

Holiday Darters feat. Brett Albanese

Hey to all you fish enthusiasts out there, whether you're an avid angler or just curious about fish, we'd like to welcome you to Fish of the Week! It's Monday, December 27 2021. And we're excited to talk about all of this. I'm Katrina Liebich with the US Fish and Wildlife Service in Alaska.

And I'm Guy Eroh. Today, I get the privilege of introducing our guest coming to us all the way from the great state of Georgia, a teacher, a scientist and an all-around fish fanatic. This is the first guest on this show that I've had the pleasure of meeting outside the confines of a zoom call with the Georgia DNR freshwater biodiversity program. Please welcome Dr. Brett Albanese.

Thank you very much for that. Really nice introduction. I'm very happy to be here.

And happy holiday darter, very excited to have you on today.

Happy holiday darter, happy Halloween darter, Happy Hanukkah darter. Happy Christmas darter. These are all names for darters in Georgia.

Yeah, there's a pretty big diversity down in those waters. That freshwater biodiversity is pretty incredible.

Yeah. So we have 45 darter species in Georgia, which is more than some states have fish species so...

This is the first darter that we've had on show. Can you talk a little bit about what their role in the ecosystem is? Where are they living?

Yeah, great question. You know, darters, as a group, there's about 222 described darter species, it's the second largest family of fishes in North America. They're not in Alaska, there's only a couple of species that get to the Rockies. Most of them are down in the Eastern US with the peak of diversity in the southeastern US. Most of them don't get very large, just a couple of inches. There's exceptions to that. There's four main genera of darters. And I'll just talk about each one because it helps talk about the habitats and the way they live. But one is Crystallaria which is a really rare, translucent one. Don't need to really talk too much about that one. It doesn't occur in Georgia. The next one is Ammocrypta. Those are the sand darters. And we actually just discovered our first species of sand darter in Georgia in 2014. In the Flint River, it'd never been found there before. And these guys are also very translucent. And they have their eyes on the top of their head, and they bury themselves down in the sand. That's one of the reasons they're very hard to catch is they can just shimmy down in there. That's a small group. Percina is a relatively diverse genus. And the Percina are the larger darters, are not as brightly colored, they generally have a pointed snout, they have retained a small swim bladder, so they actually can be off the water column. And so when you're snorkeling for, let's say, with a tangerine darter, it might come right up to your eyes, you know, it might come right up because it's off the bottom. Whereas Etheostoma, the biggest genus with literally hundreds of species, those are the small ones, they've lost their swim bladders, they're down on the bottom darting around, they've got large pectoral fins, which they kind of use to jockey for position behind a flow refuge, or, you know, to get away from a predator, or something like that. So, you know, the role in the ecosystem. They're eating insects, or

other invertebrates, but primarily aquatic insects, like a lot of our native stream fishes. Their reproduction is amazing. This is one of the cool things about darters. Different subgroups of *Etheostoma* have very different spawning strategies from egg burying, which is just like it sounds, that females shimmy under the water in the mud and they deposit gametes in the substrate, that's the most primitive strategy. Holiday darters are egg attaching darters where the female will just drop one egg at a time and stick it to plants or rock something like that. A clumping darters this is a really cool, this is when the male will guard a cavity under a rock, okay, the female will invert and lay her eggs in there and they'll be in a big clump. And the male will guard that in a lot of species, multiple females will go in there and also add eggs to that to that clump. And so they're not really protecting the babies, but they're protecting the eggs from predation. And this is this is pretty cool. I have a rap about that one.

You have a what?

I got a short rap about that that spawning behavior.

We'll have to hear that.

Yes. Can we get that recorded?

Yes, yeah, we'd like to hear that.

And then there's the final one is a clustering, which is very similar to egg clumping. But what happens in this case is that the eggs are laid up singly like in a line. And so they're not a big clump. And what that means is, if an egg gets fungus on or something, the male can remove that individual egg so it's more advanced nest guarding. It's a pretty complex reproductive behavior.

Alright, so importantly, let's hear this rap.

Right? So this is just a small part of a much larger rap, it's just about the wounded darter. *Etheostoma vulneratum*, which is in the subgenus *nothnotus*. So it's: egg clump egg clump under a rock in a river. The DNR likes to stock. It a *nothnotus* called *vulneratum*. If you see its red spots, you'll want to mate 'em.

Awesome.

So I'm in Alaska, and I've only ever seen photos of these fish. Absolutely lovely. Could you describe for someone who hasn't seen them what they look like? And are they that colorful all times or just during certain times a year?

