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, July 19 2021. And we're excited to talk about all the fish. I'm Katrina Liebich with the US Fish and Wildlife Service in Alaska.

I'm Guy Eroh. I specialize in talking about fish. You can hire me for your next party.

Okay, so love salmon, sharks are pretty neat, too. So today we're excited to talk about salmon sharks. We have two special guests with us today. Sabrina Garcia, who's joined us for a fascinating chat about lampreys earlier this year is back from the Alaska Department of Fish and Game. We've got a new guest today, shark expert Cindy Tribuzio, from NOAA National Marine Fisheries Service, Alaska fisheries Science Center, and she's based in Juneau, Alaska. So welcome you two.

Happy to be back.

Okay, so salmon sharks are pretty interesting, because one of the they're one of the most northern dwelling sharks in the world. And I know they range down in California. How do they survive up here in Alaska is cold waters, and are there other sharks with similar abilities?

The salmon shark are part of a group of sharks in the Lamnidae family, which has this ability to regulate their internal body temperature, which allows them to inhabit colder waters. And this species has the strongest ability to do that. They can carry a body temperature as many as high as 20 degrees Celsius above the ambient water temperature. And that allows them to go much farther north than other species of lamnid sharks. They have these structures called retes, where they're very active swimmers very fast swimmers, and it creates a lot of energy and heat in their muscles. And the warmed up blood from the muscles heats up the cooled off blood that's been circulating the rest of the body, and so they're able to maintain a warmer body temperature. And so they're able to tolerate a wide range of temperatures. And that's why they can range from the northern Bering Sea all the way down towards Baja California. And that also means that they're very, very active. You know, the videos that you see of the great white sharks leaping out of the water was very dramatic, well salmon sharks do that too. They're just a short, stubby, great white shark. So they're very dynamic to watch and very exciting. But they're also when if you catch one or bring it on your boat, they're very exciting. They have a lot of attitude.

I've read that they're like the smaller cousin of the great white shark. So that's, that's cool.

Yep, they are.

How old do they live to be?

I think the current estimates are in the 30s, right? 30 years?

Yeah, like upper would be 25 to 28.

Yeah.

So this is actually really exciting. Because this is the first shark the first chondrichthyan that we've had on the show. Can you tell us a little bit about some of the differences between the sharks and the typical bony fishes we've been covering?

Sharks do not have typical bones like the bony, the teleost fish, they don't have the skeletal structure that you see in a fish. They don't have the ribs and all the other bones, but their bones. They do have bony like structures that are made out of cartilage. They just don't have the calcium in them. They have cartilage in their jaws and in their teeth, which is why you see those in the fossil record. They also have very, very large livers, which is what allows them to swim that gives them the buoyancy so they can float in the water. And they use their large rigid fins to playing in the water. And sharks also have a heterocercal tail, which means that the top lobe of the tail is different from the bottom lobe. And their vertebral column actually extends all into the tip of that tail. So it gives their tail the structure for the power for their swimming.

Are there are there any differences in how sharks reproduce versus the teleost fishes?

Yes, that's a great question. So teleost fish, typically their reproduction, they are spawners, so the males and females will come together and the females will extrude eggs and the males will extrude milt or I guess for fish, it's sperm. And it all happens outside the fish's body. Whereas for sharks, they actually have internal fertilization. So the male sharks have these two appendages behind their pelvic fence called claspers, and they will mate with a female and they actually have different modes of reproduction. So some sharks will actually lay eggs, all the skates lay eggs, and the salmon shark has a really cool mode of reproduction where the female will, the embryos will develop within the females and as they get larger, the female will extrude unrealized eggs and these developing baby salmon sharks will feed on the unfertilized embryos, and that's called oophagy. As Cindy has showed some pretty awesome pictures of these salmon shark embryos and they've got the tiniest little teeth. They're just in their mother's womb just chomping on these unfertilized eggs. Yeah.

Oh my gosh.

Just little balls a yolk.

Mm hmm.

super cool.

Can we talk a little bit more about the connection between these sharks and salmon? Is this their primary diets? I want to know a little bit more about their name and why they're called salmon sharks.

Sure. So I will throw out that their common name is salmon shark. One of the cool things is that in Russia, their common name is actually herring shark. So as the name suggests, they do eat salmon. A lot of what we know about salmon shark diet occurs when we see salmon sharks and that tends to be

