up with you, man?

GREG HITZROTH: Not me, but here I am.

STUART CARLTON: Yeah, Greg. Poor devil is on central time. So it's an hour earlier for him. That's OK. We're here to talk about invasives generally, but really we want to focus in on the crayfish issue, because it's near and dear to my heart this time of year because we're getting in a crawfish season back in my hometown of Louisiana. And I keep checking the vaccine database or whatever every day so I can try to go home and have some. But no vaccine yet, so no crawfish for me.

Brian, you've done a lot of crawfish research. Hang on. Crayfish research. How did you get started in that field exactly?

BRIAN ROTH: Yeah, that's a really good question. And yeah, I appreciate the crawfish crayfish prod that mud bug name game there I used to live in Louisiana, and I always used to have to correct my friends and call them crayfish and they would just call me a Yankee instead. Yeah, I've always had a curiosity about crayfish.

I grew up in Seattle and walking along the creeks we would see them, and then as I grew older, I started snorkeling for them and I knew that they were edible, and so I would take them home, boil them up, and eat them. They are delicious. And then that really got me thinking about, what are these things doing? Why is there. So many of them in some places and none in others? And that really started me down the road towards my research focus.

CAROLYN FOLEY: So do you have a favorite crayfish species that you study or eat? Either one.

BRIAN ROTH: Well, to eat, frankly, like I said, when I lived in Louisiana, we ate a lot of red swamp crayfish and they were delicious and easy to peel. And so certainly, in terms of consumption, the red swamp is up there. It's delicious and easy to eat.

In terms of ecologically speaking, one of my favorites, actually is the virile crayfish, which is a native species to the region of the Midwest, and it's one of those-- it's a real survivor, and that even in the face of rescue crayfish invasions, in a lot of cases, it just seems to hang on and hang on and hang on and stay around even though all the dominoes are stacked against it.

STUART CARLTON: So I heard you say, is that the virile crayfish?

BRIAN ROTH: That's correct.

STUART CARLTON: I have to ask, why is it called the virile crayfish? Is it got a high fecundity as we like to say or is it just called that for some other reason? Because I think virile, you know what I'm thinking?

BRIAN ROTH: Yeah, it's interesting and not particularly. It's uncouth, to be honest with you. Crayfish have reproductive parts that are not so similar from humans, so they have two and that one in terms of the males. And the virales are substantial. I'll just say that. That is not the reason why they were my favorites.

STUART CARLTON: It's actually my favorite one too. I never heard of it until just now, but great.

CAROLYN FOLEY: So what are some-- what are some things about-- are crayfish actually better invaders than other species or like then fish or something like that? And what are some of the features that make them good invaders?

BRIAN ROTH: Yeah. Crayfish are nasty. That is for sure in terms of their potential as invaders. I wouldn't necessarily say they're better or worse than fish, because there are certainly some fish that are unbelievable good invaders. Think common carp, which are worldwide goldfish are really good invaders, believe it or not.

And then beyond that, humans are really good at transporting species around the globe. So one species that you might not think of as an invader per se but is a really good-- it's a species that has been distributed widely. Is something like rainbow trout. So the rainbow trout have a very small native home range, basically the West slope of the Rockies and Cascades, but they've been introduced to well over 100 countries. So it really depends on the species that you're talking about.

But in terms of crayfish, certain species in particular are really good invaders, and the red swamp crayfish is certainly near the top of that list. There are a number of species that have been introduced both within the United States and North America as well as to other shores including into Europe, and they're good.

And one of the things that makes them such good invaders is that they're oftentimes really tolerant of conditions, of varying conditions, I should say. So the red swamp, for instance, whatever water body that they had been surviving, it can dry out completely, for months at a time, and they're fine. They survive, they reproduce, they in fact don't mind it when their ponds dry up.

STUART CARLTON: So what do they do? Is that when they-- does that when they hunker down like in the little burrows and they put those little mud piles on top, right?

BRIAN ROTH: Sometimes? Yeah, sometimes. So that is something that we're finding that's different here in Michigan where they've invaded oftentimes as compared to what they do in their native home range. And it probably has to do with the soil characteristics. So there's a lot of clay and their native home range, and so they build these chimneys. And so if you drive down any road in Louisiana where there's any kind of ditch, you'll see these chimneys everywhere.

Whereas here in Michigan, they occasionally make chimneys, but oftentimes it's just a whole. And that's the sign, so you have to look very closely and be able to differentiate between what's a crayfish hole and what's like a chipmunk hole.

STUART CARLTON: Greg, how did the Illinois Union figure and how did we get involved in crayfish? I mean, so it's a big issue so we covered the two-state region in addition to the Great Lakes broadly. And so our invasive crayfish like a big deal for us too, how did we get started with that?

GREG HITZROTH: Yeah. So a lot of my work is focused around organisms and trade. So organisms that get bought and sold. And through my work, I had visited plenty of aquarium shops and nurseries or garden centers, and I kept coming across crayfish being sold as crayfish, like no species decimation and knowing that there are some known invasive species of crayfish out there, it was a little disconcerting what was being sold. And so from my perspective, I was more interested in what was actually being sold or traded in crayfish.

But also I did a lot of trade shows like aquarium shows and garden shows, and we have a couple specimens mounted in acrylic blocks, and like sometimes I'm not the most approachable person, but crayfish would definitely bring people to our tables. I would see people walk six tables past us, make a U-turn and come back and talk about crayfish.

STUART CARLTON: Oh, really?

GREG HITZROTH: And so it became a large talking point for me at these trade shows but also seeing these issues in trade and trade is one of the pathways of introduction of invasive crayfish but also hearing stories from groups like Brian's and South Herbst in Michigan, Reuben Keller in Illinois and Tim Campbell in Wisconsin DNR. I'm talking about new populations of red swamp crayfish popping up. It seemed like an interesting topic to be involved in in the Irish perspective.

STUART CARLTON: Yeah. And so I guess there's a question. So people are selling them for-- so people put crayfish in their aquariums for decoration or pets or whatever. I don't even know our aquarium has one fish kind of swimming around, and it isn't doing much.

So we know that they were probably introduced that way, people releasing them, and I think, Brian, talked last time he was on about how there are some let go through crawfish boils or whatever. What's the big deal like? Why do we care about this, generally? Invasive species are bad I agree, but what is the effect when either a rusty or swamp crayfish get introduced, what are the effects of that in the area?

