

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!, your audio almanac of all the fish. It's Monday, February 5 2024 and we're on a week by week tour of fish across the country with guests from all walks of life. I'm Katrina Liebich with the US Fish and Wildlife Service in Alaska.

Ahoy hoy, Katrina, I'm Guy hero. Today we are talking about...I don't know where I was going with that...No, A-hoyi is what we're talking about. Coregonus hoyi. The bloater.

And we have two excellent guests with us today. We've got Brian Weidel. He's joining us from New York, where he's a research fishery biologist with the US Geological Survey Great Lakes Science Center. And Dimitri Gorsky is a fish biologist with our lower Great Lakes Fish and Wildlife Conservation Office, also in New York. So welcome to you both.

Thanks for having us.

Thank you, it's great to be here, we're happy to talk about a species that has one of the more unfortunate common names. But it's a really neat species, once you get into it. I've fallen in love with these deep water fish that most people don't get to see. And bring them up on the lakes, show them to people pictures of these species. It's just really impressive to see the light bulb moments that go off when folks understand just how much is out there and how deep it is and how different it is than what you see if you're just standing on the shoreline or looking at a stream. Right?

Yeah. Speaking of unfortunate names, we're going to be covering the assfish a little bit later this year.

Something that actually beats bloater!

Yeah. Where does it come from? Why is it called a bloater?

Commercial fisheries when they would fish for them they're catching them from really deep water, right? And so as they're pulling them up in their nets, their air bladder expands and they come up and they're just totally bloated up their fins are sticking out every which way. And so they've just become bloated chubs was another name they used back in the day.

Awesome. So real basics, we're curious what a bloater looks like.

They're relatively small sort of slender, silvery fish you can think of like a bait fish that inhabits the pelagic areas of the Great Lakes, really mostly Lake Superior lakes here on Michigan and Ontario, and depending on how you lump or split potentially Nipigon as well. But the deeper portions. So like 100 to 300 feet of depth, very silvery. The largest sizes that they get or maybe 12 inches, right? But probably typically smaller than that certainly in some of the great lakes that are much smaller than that. Often folks will refer to them as a prey fish because of their importance to the native fish that consume fish the piscivorous fish, the lake trout and the salmon and things like that in the Great Lakes.

Bloater feat. Brian Weidel & Dimitry Gorsky

Yeah. And where do these guys sit on the family tree with other white fish or other related species?

Salmonidae is the family and then the sub families are Coregoninae or Salmoninae.

I do love fish with adipose fins.

That's why I like 'em. They're related to the lake whitefish, round whitefish and fish that are referred to as the Cisco's right. And so this is considered a deepwater Cisco.

Awesome. So these guys are occupying their own niche, which is deeper water. What are some of the other species historically that you might have found in those other niches around these fish?

There's a bunch of different deep water Ciscos. They've diversified in these deep-water habitats filling these really unique niches that somewhat overlap, but really are pretty well differentiated. There's a species of deep-water cisco called Kiyi. There's this one, the Bloater, There's Blackfin Cisco.

Cisco. Yep, Deepwater Cisco Shortnose Cisco. And then you start getting into the Shortjaw Cisco, and in Lake Superior that's where a lot of these forms were based, originally. And still, a lot of these forms remained. And some of the important science and conservation work that's being done now is just figuring out what's there. And using historical anecdotes or descriptions from fishermen. We've got some great researchers digging through just local libraries and pulling up newspaper stuff to really try to understand more about the history of species that we're not sure if they're still there or not. Some folks that work in genetics have done a really great job of using museum specimens to see that there actually might be a few more of these species. Some of the species we thought may have gone extinct might actually still be out there. But we just have a hard time telling them apart. They're all sort of silvery fish.

I imagine with historical records, teasing that out would be difficult. And these are big lakes, yeah, actually studying them seems like it'd be challenging as well, especially if they're lower numbers than they were historically.

Yes, much, much lower. So they used to be just about in every port.

I'm curious, we can dig in a little bit more into how all these different deepwater ciscos differentiate from each other? What unique niches are each of these ones fulfilling?

This is super nerdy.

Good go for it!