The ones we're talking about today? Genius, *Etheostomatae*, they're the small ones. And as you alluded to their color patterns, they're beautiful. They're well known for their sexual dichromatism, the males being much more colorful than the females. And that is, you know, generally at its peak during the spawning season, which is typically but not always, in the spring, some species spawn

throughout the summer. And a lot of times, even though outside of the spawning season, you'll see color on them, like in the late fall, for example, they'll start coloring up, it's driven a lot by water temperature and food as well. They definitely, you know, reached their peak colors when they're breeding.

So what does a beautiful spawning male holiday darters actually look like?

Yeah, so they have these green bars, Christmas color on the sides, okay, they get longer as you go back towards the tail of the fish. In between those bars, they have these red spots or half bars and a lot of red on the belly. So that's your, that's your green and red. In the middle of the anal fin, there's a little horizontal, red stripe in the breeding males. And that's, that's a really, that's a really great characteristic when you're trying to do surveys for them. And we actually do quantitative surveys for these things while snorkeling because we don't want to harm them. But when you're doing that, you want to make sure you're identifying them correctly in that little red there on the anal fin. If you see that like oh has to be 100%. None of the other fish around here get that. A lot of people always say "Darters - they're kind of like the Warblers of the of the fish world".

Let's hook in some of those bird people. Yeah, I always think about that the fish are oftentimes just as beautiful or more beautiful than the birds that people see very commonly.

I'm curious talking about birds, and this kind of sexual dichromatism, that appears not just in fish, not just in darters, but in lots of species where you have the really bright colored males and more drab females. What is the reasoning behind that? Why would this evolve?

Yeah, well, so this is sexual selection. And, you know, the male maximizes his reproductive success by mating with as many females as possible and attract as many females as possible, whereas the female, she maximizes her reproductive success by choosing the best males. And so color pattern is a way to find that male that has high fitness, high health, good condition, probably has good sperm that's gonna benefit her offspring.

So you think about trying to survive and being able to pass on your genes. And seemingly, these bright colors aren't going to help you avoid predators or find food? Because you might be worn them off? Is it kind of like, Ah, I don't even need that I'm a good enough swimmer, I got good enough genes that even with all this bright coloration, I can survive and move on. Is that kind of the thinking along it?

I think that's definitely something I've heard described before. You know, it's like, there's a trade off with these characteristics. Like you said, they make them more vulnerable to predation yet, if they're good at hiding from that, and, you know, evading that and you despite their high chi, good color patterns, and then yes, I think that would be another indicator.

So if I wanted to get in the holiday spirit and go see some of these fish in the wild, or maybe see him at the Tennessee Aquarium, or you know, are there are there ways people can experience these fish? I mean, I know we've talked about micro fishing a little bit in previous episodes, too, but what are some ways folks can go experience these fish in real life?

Yeah, the Tennessee Aquarium is a phenomenal freshwater aquarium. I highly recommend going to see it or the Georgia Aquarium. But Tennessee Aquarium is focused a lot on on southeastern fishes, and they do have darters I don't know if they have any holiday darters. I don't think that they do. A great way that anybody on this listening to this right now can google Georgia biodiversity portal. This is our website where we have information, photographs, range maps, species accounts for all of our rare species, whether it be fish mussels, crayfishes, and you'll see later Lots of pictures of holiday darters. Now, if you want to go like for reals, you'll have to get a wetsuit, mask and snorkel and go up to the Conasauga River, right, as it leaves Georgia, for the first time, come out of the Colorado mountains, there's a place called the snorkel hole. It's definitely right on the Tennessee line. And that's public access. And the best time to go, Well, you could go in May, if you're crazy and wanted to freeze, or you could go in June, I'm from Alaska, okay. Maybe April, then might see some stuff that no one's ever seen before. But I usually go in June, that's the time when the waters a little bit warmer, but the fish still have their colors. And you're gonna see like, any mighty 30 species of fish there and one sparkling event, if you're really lucky, and really work at it, walk in the river, take a left, go upstream, come up to this, you'll be sorting through a pool, you come up to this riffle habitat, and there's a lot of predators there. And usually the holiday darters and all the darters are up in this kind of shallow spot. And there's a really cold spring coming in right there. And so when you have that situation, you'll see that fish will extend their spawning season a little bit in that area, because the temperatures are right. So that's a way you can, you know, go in June and see him.

There's other person what kind of water temperature what kind of water temperature are we talking?

It's probably like, at that time, like 15 to 18 Celsius. Not too bad. It's like for you is probably like, you know what, you take showers for an Alaskan.

Yeah, yep. Yeah

Go out in the snow.

I noticed that it's not listed under the federal endangered species act, but is listed as a Georgia State endangered species. And I'm curious what that listing means for conservation and allocation of funds, and also what it means for people hoping to possibly go out and interact with them in the snorkel hole observing them, or possibly, if you're fishing up there, and you end up catching one what that means.