in summertime when there's these large aggregations of Pacific salmon in areas like Prince William Sound, Alaska, and they do eat a lot of salmon from the stomachs that they've looked at, they tend to find chums, pink salmon, and coho salmon in Prince William Sound specifically. And I think the really interesting thing is that in the summertime when there are all these salmon in the area, about a quarter of their diet is still made up of other species of fish and other sharks. They do eat spiny dogfish, rockfish, sablefish, Pacific Cod. So, we consider salmon sharks an opportunistic predator. So while we may think of them as these, you know, voracious salmon predators, which they are, they are also feeding on other species of fish and squid, and squid. Yeah, another study from you know, sharks from the western Pacific found on the entire stomach contents were squid. So we expect that their diet changes seasonally. So we would expect that they would eat different things in summer and different things in winter. But it's really hard to track down the sharks in the wintertime and see what they're eating. So a lot of what we know about is what they're eating in summer, which tends to be salmon because it's really easy to catch salmon when they're all concentrating right outside their rivers before they start migrating upstream. One of our colleagues who we work on with our salmon shark tagging project has actually tagged in mature Chinook salmon, and a lot of those tagged and mature Chinook salmon were eaten by salmon sharks. And you know, these Chinook are tagged with tags that measure ambient water temperature. So you can tell it's a salmon shark because the temperate once the fish is eaten, the tag starts to measure higher temperatures on the surrounding water. And then the light, the light levels go to zero. So you know it's inside something. And so we can tell, okay, it's a salmon shark because it's not a marine mammal, because marine mammals would have much higher temperatures. I think one of the misconceptions is that they're a specialized predator on salmon. And so when I think of a specialized predator, I think of like Southern resident killer whales that specifically eat Chinook salmon, and a salmon shark, I wouldn't put those in the same category. They're gonna eat what's available, and what's easy to catch.

So even if these salmon sharks aren't eating salmon exclusively, it sounds like they do prey on them. And considering the salmon are such an important species for humans in Alaska, is there any conflict that results as these sharks are feeding on the same fish that fishermen are trying to catch?

There are conflicts especially when salmon become a conservation concern. And there's been a number of conservation concerns within the state of Alaska. So I think that the salmon shark predating on salmon is becoming a more apparent issue, even though it's probably always been around. It's just more apparent now that we see were observed now. So there's a certain observation effect. But also, we're having conservation issues with some of the salmon runs, and that's impacting people. And so yes, that's part of the reason you get this misconception of salmon shark being the bad guys.

And I think it's a lot easier to, you know, we can see a salmon shark, right? So it's easier to blame something that is easy to see where, whereas it's really hard to be like, well, oceans are getting warmer. Well, how do you fix that? It's a lot more abstract than something like the salmon shark.

Speaking of oceans getting warmer, is that affecting the range or the migration patterns of the salmon sharks themselves?

I wish that we had way more data than we do on shark migration. I would expect that as oceans get warmer, it's going to open up a lot more habitat to the sharks. So if I had to place a bet I would, we would start to see the sharks are to move forward further north. And along the same lines, I'd expect to see some of these other more tropical sharks start to move north as well. So things like thresher sharks, which are typically considered more of a tropical species, we're starting to see those species come into Alaskan waters. And we would probably expect the same thing with things like make sharks. So I think as oceans get warmer, we're just going to see not just salmon sharks, but a lot of shark species start to shift a little bit farther north.

I'd like to know a little bit more about the salmon shark tagging project like specifically how are you catching them What are you tagging them with? And what are you guys finding out with that project?

The salmon shark tagging project is Cindy and I work on that together with Andy Seitz at UAF and a bunch of other awesome people. We catch salmon sharks incidentally to our salmon surveys. So while I like to work on sharks, my job is actually to work on salmon. So we go out and do surface trawl surveys for juvenile salmon in the Bering Sea. And surface trawl is, if you imagine just almost like a bag being dragged through the water with a big opening at the front and fish get funneled towards the back. So that trawl is getting pulled through the surface of the water. So the top 60 feet, we're basically looking for baby salmon that have just come out of the rivers. But every once in a while, typically once a year, we do catch a salmon shark by accident. And so like Cindy said, the sharks are energetic they get in the net, as soon as we open the net, that shark is not happy to be on the deck. So it's moving around, it's thrashing. So what we do is we put a towel over its eyes, that usually works to just chill them out. And then we started tagging them in 2017. And we've tagged two of them so far, and hoping to get another four more deployed this summer, fingers crossed. So this is an opportunistic project, we're not going out and specifically looking to catch salmon sharks, we're just doing our other research. And if we happen to catch one, we just take advantage of that opportunity and put tags on them. The tags that we use, are there two different types of satellite tags, so one of them collects and records data on depth, temperature and light. And those record data for about a year. And then at the end of that year, they pop off the shark. So it's like a little pin corrodes, and it floats off the shark to the surface. And it transmits a subset of its data via satellite. And then we also have another tag that's it's a more of an actively transmitting tag. So that goes on the shark's dorsal fin. And anytime that shark is at the surface of the water, the tag will note that it's dry, and it'll send a location of where that shark is, that tag is really, it's fun, it's very distracting, because I can just log in, and I can see where that shark is all the time.