I think like I'm gonna totally go for it on this. But I think it's amazing how plastic of this group of species are, right, they've diversified in a relatively short time since the last glacier 10,000 years ago, right? Where they recolonized the Great Lakes. And theoretically, they had an ancestral form. And then they diversified from there. And you're talking about over six different species in that timeframe, I think depth

played a big part in it, right? So you have shallow forms of Cisco. And then you have a variety of deeper ones, I struggled to think about what caused the deep ones to really segregate as much as they have. The shallow to the deep one seems to make sense. In the deep offshore areas, you've got a few different varieties. I'd like to think that it's because Great Lakes are so big, you have different areas that they can adapt to, you have a lot of embayment type areas that are bigger than most inland lakes, right? You've got some unique environments that play into that and a variety of food for them to eat.

The key piece is depth, right? And when people refer to deep water, I often laugh and ask which deep water do you mean? Lake Ontario in and of itself, even the smallest Lake has 800 feet of water out there? The kiyi which is another one, that's probably the one that's closest to the bloater that's *Coregonus kiyi*, those were historically in Lake Ontario. And they were thought to be even deeper. So the bloater was the intermediate depth one and so you really have to try to use actual depth ranges to talk about which species were where. Because that's how they've been segregating out.

Yeah, at that intermediate depth, what are the bloater eating? And then what is eating them both historically and today?

What's eating them is the easy one: Lake Trout historically, and today, they they're one of the primary predators of them.

Just talked about live chat last week with Larry Miller. Oh, check that one out. If you want more info on yeah, on the Lake Trout.

Yeah. And so what they eat I know, they go after mysis. Mysis is like a small strip.

Yeah, I was

gonna ask you if mices were those little rodents that keep eating my pasta? Glad you clarified.

Laughs

Yeah, definitely not.

That's one of the species that they probably co evolved with. Mysis are these glacial relic species. These are species that were first in to these systems after the glaciers receded. And mysis can do a whole lot of different behaviors. They're known for migrating from the bottom of the lake in hundreds of feet up to the surface every night. And some of these species like bloater also evolved some of those vertical migrating behaviors. Others stay down on the bottom and feed on the mysis that stay on the lake bottom. So mysis were incredibly important. They form a large basis of their prey base. But they also likely probably helped with some of the speciation.

That's cool. And well, we're wrapping up this topic about how they species and their behaviors and stuff. How do they reproduce? Do they reproduce in these bands of water where they're found? Or do they migrate inland to structure or how are they going about that?

That's one of the more difficult questions.

Yeah.

most of these fishes in the genus *Coregonus* they spawn when everybody's putting their boats away for the winter, late November, December, in the case of bloater, probably into January or February. So we actually have incredibly little information relative to things like rainbow trout or northern pike or smallmouth bass and what we know about how they spawn, the things we can observe much more easily. And that's what our research groups, Dmitry and I and other colleagues have been working on, trying to go figure out exactly what those spawning habitats are in their native ranges where they're still reproducing successfully, so that for the places where we'd like to restore them, we can double check that they can actually conduct their whole lifecycle completely.

Yeah.

We really have a lot of unknowns. But we do believe that they spawn at depth, right. So these areas where they do live their life, we believe they prefer much deeper habitats for spawning.

You know, as we kind of understand what's out there in terms of what we know about the biology, I know things have changed a lot in the Great Lakes, now we have alewives. Now we have introduced species, we've got invasive species, we've had commercial fisheries, what has affected these fish over time? And where are we at today?

all the great lakes have lost some of the diversity in the species. Lakes like Lake Superior, have retained a higher proportion. Lake Erie and Lake Ontario really have lost a lot of their species. And so in Lake Ontario, we do have bloater back in the lake, but that's only because of a collaborative restoration effort where it's really an international effort of just dozens of different agencies and offices to figure out how to collect the fish out of Lake Michigan, rear the fish in both US and Canadian hatcheries, right? These aren't species that there's manuals written on. Everybody working on this has to invent it as they go. And then they've been reintroduced into Lake Ontario, that population is one that was extirpated, thought to be we caught the last one in the 80s. But they were very rare even before that. And now we catch them not often, but one or two or three every year.

Yeah.

What was the commercial fishery like for these fish and some of the other whitefishes, Ciscos?