GREG HITZROTH: Yeah. So with red swamp crayfish, we're still trying to figure that out, to be honest with you. There are new invader in the Michigan as late as 2017, that's when we first figured out where they are. And to be quite frank, we're not exactly sure. That's because they are so new and many of the systems in which they've invaded were not particularly well studied before they got in.

That's oftentimes one mechanism to be able to determine their impact, is you look before they got in, and then you look after. Well, if there's no before, then how do you know what happened afterwards? With other invasive crayfish species, we have much better information. And even with red swamp crayfish and other locations, say in Europe.

And we know that they can have some pretty dramatic ecosystem effects as opposed to native crayfish species. And that includes things like aquatic plant destruction, reducing and changing the community of benthic insects and other aquatic invertebrates, they can also affect water quality. So one of the things that they do either through clipping macrophages or just through their normal feeding activities is increase the suspension of essentially muck and so they can change the quality of water, they can resuspend nutrients into the water column, which could make them greener, and that is one thing that we're looking out for.

One of the things that we know and what we've seen with our eyes in Michigan is their impacts on bank structure. So those burrows that we talked about, they actually are bearing down to the waterline, and if there's a fairly high density of crayfish in a particular area, they can essentially turn that bank into Swiss cheese.

And because of that, you might imagine that a storm or intense wave action or even just the heavy rainfall can increase erosion, and we know that is occurring in some of our ponds already. We just have to measure it, and that's been established in many other locations to the point where you could have failures of pretty substantial water control structures. There's documentation of entire wetlands being drained by red swamp crayfish burrows, and other things like earthen dams being damaged beyond any reasonable utility by other burrowing. And so those are primarily the impacts that we're looking for when we're studying red swamp crayfish.

Another primary impact is their effect on native crayfish species. And time after time after time, what we see when really any invasive crayfish-- almost any invasive crayfish species invades is that the native species just go away. And that is something that can occur really dramatically such as in Europe when North American crayfish is were introduced there, those North American crayfish is carried a disease called crayfish plague, and essentially nearly wiped out some of the native species in Europe.

Here in America and North America in general they're all that disease is endemic and so it doesn't have as big of an impact, but oftentimes these invasive crayfish are larger or more aggressive and/or more sickened. And so there's other mechanisms such as fish preying more heavily on the native species than the non-native species that leads to the replacement of native crayfish species by the invasive.

CAROLYN FOLEY: So would that be basically because the native species are easier to catch or easier to eat or something like that?

GREG HITZROTH: Yeah, usually. Yeah. So it's either behavioral, so the non-native species, and this is really well studied for rescue crayfish in particular, where rescue crayfish are more aggressive and can literally yank the native species out of their hiding holes, or it's physiological. So crayfish or sorry-- more morphological.

So crayfish almost all of their battles are handled in terms of who has the bigger claws. And so if you have bigger claws the likelihood is you're going to win, and a lot of these non-native species happen to have bigger claws relative to their body size than the native species.

STUART CARLTON: Well, Yeah. Like in Louisiana, when you get the biggest ones, you actually eat the claw meat sometimes. It's like five per boil or that big, but those are the ones-- those are the ones.

GREG HITZROTH: That's my favorite part. The claws have the sweetest meat for sure.

STUART CARLTON: You're a title machine.

[MUSIC PLAYING]

So you talk about them in ponds a lot and maybe on banks and stuff like that. These aren't in the lake though, in Lake Michigan, are they or are they a concern for Lake Michigan?

GREG HITZROTH: Yes, very much so. Yeah. It's something that, I think still needs to be worked out so Lake Michigan proper, particularly for red swamp crayfish. So the lake proper is probably not their ideal habitat. However, for rescue crayfish in particular, they've invaded everywhere in Lake Michigan. All the way from the south, all the way pretty much up as far north as you can go.

With red swamp, we're really concerned about the surrounding wetlands, and inland water bodies rivers that lead into the lakes. That is where we're most concerned. And in fact, they already are established in the Lake Michigan basin. Scientists by the name of Reuben Keller who's at Loyola, Chicago, he has done extensive work in the canals around Chicago on red swamp crayfish invasions there.

STUART CARLTON: And we'll put a link to some of the work that Reuben's done and some of the work you've done in our show notes, which you can find at teachmeaboutthegreatlakes.com/27, because this is episode 27. So, Greg, so this is original problem that has a lot of different potential pathways of introduction, like we talked about, from the crawfish boils to the organisms and trade to who knows even what else. It seems to me like a collaborative approach is the way to go, and that's the idea right behind the invasive crayfish collaborative. If you want to tell us a little bit about what that is and how it was formed?

GREG HITZROTH: Yeah. So in Great Lakes, invasive crayfish collaborative was again born out of those observations about different introductions happening around the Great Lakes. There's some concern about additional species being introduced, Illinois list Cherax destructor, also known as the Yabby, as a potential invasive species, which is a crayfish from Australia. There is a concern about a species called marbled crayfish, which is self cloning or pathogenic.

So there's a variety of species of crayfish of concern. Red swamp crayfish is a huge concern in the region, but we also wanted to think about all of the different species that are in trade, all the different pathways of introduction of different species. But also not being a crayfish expert, my background is in botany, actually, and so trying to rely on expertise like Brian, or Reuben Keller, or Eric Larson at the University of Illinois, or Chris Taylor, looking at Illinois natural history survey, trying to leverage all these other people who do have expertise in crayfish to be able to help address these issues across the Great Lakes and use an outreach perspective.

So really what we wanted to do was bring together a whole bunch of people to talk about crayfish and share information. So essentially, we established a set of meetings associated with other meetings so we can get experts to these meetings. So the Great Lakes panel on aquatic nuisance species, we usually try to attack on our meetings around those meetings, when people actually saw each other in person.

And we hosted webinars, we have a website, we have a Gmail group and a monthly newsletter, and so we essentially just tried to create a means of sharing information among experts and people interested in crayfish in the Great Lakes. So everyone down from graduate students up to professors and everyone between such as land managers, outreach professionals, et cetera. Pretty much it was just an excuse to go talk about crayfish in a large group.

STUART CARLTON: And so it's really it's serving that coordination type role and communication, is that where you are? I guess you planted yourself as a botanist. But I think that's a really valuable role. So what are some of the things that have happened as a result of the ICC?