Yeah, so just starting with the federal thing, like you said, they're not federally listed. They were petitioned for federal listing a few years ago. And we actually got a grant to help assess their conservation status, the Fish and Wildlife Service who is an awesome partner for us, on the southeast, providing lots of grant funding and collaboration on projects. But for whatever reason, they decided not to list it, but it is protected under Georgia's Endangered Wildlife Act, which means you cannot handle the fish, you cannot kill it. If you want to do research on it, we would permit that, you know, with specific guidelines, and we don't want people to just not learn about them and certainly snorkeling, no problem at all. You wouldn't want to like catch them with a you would want to micro fish for them. And you

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wouldn't want to micro fish at all on the upper conasauga river because there's lots of imperiled species there, including federally listed ones, and there's potentially some yes there with a little tiny fish like

So that's a good point. If you are going to micro fish, you should be aware of what species are in the area? And if Yeah, if you're going to be targeting something that's obviously common or not listed, make sure you know the difference and make sure you know where the listed species are.

Great. Yeah, I agree. Totally.

Could you talk a little bit about kind of where what kind of habitats they're found and and what the water what the water is like?

Yeah, so talking about darters. In general, like free flowing stream streams and rivers is their typical habitat. There are exceptions. There's one that lives in swamps. But that's an exception. But most of them like swiftly flowing waters, holiday darters. In particular, they occur in the Blue Ridge Mountains of Georgia. So North Georgia, and they're in these really nice, clear streams, high gradient streams, not super steep, but you know, steep enough to have some good flow, pretty cold water, Rocky, and they're really kind of, they're kind of in a sweet spot in those river systems in the sense that if you go too far up those mountains, the streams will be too steep, too shallow to Swift, maybe too cold, not enough food. If you go further downstream, as these rivers leave the Blue Ridge, and enter the Ridge and Valley, which is an adjacent land form, the gradient slows down and they become slower moving more turbid rivers, they're a lot more impacted by you know, environmental degradation because they're not in protected forested areas. And holiday darters just don't survive right there. So they're kind of caught between these two extremes, like many, many mountain fishes are.

So they're somewhat confined, they're not moving too much like some of the other species we've been talking about.

There's very little known about their movement behavior. And if you look at a map of their distribution, you'll see that they are pretty there's five different populations. And some of them are actually in the same river basin and would be connected by connected river systems. But it's a long journey to disperse between those habitats. So to the best of our knowledge, you know, where the exception of rare dispersal events, they're confined to these headwater reaches and the populations don't mix.

So for all the folks listening out there, is there anything you'd like to tell them about? You know, why it's important to care about freshwater biodiversity and darters? In particular?

Yeah, that's a great question. I think you know, for the general public, sure those snorkel forum, get excited about them, learn about them, that's great. But not everybody's gonna do that. So, big picture, the things that we need to do to protect these species, save them from going extinct, are the things that are going to benefit our quality of life. We all want clean rivers and streams, we all want good drinking water quality. In fact, there's actually a paper that was published on holiday darters guy named Greg Anderson out of UGA, and some co authors, he looked at a model, looking at their distribution related it to landscape scale factors. And one of the most important factors in his model was percentage of forest

cover. And his model predicted as forest cover declines. So does holiday darters. And why is that? Well, forested watersheds generally have better water quality, if you have forest along the actual stream itself, you're getting a lot of thermal protection from the sun, you know, just keeping those streams, cool. Fish need these trees just as much as the birds do, because they're basically providing shade, when their leaves fall off, that's becoming a food source for invertebrates that they feed on their living filter that are trapping sediments and contaminants, fertilizers, herbicides, washing directly into the stream. So that's a super important thing for a lot of fishes, but holiday darters in particular, and a lot of these streams have trout in them as well. And that's one of our messages to people was like, Well, you might not care about the holiday darter. I mean, if you saw one, surely you care about it, but you might not even know about it. But if you want to protect your trout fishery, you have to protect those riparian forest habitats, a diversity of tree species, but also an herbaceous layer as well, which intercepts a lot of runoff, you know, flowing over the ground. So generally, yeah, if we can, if we can save the holiday darters we can have a better existence for human beings.

Perfect. Well, thanks for joining us today. This was great talking with you and really appreciate you joining us.

Thank you, Brett. I really appreciate it.

We hope everybody gets out there and enjoys all the fish. Thanks for listening to fish of the week. My name is Katrina Liebich. And my co host is Guy Eroh. Our production partner for this series of Citizen Racecar. Produced and story edited by Charlotte Moore. Production management by Gabriela Montequin. Post production by Alex Brower. This for the week is a production of the US Fish and Wildlife Service Alaska Region Office of External Affairs as the surface reflects on 150 years of fisheries conservation. We honor thank and celebrate the whole community, individuals tribes, the state of Alaska, our sister agencies, fish enthusiasts, scientists and others who have elevated our understanding and love as people and professionals of all the fish.