The commercial fishers collect the fish that are easiest first, right? So the shallower fish, the bigger fish first. And as those were either over fished or habitat was causing issues with their reproduction, the fisheries moved deeper. Bloater were still around in the in Lake Ontario in the sort of late 1940s and 1950s. But they were greatly reduced. And at that time, they were even thinking about allowing the fishers to use smaller size nets to catch them because the fish were so small, but then the next thing the fish aren't there anymore. You mentioned some of the issues overfishing, nonnative species, but

also habitat change. That's one where we see a lot of that, especially if you work in lakes Ontario or Erie, they're quite different than what they look like the pre European time period.

I know this is like deep water. You can imagine that we've had an impact on this habitat. But the silt and sedimentation that happened from deforesting more than 100 years ago, that deforested our landscape, we were putting a lot of phosphorus and nitrogen into the water for 100 years. And all of that stuff ends up turning into sediment and it has to go somewhere. And sometimes it's near shore sometimes it's deep down. I think we've definitely impacted the habitat quite a bit with that. Another possible impediment is alewife being in the system. There's a lot of people that think they compete and compete for resources. Alewife have been shown to change the food web quite a bit.

Are these fish a better food source than alewives?

So in your lake trout podcast, you spoke about lake trout and other species have an issue with eating alewife.

That's not good for them. Right.

So the lake trout and other fish that eat away if it's not good for them, they get a lot of thiaminase in their system which breaks down the thiamin and they have reproductive failure. And so providing an alternative prey species for lake trout is really the main reason why we're investing so much in these bloater.

Aang everybody time for a minute with Maria with me Maria calling in from Choggiung lands in Dillingham, I just want to give a big huge qagaasakung to our guests Brian and Dimitry for coming and chatting with us about this wonderful fish the bloater. I think it's really marvelous how this fish continues to swim on despite all of the roadblocks in its way. I think it's really fascinating how the reproduction of the bloater is relatively a mystery. So big huge qagaasakung to everyone that has boots on the ground in this area and is making observations about the bloater so that this fish continued to thrive and not just survive. I had no idea that it was cousins to the beloved salmon that are so important to us here in Alaska. The bloater is a really important fish to the Indigenous cultures over in the Midwest spanning up to Canada and to the east coast. So I hope that we can take care of this fish. So thank you for everyone's conservation efforts and making sure that this fish has a life of longevity in the area. I look forward to learning more about this bloater Thanks all. Qagaasakung!

Dimitry, can you tell us a little bit more about the lower Great Lakes Fish and Wildlife Conservation office? And then same question to you Brian with the Great Lakes Science Center?

Yes, at the lower Great Lakes, Fish Wildlife Conservation office, we work with partners to manage the fisheries of lower lakes. So Lake Ontario and Lake Erie. We're primarily working on native species restoration. We have a group that does invasive species detection and monitoring. And then we have a group that specializes in habitat restoration. I think the best part about working at my office is the collaboration that I've been able to have with the other agencies around the lakes. I get to work with the Canadian agencies and the state agencies. It's really a great experience on both lakes.

So what all agencies...you mentioned, it was an international effort. And you know, considering these big lakes are on the border, US and Canada that makes sense. But what all agencies both governmental and non-governmental have been involved in the recovery or the attempted recovery.

So our office, USGS Great Lakes Science Center, is based in Oswego, New York, right on the southern shore of Lake Ontario. And then there's offices like mine in all the Great Lakes, up an Ashland, Wisconsin and Lake Superior. Or there's the vessel base and Sheboygan, Michigan. The Great Lakes Science Center has these vessel bases all around and field stations to keep up a fleet of large research vessels 70 foot to even up to 130 foot vessels. And these basically have a primary science mission in the Great Lakes. So assessing the status of prey fish, assessing the status of native species like lake trout, or bloater, or other *Coregonus* species. And so that was a big portion of what my office was here for and always did. But as we've recognized the information that we need for restoring the species, a lot of it has to do with embayments or nearshore areas. We've diversified our science to not just include our large vessel work and work with partners, including Dimitry's office, the state, as he mentioned, Ontario, as well as tribes throughout the Great Lakes to better take our big boat time series and surveys and help us understand why those fish populations have reacted the way they have.