GREG HITZROTH: Yeah. So as a result, I think we've created a lot of good means of communication. We've created some good conversations. We did a needs assessment of our stakeholders. So pretty much what we did is we asked a bunch of questions from ICC members or invasive crayfish collaborative members about what they saw as their need to understand crayfish and crayfish management or crayfish research in the region.

So we partnered with Craig Miller at the Illinois Natural History Survey to do a survey of our stakeholders, and pretty much we asked people open questions about what did they feel they were lacking and these topics, including outreach, and then we ask them to rank those. And so we essentially created a priority list for the region based on expert opinion.

STUART CARLTON: All right. So give me the top two or three priorities, I guess, just so that the influential listeners to this show can help to make those happen.

GREG HITZROTH: I think a better understanding of impacts in the biology of some of the crayfish people found to be important, and also understanding the management methodology, I think, better and more broadly perspective.

STUART CARLTON: Ask a bunch of scientists what they need. And the answer is more science, I agree in the same way. But it shows what a dearth there is. It's like to know something, like even to know the basics, just takes a crayfish low to work. And it's easy to say, we should do this, we should do that or whatever, but it's just lot of work.

GREG HITZROTH: What was interesting though in part was that some of the things that people identified as needs, other experts like Eric Larson and Reuben Keller did approach us and say that a lot of information does exist, and so that essentially pointed out another need of just more communication of crayfish issues.

CAROLYN FOLEY: So this is a question for both of you. Do you think there's hope in the fight against invasive crayfish, or are we just trying to minimize damage? You're talking about the ones that are here. You're talking about the ones that are on the horizon. Who knows how big these crayfish are going to get and they're just going to keep fighting?

STUART CARLTON: Is quite big, but, yeah.

CAROLYN FOLEY: But, yeah. So question for both of you, do you think there's hope or are you just trying to minimize the damage that occurs?

BRIAN ROTH: Yeah. So this is Brian. And I think it's a mosaic. There's no simple one answer. I think in certain situations, control and even eradication of certain populations is feasible. We're actually attempting an eradication of red swamp in a couple of ponds this upcoming summer. However, in certain situations, they've kind of gone beyond the control stage.

So a good example of that would be rusty crayfish in Northern Wisconsin. They're in so many lakes, those lakes vary in size from small to bigger than you want to deal with. And you can't just go in there and reset that lake.

There's other management priorities that wouldn't allow that nor should they. They shouldn't, just you have to do kind of the cost benefit of starting over too late. And even still the methodologies for control and eradication of crayfish are still being evaluated. So there's a number of different ways to try to do it and there's no one single prescription that would work for every water body.

And so it is a mosaic. I think in certain situations, control or eradication is possible. But in many others, it's not. The most important thing, I think, in all situations, we don't want more new invaders. So some of the species that Greg mentioned, such as the marbled crayfish, the white-clawed crayfish, the yabby, those are ones that we don't want here.

And so if we can reduce or eliminate the potential for new invaders, that would be beneficial relative to the situation we have now. Some of these species that are already here, we may be stuck with, and that just depends on where they are and what kind of water body they're in and what kind of management priorities exist around those water bodies.

STUART CARLTON: So then related to that, I guess, thinking about preventing new invasions, do you have like, and this could be either of you, maybe like a top couple of tips to give-- we want top tips for listeners on reducing crayfish invasions. And if you want a drum roll first, I've got that ready to go. So we can do-- we'll do that. We'll do a drum roll and then and then we'll have your top tip, Greg. So do you need a second to prepare a top tip?

GREG HITZROTH: Oh, my gosh. I think I have a good one.

STUART CARLTON: All right. Here we go.

BRIAN ROTH: Drum roll, we paid a lot of money for this.

[DRUM ROLL SOUND]

GREG HITZROTH: I'm going to say release zero, be a hero.

STUART CARLTON: Yeah. That is the top tip of all. So tell us what does that mean, release zero and be a hero.

GREG HITZROTH: Essentially, we were trying to get people to think of alternatives to releasing organisms. So when we talk about people releasing crayfish, like usually, it's to dispose of them and what often people think as is a humane way of disposing of crayfish so that they no longer want or can care for. So pretty much we're asking people to find a new home or consider working with a vet or a professional to find a humane way of euthanizing their crayfish.

STUART CARLTON: So if you have a pet crayfish, don't dump it in the river or the pond?

GREG HITZROTH: Yeah. Pretty much. I mean, sometimes you hear crazy things like people wanting to control aquatic weeds on their golf courses and throwing crayfish in there to control them as bio control, and I don't know about those people. That's an audience, so I'm still looking into a little bit.

STUART CARLTON: No, it's an important audience, but it's one that you have to reach in different ways.

GREG HITZROTH: Yeah. So you have to think about other ways of talking about weed control with some people, but top tip is just don't release them there. We go something else to do with them.

STUART CARLTON: All right. Brian, do you have--

BRIAN ROTH: Yeah. So one of the things that we-- oh, Yeah. Sorry. Go ahead.

[DRUM ROLL SOUND]

STUART CARLTON: It's so incompetent. What is your top tip, now that we've wasted your time?

CAROLYN FOLEY: Yes.

BRIAN ROTH: So I'll stack on the grades, and one of the things that you have to know is learn what crayfish you have. So most people are completely unaware of how many species of crayfish are out there and what species that they have in their aquarium, or that they're buying from a store or whatever the case may be.

And we've learned that by going into some of those pet shops, et cetera, that Greg mentioned and the owners and managers of those pet shops, they don't know what species they have. And they don't know how to tell quite frankly. So learning what crayfish you might have in your possession is really important.

And just as a side note, the most humane way to euthanize crayfish is simply to stick them in the freezer. That is the most humane way because essentially they just get cold and go to sleep, and then they turn soft. Crayfish sickles.

STUART CARLTON: There we go. Crayfish sickles.

CAROLYN FOLEY: So is there a resource for crayfish identification that like is there an online resource that we can add to the show notes if people want to try to up their identification game?

BRIAN ROTH: Yeah, there's several, actually. And I can point you, in fact there is a threat on the ICC about crayfish identification. And there's a field guides for Illinois and field guides for Michigan. And I don't know if there's one for Wisconsin, but the species that exist in that quad state area from Minnesota-- well, five states-- from Minnesota around the bend to Michigan are pretty similar. And so there's a lot of overlap.

GREG HITZROTH: There's a Great one from the Illinois Natural History Survey and Chris Taylor. It's a book, I think it cost about $10, but it's very good, lots of good photos, really good descriptions and taxonomic keys.

BRIAN ROTH: And I can pass you on that Michigan produced that's online and free.

STUART CARLTON: Perfect. Well, we'll put links to all those in the show notes as well. Again, teach me about the greatlakes.com/27. This is really interesting. I'm talking about crawfish and it's actually kind of hopeful that we can help at least prevent future spreads, but that's actually not why we had you on Teach Me About the Great Lakes this week.

The reason we had you on Teach Me About the Great Lakes is ask two questions, and the first one is this. And we have an answer from Brian for this, but maybe it's changed. I'll be interested here. Greg, if you could choose to have a great donut for breakfast or a great sandwich for lunch, which would you choose?

GREG HITZROTH: I had some time to think about this, and my answer is actually a combination of both. It's the donut hamburger. See, instead of a bun, you use a donut

CAROLYN FOLEY: Oh, no. No. You tried to Kobayashi Maru. This sounds horrible. Yeah. So have you ever actually get one or are you just trolling us here?

GREG HITZROTH: I'm just telling you. But I think in the nature of this, I would try it.

STUART CARLTON: Yeah, I was going to ask, the next question is where to get one, so if I see one in Chicago. I'll try it. No, I won't. I'm not going to try donut, here in Hamburger, I'll be honest, maybe a hamburger with a side of donut. Well, thanks for that, Greg. Brian, I reviewed the tape, and last time you were here, you said a sandwich as long as it was corned beef with mustard from Chicago. Do you want to revise that answer or you're sticking with it?

BRIAN ROTH: I'll revise, although that first choice is really hard to beat. I have made some really good Philly steak. Philly cheesesteak sandwiches over the coronavirus pandemic being stuck at home and trying to gain like 50 pounds and that help.

STUART CARLTON: Good. I'm glad you were able to achieve your goals. What's the secret to a good homemade Philly cheesesteak sandwich?

BRIAN ROTH: You really need good meat. So the steak is critical. I actually prefer flank steak over ribeye, and it just, for me, has more flavor and is delicious. And then you really have to get those vegetables just right. Just a little bit of teeth in them, and melt the cheese in it.

STUART CARLTON: Here we go.

BRIAN ROTH: 50 pound.

STUART CARLTON: 50 pound per sandwich. I eat nachos the other, anyway, never mind. That's a different podcast. So, Greg, you are going to see Grant's aquatic invasive species outreach specialist. What makes you good at that job? What are key skills that somebody needs to have in your type of work, do you think?

GREG HITZROTH: Oh, good Lord.

STUART CARLTON: Oh, you act like I didn't send this to you in advance.

GREG HITZROTH: Yeah, I know. I've been thinking about it. I don't know. There's so many answers to this. I think I find being tall and intimidating the best when working in person, so I really commend authority. So I think that's quality.

STUART CARLTON: Thank you for that. Mental note on Greg. Don't ask him questions. Good. So, Brian, you haven't answered this one, because we changed up our second question for a year or two, but so what do you think makes a really good, I guess you're a researcher and associate professor and a fish ecologist, what are key skills you think that makes somebody great at that job?

BRIAN ROTH: Stupidity. I don't know.

STUART CARLTON: That's a little known fact about professors and researchers.

BRIAN ROTH: Being a glutton for punishment, I think, is one of them. No, almost the pathological stubbornness, quite frankly, I think is really key to being a faculty member in just about any field. You have to really learn from your mistakes, I should say, and you'll make a lot of them and hopefully, you'll come out the other side.

STUART CARLTON: Wonderful. Great. Well, where this has been really fascinating discussion. We can't thank you enough. Where can people go to learn either to follow you on social media learn more about your work, et cetera. We can start with the ICC, Greg, where can people go if they're interested in that? Is there a public website or is it mainly just internal stuff?

GREG HITZROTH: It is. It's invasivecrayfish.org, and you can see our invasive crayfish Google group RSS feed on that website, and you can always join through the website as well to become part of the collaborative.

STUART CARLTON: And that's open to anybody, just interested group?

GREG HITZROTH: Anyone who's interested in crayfish.

STUART CARLTON: There you go. Great. And, Brian, so you have a Great Twitter follow, if you like pictures of fish and crayfish, really just pictures of aquatic things generally, where else can people go to find out more about what you do?

BRIAN ROTH: Yeah, my website is rothlabmsu.com.

STUART CARLTON: Wonderful. Well, Brian Roth, associate professor at Michigan State University and Greg Hitzroth, who is Illinois, Indiana Sea Grant's aquatic invasive species outreach specialist. Thank you so much for coming on and teaching us all about the Great Lakes.

BRIAN ROTH: Thank you for having me.

GREG HITZROTH: Thanks.

[MUSIC PLAYING]

STUART CARLTON: Man, I always love talking to Brian and that was some interesting stuff on the crayfish and the great work that we're doing with the ICC as well.

CAROLYN FOLEY: Yeah, I mean, everybody, I think, who listens to this knows are there learning that I'm an invertebrate person? So any time we can talk invertebrates is good.

STUART CARLTON: Yeah, you're an invertebrate lover.

CAROLYN FOLEY: Yes.

[MUSIC PLAYING]

STUART CARLTON: I'm glad I cut you off for that stupid joke. That's good. Yeah, so no, it's always nice to hear about inverts, and it's a problem and a growing problem, but it's interesting to hear, all the work we're doing transport, zero, and things like that, I think that message is something we can't drive home enough.

So you should go check out the be a hero stuff at transportzero.org, where you can learn about the work that we're doing to fight the spread of aquatic and interest real invaders in the area.

CAROLYN FOLEY: Right. And so there's a lot of different iterations of that type of message all across the Great Lakes basin, right on the Canadian side in the different states like remove drain, dry, don't move things around. So I think you had a conversation with some people from Wisconsin Sea Grant who are also trying to share a podcast and talk about the aquatic invasive species issue, which a lot of people think is like one of the number one issues facing the Great Lakes is the introduction of aquatic invasive species and how things completely change.

STUART CARLTON: Yeah. No, you're exactly right, and so our colleagues over Wisconsin Sea Grant they have a podcast called Introduced, and I was lucky enough to get to talk to the people the introduced podcast, and we'll go ahead and play that interview now.