It started on Lake Ontario with the Lake Ontario Lake Committee, which is chaired by Ontario Ministry of Natural Resources, and New York Department of Environmental Conservation. Those are the two provincial and state leads for this committee. And based on advice from their technical committee, they decided that it was time to pursue reintroduction of these bloater. They reached out to all different partners for help from there. They went to Green Bay, Wisconsin to find commercial fishers who knew where to get sexually mature bloater, which was maybe two guys at the time, right and only one of them was crazy enough to go out at the right time to get them. So they're like icebreaking out to the middle of Lake Michigan and fishing out, I don't know 400 feet down. They're trawling and they're pulling up these sexually mature bloaters. We've got hatchery staff from the Fish Wildlife Service on board. They're stripping these eggs right on the deck in all different types of waves and weather. And then those eggs have to get back to get disease checked and all sorts of things. So long story short there's a lot to list but eventually you've got hatcheries in Ontario department. You've got hatcheries and fish and wildlife. You have experimental tech centers in USGS and in Fish Wildlife Service that are working on techniques to rear these fish. You've got field offices like my office's looking into survival of the fish once they're in the lake. Then you've got Weidel's office who's looking at assessment using big boats and trawls the State's got a big boat program this so many I'm sure I forgot somebody along the way.

The Great Lakes Fish Commission has been very supportive and helping facilitate these group groups in these efforts takes quite a bit right to get these eggs moved around. Do you mail them do drive them? Folks have tried just about as many different things that you can come up with. And we're just now getting to the point where we're figuring out what works. folks up in White Lake Ontario have been the most successful at culturing the species, but they're delicate, they don't like to be transported. And so how long we keep them and how we get them back to the lake can really influence their survival once we put them back in.

So a lot of good work, a lot of good teamwork, a lot of investment. Why is it important to recover this fish and these native fishes?

Yeah, part of the lake committee's fish community objectives is to have a diverse prey base. And right now, when you look at the prey base of a large majority of the biomass is just alewives. So it's not very diverse. We have little pieces of other prey fish around. But upwards of 90% of the prey base is alewife. And so our mission is to diversify that so that if we have any catastrophic issues or if alewife disappear. There's something still in the food web, the tickets place,

Right on. So I'm curious on the technical side of things, how you guys actually go about evaluating the success of these programs? How do you know if there's more fish out there year to year? How do you know if they're reproducing and recruiting into the adult class?

One of the primary sources of tracking the restorations success or status comes from the bottom trawl surveys that have been established and being done in most of the lakes since the 70s. And so luckily, even in Lake Ontario, where we didn't have a lot of bloater, once the surveys get started, we can mirror what the folks have done in the upper lakes to understand surveys when and where and how they catch them. And so these surveys, for instance, we do want in both April and October, and they'll have somewhere around 250 Bottom draws that extend everywhere out from 250 meters, the deepest point we control up to about five meters. And those trawls were dragging the net along the bottom have produced to date, I want to say I think our numbers are 14 total. So in some years, it's one or two, and then some other years, we've had none. But those are those surveys, because they're the most widespread and conducted by all the agencies are our best look at knowing what's happening on a whole lake scale. And what's interesting is we tend to catch the most on the southern shore in the US waters. But the problem with that is, if we were to trawl at those depths on the north shore in the Canadian waters, that's where things get really rocky. And so we don't run our trials over there. So we're not sure if it's fish in the US waters because that's where they want to live, or if we just can't sample them as well.

They're biased.

Yeah, exactly. And the other location and Dmitry's crew works a lot with acoustic telemetry. And that gives us a lot different kinds of information about these fishes behavior.

Dimitry, what kind of tags are you using in terms of like, how big they are? And what did the tags tell you? How do you track them?

Yeah, so we use acoustic telemetry and the tags come in many different sizes. It's really dependent on the battery you stick in there. And then the lifespan of that tag depends on that battery. So yeah, when we're talking about some of the work that I've been doing with bloater, we're trying to get really small tags and really small fish. And so these tags are about the size of the mid-size vitamin, not the big, huge ones. But we're putting those in fish that are only like 15 grams, which I looked up what, what is like a common thing that weighs 15 grams, and it's three grapes.

Oh Wow, I can barely take those vitamins. Yeah.