[MUSIC PLAYING]

So next we're going to-- so we move from talking about the invasive crayfish collaborative and all the Great work that they're doing and having Brian back to talk with him about the work he's one, but we wanted to go more depth on aquatic invasive species because it's such an important issue and the timing of this is perfect because starting very soon in March our friends and colleagues over at Wisconsin Sea Grant are going to introduce or, no, what they're going to do is release the second season of their really Great podcast Introduced.

If they were introducing, they'd be an Austin power situation. Allow myself to introduce themselves. Anyway, regardless of that, we'd like to bring on a couple of people, a handful of people, from Wisconsin Sea Grant. We're going to talk with Bonnie Willison and Sydney Widell who are the hosts and producers of the introduced podcast of Wisconsin Sea Grant. We're also going to bring on my old friend, Tim Campbell, who's the aquatic invasive species, outreach coordinator at Wisconsin. Bonnie, and Sydney, and Tim how are you all doing today.

BONNIE WILLISON: Good. Thanks for having us.

STUART CARLTON: Yeah. We're thrilled to have you. So Introduced. So for those who don't know, first of all, let's get this out of the way right away you should listen to introduced. It's a really great episodic podcast that you can find. We'll put the show notes, but it go to Wisconsin Sea Grand, and you'll see it all over there.

But it's a very different show from Teach me about the Great Lakes. It is, and I'm going to use some big words here, but it is professional and produced by people who aren't lazy. So that puts it in contrast to us-- and it's all about aquatic invasive species. They did season one, they wrapped it up, season two is about to come out, and it's got a Wisconsin focus, of course, it does, because they're Wisconsin Sea Grant, but the story is much bigger than that.

And each episode has it feels like 225 interviews with really smart people talking about fascinating stuff. I just love it. You should definitely go check it out. But let's start with that. So introduce, how did the idea come about? Why did you want to do a podcast about AIS issues?

BONNIE WILLISON: Yeah, so, I am the videographer for Wisconsin Sea Grant, and I got brought on saying that I would create videos and a podcast. My supervisor Moira then came to me about maybe six months into my job and said, I think here's a topic that would be good for you to do a podcast on aquatic invasive species. And so from there, we hired Sydney as well to be the co-host, co-producer, and then Tim definitely as the aquatic invasive species outreach specialist, gives a lot of ideas, a lot of advice as a recurring guest, so that's how it got started.

STUART CARLTON: And so it's a really, like I said, a highly-produced show. It combines field recordings, phone calls, interviews, witty banter, and it's similar like you might hear from NPR or one of these professional podcast things but how much work is that like how do you put together each episode do you decide on topics in advance and maybe you can talk about some of the topics that you've covered, or what is the process for putting together one of these really well-done episodes?

BONNIE WILLISON: So Introduced, I like to say that it's about Wisconsin's changing waters or changing waters in general. It's about invasive species, but also humans, human stories, because humans are the ones that are introducing these species and humans all interpret these species differently. So we didn't exactly know what form the podcast would take at first, but we decided to do this, gather interviews, do research and everything, and put together multiple interviews into an episode.

So we usually start off by researching, getting ideas from Sea Grant staff, researching what stories we could follow. And we gather interviews, talk to a lot of people over Zoom or take field trips even, we then we'll write the script and record and edit. So it's a lot of work that goes into each episode.

We calculated that in season one. We talk to 30 people. Season two, we talk to like 31 people, and each interview takes like about two hours, and then you have to sit down and review the interview and cut it and everything, so it's a lot, but it's fun.

STUART CARLTON: That's a whole lot. I guess it is fun. You spend more time in one season than I think we've spent on this whole deal. So I have a question though. You say how people are-- different people interpret species differently. What do you mean by that? How do people interpret species?

SYDNEY WIDELL: It's Sydney here. Thanks, Stuart.

STUART CARLTON: Oh, you're welcome. Yeah, I should have said that in advance so we know who's who. Anyway, I'll figure that out. Sydney so how do people interpret species?

SYDNEY WIDELL: Well, first of all, just wanted to say we are big fans of "Teach Me About The Great Lakes." And then to answer your question, what we've been learning more and more as we try to tell these stories, and we talk to different people from different backgrounds and different disciplines, who all come at a topic or a species, I guess, with their own set of experiences, everyone is going to have a different relationship with that species.

Like our own understandings of this have changed so much since we started recording and doing all of this research. Like the whole way we define invasive species is if it's capable of causing economic or ecologic harm, but harm for some people is different than harm for other people, and some people have long cultural histories with these species. Some people don't regard these as species at all, they think about them as beings.

So even in the relatively small space of Wisconsin and all the watersheds that feed into the Great Lakes, there is so much diversity in the way that people perceive and talk about these things.

STUART CARLTON: So Tim, do you see that a lot in your work? So you do a lot of work with the DNR and so you, I assume are really well versed in like the technical legal definition of invasive species. But do you notice that diversity of experiences with them in the work that you do?

TIM CAMPBELL: Yeah. And I guess what I really like about what Bonnie and Sydney have done with the podcast, is that I feel like a lot of times in my work as an AIS Outreach Specialist, I'm trying to think about how I can quickly get across some really scientific or technical information to people, to try to help them make a better decision, but that's almost never the whole story.

And a lot of these invasive species issues can be just complex, there's different sides, and you need more than five minutes to talk about it, you need more than 1,000 word article to talk about it. There's a lot of different people, a lot of different stakeholders, and a lot of different thoughts and feelings about those things.

And so what Bonnie and Sidney have done is they able to capture all those, and put it together in a nice 45 minute to an hour episode, so you can really immerse yourself in some of these issues and maybe see what I see or see what somebody else that does aquatic invasive species work, I guess, see and feel what they are, when they're doing this kind of work.

BONNIE WILLISON: Yeah, it's almost like the phrase, one person's trash is another person's treasure. That comes up I think, a lot as a theme of what we've kind of learned over the podcast, is like, one person's trash species is another person's really important treasured species. Like Asian carp, the four species of invasive carp that we have here, they were introduced from China, where they're a really culturally important species.

And so the way that we did a podcast episode, Asian carp episode, the second one after we went to the barriers for a field trip, where we talked to a scientist from China and got that story, and just figured out how there are ways that we talk about Asian carp where they're just like, this horrible, trash species, and we throw them in dumpsters and stuff, but that's not the whole story.

STUART CARLTON: Yeah, that blew my mind when I moved here and started looking into invasive crayfish. But I moved here from Louisiana, or that's where I was born and raised. I spent the first 22 years of my life or whatever in Louisiana. And so when I found out that it was the same crayfish, I was like, oh boy, that's a different story here, isn't it? And so it's the exact same deal.

So I think sometimes it's geography that makes a big difference, sometimes it's just what you're expecting out of a species. So I just finished listening to the really great, I think the eighth episode of season one was all about invasive crayfish, the red swamp crayfish in Wisconsin. Sydney, why don't you give us an overview of that, and I think it has some interesting examples of what we're talking about.

SYDNEY WIDELL: How the crayfish got into--

STUART CARLTON: Yeah, could you give us an overview of basically that episode, and how the crayfish were introduced, and then we could talk about what they did about it and things like that, because I think it's an interesting story in and of itself.

SYDNEY WIDELL: Well, Stuart you're touching on a huge mystery, because we don't know how the crayfish got introduced. And that was one of the big things that really drew my attention and Bonnie's attention and imagination for that story, is that the crayfish are in there and someone out there knows how the crayfish got in, but despite the tremendous amount of the effort, and we can talk about that later, how hard people tried to figure out where the crayfish came from they couldn't do it, but someone out there--

STUART CARLTON: But they did. Well, I guess, OK. So we don't know how they're introduced. But I just have this visual image in my head. So they got reported to the DNR because they were like crawling on people's lawns, right? Is that what was happening outside of a pond at a neighborhood?

SYDNEY WIDELL: Well, actually we got in touch with-- we went back and looked over some of the original reports that came into the DNR, and they had this phone number linked. And so I ended up calling this person.

And I was really not expecting anything because this happened like a decade ago, and it was just this random phone number. But I called and this person picked up, and he walked me through the whole thing, how he'd gone to this pond a lot growing up. I think I might be misquoting that. Actually, let me think for a second.

STUART CARLTON: Well, people can find out for themselves. Just go to "Introduced" and listen to episode eight. But so they were in this pond, and--

SYDNEY WIDELL: There in this pond and the son who is fishing and doesn't catch any fish, and instead started setting nets, and he ends up coming out with like a gigantic cooler full of crayfish. And the guy is looking at this and thinks, this cannot be right. I'm no biologist, but I'm getting vibes that something is terribly wrong with this system.

And so he did the right thing and he called the DNR, and the DNR sent someone out to investigate, and they IDed this crayfish. There was actually a crayfish identification expert at the Milwaukee Public Museum, which who knew that was a career path? But--

STUART CARLTON: Well, there's only one, so the career path is filled. However, right, good.

SYDNEY WIDELL: Yeah, and they were able to confirm that this was a red swamp crayfish, which was the first instance of that happening in Wisconsin.

STUART CARLTON: Yeah, and so then the DNR had a big plan-- this is where it gets good. Because they were like, well, we need to get rid of these crayfish, right? And so help me track the story here. They wanted to use some sort of insecticide, even though they aren't actually insects, right? They wanted to use an insecticide, but they couldn't do that at first. Is that right Bonnie?

BONNIE WILLISON: Yeah. So they were like, how do we get these crayfish out? Because the crayfish, they can walk for miles, which is kind of unique. They burrow into the ground, so they kind of can shield themselves off from anything that you try to do. So they wanted to use an insecticide but they couldn't get it in time, so they decide to use just bleach.

STUART CARLTON: Bleach.

BONNIE WILLISON: So that's something they tried. They fenced off the pond, they poured a lot of bleach in there, and it seemed like it would work, but then they came back. And so, yeah--

STUART CARLTON: This is the zombie red swamp crayfish, right? You can bleach them and they won't-- you have to burn them. No, but anyway, so they came back the next year, right? And it turns out, why did they come back? What did we miss?

BONNIE WILLISON: Yeah, they think they came back because the crayfish were just burrowing down, and they had kind of a little layer that the chemicals couldn't reach. And so they were going to have to do a lot more to get them out.

So they flew in a crayfish expert from Europe to help with that, the only person who has used this insecticide on crayfish before. And they ended up using the insecticide, but they also just scraped the whole shores of this neighborhood pond in these people's backyards like 20 feet out, and they constructed a whole new shoreline that crayfish wouldn't be able to burrow into.

And also there was a different pond that was like really close by, and they actually just eradicated that pond. They filled it in, it's no longer a pond, because it was just too big of a risk.

STUART CARLTON: There's a real lack of knowledge about how the invasion started, and even what its status is. Is that common with aquatic invasive species? Is it hard to know?

TIM CAMPBELL: Yeah, it's hard to know a lot of things. It's hard to know, how things got here in the first place, especially in these instances of organisms and trade invasions. Like we don't know if it was a pet crayfish, or a crayfish boil, you know, we're not quite sure.

So that's why just prevention is one of the best things we can do, so we don't have to worry so much about how things got in there. We can really just stop the behavior, so then that way, we're not trying to have to figure these things out. Yeah, a lot of times there's a lag time before something is detected.

It could be introduced, it could hang out at really low numbers until some environmental condition really allows the population to explode, or it could just take that long for it to get so big that somebody could notice it anyway. There's a paper that just came out about sleeper cells, that I haven't had a chance-- It's in my browser window with like 50 other tabs of papers to read, so someday I'll read it.

STUART CARLTON: My browser window is just filled with tabs of your tweets, so yours is probably better off than mine is. That's interesting. And so sleeper cells may be an aggressive metaphor, but it's kind of right. And I guess we don't even know what's out there, right? In terms of other potential invasions just waiting to reach some tipping point. That's frightening.

SYDNEY WIDELL: That's another big theme that Bonnie and I have encountered during this, is that sometimes something, like when it's in low numbers like that, I don't know Tim. Do you even-- can you call it invasive if it's a population that's just so undetectable? I don't know.

But then like the environmental condition shift around it, and that can produce a new context in which that species does become very problematic for other species or humans who use that resource. And so, yeah, it's like the species but also you have to consider the context. And that can be just as important.

[MUSIC PLAYING]

STUART CARLTON: You produced this podcast, you got eight episodes. And like I mentioned, you took a really wide view of aquatic invasive species, or invasive species in Wisconsin, right? Things like goldfish, plants-- in fact, I forgot to mention that you were hardened criminals who have purchased illegal plants. Are there large sort of themes? What big themes can you say ran throughout season one, I suppose, of "Introduced?" Bonnie do you want to start us here?