Right. So these are like, really small fish. And they're getting a pretty big tag for their size. Once they're in a fish, they emit a signal. And that signal is unique to that tag. So we have an ID for that fish for that tag. We have an array of receivers out there that are just sitting on the bottom of the lake listening for fish to go by like a tollbooth system like an EZ Pass system, right. And when they go by the receiver logs, the date and time and the unique ID of that tag and we know we can learn a lot from multiple detections of these fish throughout the array.

Can you tell how deep they're going or anything like that?

you can add a lot of different sensors. And so you could do temperature, you can do depth, the one that we're using is actually a predator sensor. So it has a little film on it that once it gets eaten, it'll get digested and send out a new signal. And that's how we know that it's been eaten. And the challenge is, every time you add one of these sensors, the tag gets bigger. Right? So we're limited again by size. And so my crew has been working on evaluating the success of stocking fish, right? Because immediately after you stock fish is one of the hardest periods of time for that fish, right? They're getting put from a hatchery into a complete new environment, they're stressed from transporting, they're getting thrown right on top of a bunch of predators that they've never seen before.

And so not getting fed either.

Yeah, exactly. And not getting fed, right. So the first couple of days, couple of weeks are really tough for a stock fish. And so we're trying to evaluate how well we're doing with our stocking techniques and transport techniques to improve survival. Like Brian mentioned 14 fish in the last few years, that's not very good, considering we've put in over a million fish. So that's one of the pieces of work that I'm working on is looking at their survival with these tags.

How many tags have been eaten?

20% of the tags get eaten. But then we also have a bunch of fish that had mortality just because of stress related mortality. And that was also another 20%. And then another 20% were possibly eaten by birds in our first year of study in these fish. We estimate in the first two days 60% mortality of the stock fish.

Yeah, and they are prey fish, though some of that's to be expected, I would guess. Yes. Yeah. How long did the batteries last? I know, my recorder batteries just died and I hadn't even like played it yet. So how long are we talking?

60 days

Okay



It's one of the biggest arrays for this kind of study. We had like 100 receiver locations out there. So we covered a huge area, we really had a good shot at evaluating the stocking practices, we've done it for two years. The data I shared with you is from the first year. But I think the biggest thing that we've learned is that we have a lot of things still to learn about how to stock these fish, how to handle these fish and transport them. This is not our typical salmon stocking program, you're definitely not dropping these fish from a helicopter into the lake, right? This is gonna take a lot of trial and error and possibly doing things differently than we've done for 50 years. We

We tried recently, this past year in collaboration with Dimitry and his group to try to environmentally condition the fish, right, do more of like a soft release, taking lessons from both wildlife releases, as well as different salmonid stocking using net pens where the fish can acclimate a little bit. And we were amazed, we did it a couple of different ways. And in these environments, in a net pen environment, we still lost approximately 50% of the fish.

oh, wow

over those three days. So we tend to think of we want to come up with these neat ecological mechanisms. And it's this predation, that predation or it could just be that these fish are so stressed, moving into these systems, it's so much of a change, that we're really losing a lot of our investment right off the bat. And those are some of the questions we want to try to investigate with tags with tanks with nets, things like that.

it seems hard to try to simulate where they're supposed to be, these deep-water fish, just simulating the kind of pressure in the environment just seems like an extreme challenge.

You put it perfectly, right? How do you simulate 400 feet down, some folks are trying to work on that with pressure chambers. And they're seeing some neat results. But again, it can only make so big of a pressure chamber, right? And so these are just some of the challenges that come with studying and reintroducing these fish.

What would you tell a taxpayer so both public agencies, Fish and Wildlife Service USGS, this is a big investment. Can you just talk a little bit about restoration of a species like this recovery and just the amount of time it takes and why it's important to stay on board with that timeframe?

That's a tough one. That's not an easy question, because this is a very experimental effort. There's intrinsic value in restoring native species back into the habitat that we as humans extirpated them from, but there's also certainly consumptive potential, if you can get the species back in a sustainable way they could be potentially fished, they are still fished in Lake Michigan and Lake Superior. When you have empty niches in a lake, you're more likely to be invaded by nonnative species. If everything goes right, there's the potential that this could be a fished species, either commercially or recreationally here in Lake Ontario. But I think more importantly, is the idea of diversity in the prey fish that supports the predators that that the public tends to be more focused on. And so whether they're the native predators, lake trout, or the introduced predators, Chinook salmon, a diverse prey fish assemblage is going to help all of those sport fishes.