BONNIE WILLISON: I think for me, I kind of realized that there is this sense of urgency around a lot of these species. A lot of our stories are about the red swamp crayfish in Germantown, just like one person can make a really big deal. And then introduce the species, and then you have to spend a million to get rid of it. So telling a lot of stories like that, that will kind of tell people, don't move invasive species, like crayfish, carp, mussels, they're all like a big deal.

And then I think, another theme is just realizing that what I said before about one person's trash species is another person's treasure species. And we've talked to people, more upcoming in season two, but groups like Native American groups, they believe that all beings deserve respect.

And some groups aren't even using the term invasive species at all. And some of the ways that we talk about species, they're not always respectful to those beings. It's not their fault that they're here. So yeah, it's about humans.

STUART CARLTON: So season two's coming up. What can we look forward to in season two? It sounds like you're going to continue to talk about the values of species, what else might we expect?

BONNIE WILLISON: Well, we continue on with some of the species that we looked at before. Like we did a few episodes on Asian carp, and in season two, Sydney goes carp hunting on the Illinois River with a captain who does aerial carp bow fishing, where you like spear the carp while they're jumping. So trips like that. We talk about salmon and smelt in Lake Superior, and then, yeah, more existential topics of what it means to belong and what it means for a species to be native and invasive.

STUART CARLTON: That's excellent. Well, this is really interesting to hear. And again, I recommend that everybody go and check out "Introduced" season one, so you can catch up before season two drops.

But that's actually not why we invited you here on "Teach Me About The Great Lakes." The reason that we invited you here on "Teach Me About The Great Lakes" has two questions. And the first one is this. If you could choose to have a great donut for breakfast or a great sandwich for lunch, which one would you choose?

SYDNEY WIDELL: Sandwich.

STUART CARLTON: Sandwich. Got to go sandwich, says Sydney. And so if I'm in Madison, which I think is where you are Sydney, where should I go to get a great sandwich.

SYDNEY WIDELL: I'm changing my answer to donut.

STUART CARLTON: You are in between choices.

SYDNEY WIDELL: Donut, specifically a blueberry old-fashioned from Greenbush Bakery.

STUART CARLTON: Blueberry, look at that. Short and to the point, wrong at first, but blueberry old-fashioned. The second best old-fashioned that you can have from Greenbush Bakery, is that right? All right, well, when I am visiting--

BONNIE WILLISON: Taking extensive notes.

STUART CARLTON: Yes.

BONNIE WILLISON: I would agree. I'd say donut. I haven't tried that flavor though.

STUART CARLTON: Oh, OK. But is the Greenbush the place to go, or do you have a different?

BONNIE WILLISON: I think all donuts made anywhere are good.

STUART CARLTON: Yeah, but that doesn't help me travel is the thing. So I'm going to Greenbush, and so what I have to do, is get a blueberry old-fashioned and then all the rest of the donuts, which is the Bonnie special apparently. Get all donuts. OK, great. And Tim, do you want to chip in man? Or if not, a little behind the scenes people, Tim's going to be back in a couple of weeks. So he can wait. It's up to you.

TIM CAMPBELL: I'll give you more information. I'll have time to think about a sandwich to tell you about, but I would double down on the Greenbush donuts, they've pretty much ruined donuts for me everywhere else. So--

SYDNEY WIDELL: Tim what's your go to?

TIM CAMPBELL: Just the original-- the sour cream one. I haven't expanded much, but they don't get any better.

STUART CARLTON: Oh, great. The second question is this. And we'll focus on Bonnie and Sydney for this one. But your podcast hosts podcast producers, Bonnie, you're a video producer generally or a multimedia content producer, what is it that makes you good at your job? What makes a good podcast or video producer? And what skills do you think you have that you bring to it?

BONNIE WILLISON: I think just sense of story and storytelling is a really important thing. I think with this podcast, it's a challenge to interview a few people and then try to piece it all together into a story that is 45 minutes long. It's almost like a little documentary with just one podcast episode. So I think like yes, storytelling, just knowing how to make things interesting for people, like knowing how to make science into an interesting story that'll keep them interested.

SYDNEY WIDELL: One thing Bonnie and I were noticing, we've gotten a lot better at starting as both like somewhat introverted people. And this really like genre, makes you talk to people. We've gotten a lot more fearless about asking people really weird questions, and sometimes it's like, oh, I went too far, that was really bizarre.

STUART CARLTON: OK. Now hold on, hold on, hold on, hold on. Let's hear an example of a weird question you've asked?

SYDNEY WIDELL: I was just listening back through an interview that we'd done a little bit ago, and I remember feeling very awkward for having asked someone this question, but he gave like an incredible answer. So that worked out well.

I asked him to imagine that he was a daphnia, and what about being a daphnia would-- or what about like encountering a spiny water flea would be the scariest part about being a daphnia. And then he gave us incredibly gruesome and violent description, of how spiny water flea just absolutely dismember daphnia in the water.

Daphnia if you're not familiar, they're like tiny little transparent organisms that float around and eat algae, and then spiny water flea are only a tiny bit larger than them but they have this long spine, and apparently they just like shred these sweet little daphnia. Really personifying them here, but yeah, I would never have known.

STUART CARLTON: That is a weird question. Yeah, but I like it. And it's interesting that then you get the best answers out of that sometimes. So good lesson there, is ask people weird questions. But y'all are fearless. You talk about your introverted or whatever, you're like calling dudes 10 years later randomly, you're asking people what is it like to be a daphnia--

SYDNEY WIDELL: Stuart, what do you think makes a podcast so it's a better podcast?

STUART CARLTON: A really good team, because that's what I have. And so--

SYDNEY WIDELL: That's true.

STUART CARLTON: Yes it is. The stable of co-hosts we have. And so our goal will "Teach Me About The Great Lakes," is to have every episode be as little work as possible, because we all got too much to do.

And so the way that we do that is by having really smart interested people working with us. And so we have all these different topics, and we know we're going to come in on this topic, who's interested, and it spreads the work out and things like that. So extreme laziness is what works best for me.

For me what it really is, is my reason for doing this is I just want to hang out with my work friends, and learn about stuff that we're all interested in. And therefore make my job easier. Like not my podcast job, but my actual administration job.

And so when this works, which it does sometimes and does in others, it's when you can sort of sense that. That we're just having a good time and learn it stuff together, and that it's serious but it's not too serious. And that's what we go for.

TIM CAMPBELL: Can I plus one the good team?

STUART CARLTON: Yeah.

TIM CAMPBELL: Like when I think about-- it was like, oh, it'd be cool to have the AIS podcast, and then I'm sure you've tried to design something in like Word or whatever, like make a poster and it looks awful, and then your designer does it in like 10 minutes and it's amazing. I feel like that's what Bonnie and Sydney did with the podcast. Like I had this idea of what I could do, and then if I tried it it'd be terrible, and Bonnie and Sydney made it amazing. Like that's great.

STUART CARLTON: Yeah. Nope, that's exactly true. Yeah, the work you all have done is amazing. It really is. I mean, it's a professional level deal. I mean you're professionals, I'm not trying to say or not, but it's like you have all these other things you're doing as well, and so it's just tremendous. It's just tremendous.

SYDNEY WIDELL: And Tim teaches us everything we know and keeps us honest.

STUART CARLTON: That it's good. That it's good. Great. Well, introduce season two. Do you have a release date of mind yet? When is this going to come out?

BONNIE WILLISON: Yeah. We are going to start releasing season two on March 10, and then we'll release an episode every Wednesday.

STUART CARLTON: Every Wednesday.

SYDNEY WIDELL: And March 10 coincides with Wisconsin Water Week, and I don't think it's too late to register for that, if you happen to be interested.

STUART CARLTON: Yeah, so how do we register? That's right, if everything comes out right, should be March 1. I guess today is March 1. So how do you register for Wisconsin Water Week?

BONNIE WILLISON: So it's a conference for people in Wisconsin who are interested in water. If you don't mind, if I'll try to find the website.

STUART CARLTON: No, go for it.

SYDNEY WIDELL: And while Bonnie is looking it up, I wanted to mention that Bonnie and I really want to hear from everyone who might be listening right now, and has a story to share about their experiences with places that have changed because of an invasive species, or an invasive species I think we should be talking about more, or maybe something that's over-hyped, or a set of relationships that they think is really interesting. If anyone has anything--

STUART CARLTON: How should they get in touch with you?

BONNIE WILLISON: Get in touch with us, you can email bonnie@aqua.wisc.edu. You can find "Introduced," and you should subscribe wherever you get your podcasts, on Apple Podcasts or Spotify, Google Podcast or on the Wisconsin Sea Grant website. We are presenting at Wisconsin Water Week about behind the scenes of "Introduced." What do you think is the best website to send them to Tim? Wisconsinlakes.org?

TIM CAMPBELL: Yep, that's going to be the easiest.

BONNIE WILLISON: Go to wisconsinlakes.org.

TIM CAMPBELL: And it's only $20 a day. Tons of great content for $20 a day.

STUART CARLTON: I mean, you could spend that on donuts. So this is easy. It makes sense. Great. And then everybody should follow you all on social media. So let's hear your social media deals and we'll link to them as well.

BONNIE WILLISON: Yeah. So you can find me on Twitter @BonnieWillison, and you can also follow Wisconsin Sea Grant on social media. And then since I'm also a video producer, go to YouTube and look up Wisconsin Sea Grant to see videos.

SYDNEY WIDELL: And you can find me on Twitter @Sydney-- oh, sorry, no. @SydWidell, W-I-D-E-L-L, that's the handle.

STUART CARLTON: That's great. And Tim you are @t_campy, right?

BONNIE WILLISON: Correct.

STUART CARLTON: Yeah, and again we'll hear more from Tim in a couple of weeks. But for now, the cast and crew of "Introduced," thanks for coming on and teaching us all about the Great Lakes.

BONNIE WILLISON: Thanks for having us.

TIM CAMPBELL: Thanks Stuart.

[MUSIC PLAYING]

STUART CARLTON: So that was a great conversation, I enjoyed talking to the folks with "Introduced." And again, I'm just blown away by the work they do to actually be professional and produce their podcast. It's a different sort of model.

I think like I said in there, I think of them is like the kind of produce show model, whereas ours is more of a talk radio model. But anyway, so Carolyn, we've talked with a lot of people about invasive crayfish today, and invasive species generally. What's something you learned about the Great Lakes?

CAROLYN FOLEY: So I think, one of the things that I didn't learn but I want to say again, is the crayfish win by the size of their claws, so it's like you can feasibly see where they keep coming in. And then if they are actually food for other organisms, then that can totally screw things up, if all of a sudden your food is biting back a lot more than it was before.

I think another thing that strikes me, whenever you're talking-- because we're focused on the Great Lakes, we're focused on the invasions here. But I think Brian Roth brought up that crayfish from North America have gone to Europe and introduced a plague, so I think--

STUART CARLTON: A literal plague.

CAROLYN FOLEY: Yeah, a literal plague. And so I think that it's important to remember that our stuff can go other places and cause problems too. So it truly is a global issue to think about.

STUART CARLTON: No, that is a good point. And for me the number one thing I learned is that virile crayfish, not just a clever name. So where can people go to find out more about what we do at Illinois-Indiana Sea Grant?

CAROLYN FOLEY: They can go to iiseagrant.org, or they can find us on social media @ILINSeaGrant.

STUART CARLTON: Great. And I encourage you to follow the show on Twitter. What do we teach? Great Lakes. And send us an email or a feedback at teachmeaboutthegreatlakes@gmail.com.

CAROLYN FOLEY: I did want to also say that there's a lot of good invasive species specific content generated by Greg and the other team, and there's a lot of good collaboration across the Great Lakes Sea network. So if you follow us on social media or any of them on social media, you'll learn good stuff.

STUART CARLTON: Yeah, you really will. Our AIS work is top-notch, as it is throughout the region, because it's such a significant issue. And that's one reason we're spending so much time on it. In fact, we're going to have more AIS content coming up in just a couple of weeks I think, or a couple of episodes anyway.

But until then, please give us a rate, give us a five star rating. Tell a friend, If you have a friend, tell a friend about us. Write a good review, don't write a bad review. The world has enough hate in it. If you don't want to write a good review, just hit pause. Go listen to "Introduced" or some other podcast, that's fine. But in between now and their next episode, keep greating those lakes folks, keep greating those lakes. And somewhere is the theme. I have too many sounds now I can't even-- there it is.

[MUSIC PLAYING]

CAROLYN FOLEY: Realistically, we want you to say that it needs more xylophone.