I think we've said it a few times, we want a diverse prey base for native fish and for game fish.

Understanding some of these fish takes a very long time. So just something to be aware of recovery doesn't happen instantly.

I'm curious. So when you guys were budding fishery scientists, did you always pictured yourself working with bloater?

No, I don't think that was ever on the top of my species list. I sometimes tell people that I don't want to study anything that doesn't fit in a gill net. And these guys just barely crossed that line.

Smaller. Yeah.

The thing is, though, with any species you study end up or at least has been my experience. There's always something cool that ends up going on within the learn. So is there any stories that stand out that, you know, people might not think the bloaters being the coolest fish to work with? But do you have any anecdotes?

do you have any historical accounts? Or have you heard anything about people's recipes for these fish, or how folks ate them in the past or anything like that,

I have a great story of that. I spent a lot of time in the lower lakes. But I also like getting around and going learning about how things are different the upper lakes and I want to say we are up on the maybe up in Houghton up in the key one on Lake Superior, and I was going to a fish house. And that was just we don't they don't exist anymore in Lake Ontario. And so up there, it was just an amazing fish house full of locals and tourists and all different folks. And a more elderly gentleman came in from the back and just decided wasn't going to wait in line. He just yelled, you have any Chubs and, you know, to the folks in the back, that meant smoke Chubs very likely bloater. And the lady at the counter just shook her head no to him. And he just turned around with a hand and sort of said bad enough and went right back out the door. And so that's important to think about, right? There's an individual who actually knew the difference, and was like, you know, he wanted that sort of oilier fattier fish in the smoke. Yep, that was his goal. Right. And so that was neat. At the time. I didn't know any of this. You know, I I watched it all happen and I had to go Google it and understand really what was happening there with this guy that's that people prefer these fish over some of the other things like whitefish, or lake trout and stuff like that.

you get that intergenerational amnesia go and we're Yeah, once you lose a fish and they're gone, you're not going to have people connected in the same way that they used to. And that's sad.

right, so nobody knew of us smoke chub here in Rochester, New Yorker, or Oswego, New York. But at one time, they were incredibly important to the area.

Tasty it sounds like too?

I think so. And you asked about what's exciting for us, I would have to say, when we're out on our bottom trolls in late March or early April, and we're sifting through what is many totes and totes of silver fish, right? Like Ontario is what's over 7000 square miles. Right? We haven't caught that many fish. But it's a big lake with a lot of fish in it. So when we do catch one, usually I get a picture out to folks. And what's neat is to see how quickly that picture gets around. It's fun when we get one where we look harder and harder every year. But we're waiting to see that day when we start seeing a lot of them in our trials. Great. It really wasn't until some folks in leadership roles in the Great Lakes Basin helped us view the big picture, right? We didn't maybe focus on the conservation effort of the species from the outset of Great Lakes Restoration, right. It's really since the Clean Water Act and getting a lot of the sort of insults or the bigger insults dealt with that we could even think about these things and now we're Looking back were like, wow, we maybe weren't thinking about them in a full conservation standpoint. So now a lot of that work is being done right now as we speak looking for different populations looking for that diversity. Or maybe not right, maybe they are all one mixed population.

Exciting to have so many kind of unanswered questions. I

Learned a lot about bloater today!

Thank you guys for being interested in bloater?

Heck yeah.

I hope your listeners enjoy it.

All right, well get out there and enjoy all the fish especially fish like the bloater super cool native fish. Thanks, guys.

Thank you guys. Appreciate your efforts.

Thanks for listening to Fish of the Week. My name is Katrina Liebich. And my co-host is Guy Eroh. Fish of the Week is a production of the US Fish and Wildlife Service, Alaska Regional Office of Communications. Our production partner for the series is Citizen Racecar. We honor thank and celebrate the whole community, individual tribes, states, our sister agencies, fish enthusiast scientists and others who have elevated our understanding and love as people and professionals of all the fish.