Salmon shark are this great platform for tagging, because they are a very sturdy, large shark, you can put two tags on them, you can not only get this real time data, because the species tends to hang out at the surface a lot, which is also unique. Not many sharks actually do that. But you can also put this other tag on to get this really high resolution behavior data based on all the data we've had, so far as they tend to separate by sex. And the eastern Pacific Ocean, like our side is female dominated in the western Pacific was male dominated. And there's like this invisible barrier like was it once 170 degrees longitude, it was like this imaginary line. And so now that we're going to tag males, we can start to look and see where the differences in what they do are compared to all these days before the tag females are Prince William Sound.

Is this all a private data set that you guys are curating? Or is this one of those ones where people can actually go in and follow the sharks themselves?

Great question. You can go on our Facebook page, we have the undersea world of salmon and sharks Facebook page, and we do post his tracks about every month. But Cindy and I are working on a on a paper that hopefully will come out hopefully in the next month or so. And that'll be publicly available.

Awesome.

Do they have names by any chance?

The first shark we tagged and 2017 doesn't have a name. He's just shark A unfortunately. The second shark is Lawrence because he was tagged by St. Lawrence Island in the Bering Sea. So I think from now on, we got to start naming them.

Yeah, yeah, grow that following for him.

Okay, so if somebody is to catch one of these sharks say they're fishing for salmon? Do you guys have any recommendations on like, number one you bring into the boat? How do you handle it? You mentioned a towel. How do you stay safe? How do you keep the sharks safe? If you plan to release it, should people release them? I guess just what are some best practices if you catch one of these things?

My first recommendation is if you plan on releasing it, don't bring it in the boat if at all possible. If you're recreational fishing, that's easiest part. It'll probably break the line before you try to break the line. If you're intentionally harvesting one, do what you can to calm it down, put the towel over the eyes. These are incredibly active and they're strong, they can fling their tails and knock you over. Caution is the only thing I can say just stay away from the mouth, stay away from the tail, which is not easy to do. But if you're intentionally sport fishing for them, you're probably prepared for that. We do not recommend rope wrapping a rope around the tail and dragging them that way, because that can actually break their back bones, this spinal column that can separate the vertebrae, as they are very heavy animals. And because they don't have those strong, calcified structures, those vertebrae can separate easily.

I'm just doing a shameless pitch here. If folks out there do catch a salmon shark, I'd appreciate it if they reported their catch to me. There's people out there fishing all the time. And unfortunately, Cindy and I can't be out there all the time. So I'd love to know when folks run into them. And just a general location, if they are able to get a photo, that's great. If they do bring it up to the boat, and they're able to get an approximate length and check the underside for claspers to let us know if it's a male or female. I'd love to have that information. So they can send me an email drop in our Facebook page. And I'm basically trying to create like a salmon shark database, and hopefully we can learn a little bit more about these guys and gals.

So yeah, okay, so they're eating salmon. You mentioned squid, rockfish some other things. So I'm wondering from a consumption standpoint, so say you catch one, and you keep it, what do they taste like? Do they have any kind of salmon flavor? Is it a white meat? Like what are we talking about here?

Your Yeah, trimethylamine oxide. Maybe you mentioned that.

I feel like I'm the worst person to ask because I would never eat a shark. But from what I've read, yeah, you can't just catch a shark, fillet it and throw the meat and cook it up because you do have to treat it for urea. And I've heard different ways to do that. I've heard people soaking it in milk, soaking it in vinegar. From what I've read online, I've heard that the Falaise looks similar to something like a swordfish filet and color and don't taste as good.

Unfortunately, I can speak from experience on this one. So there's the TMA Oh, the trimethylamine oxide is always a concern with sharks. every species is different. There's a spectrum on these for salmon shark, I think that they're probably one of the easier ones to treat. And we've done it with just running flowing sea water just you bleed them fast as soon as you get them on board. And then you flush the meat and seawater. Yes, it looks a lot like swordfish. It's a nice firm texture. And it is a very mild taste, but I personally would not recommend eating it. And for one, that was biological concerns. These are long lived species, they have a very low reproduction. So as a population, their productivity is very low. So the biological concerns for the shark itself. But there's also the fact that these are a high level predator and they are long lived and so they can accumulate a lot of mercury and it's not good for us. So the mercury is a definite concern. You hear about that a lot with tuna and whatnot. And sharks are an extremely high mercury concern and generally, not a good fish to eat even though they taste not so bad.

Are there different regs for fishing for the sharks if you're in state waters versus if you're beyond the easy out in federal waters

On federal waters, these are classified as non targets and currently directed fishing is prohibited for the species. I don't think anybody has any interest in directed fishing for them anyway. So they are just bycatch only very, very little retention. There's almost no retention for the purposes of consumption. But there's no other than the overfish, the acceptable biological harvest limit that we set for the entire Gulf of Alaska or the entire Bering Sea Aleutian Islands areas. There are no limits to shark harvest.

And on the state side of things, there are sport fisheries for them. You can only catch two salmon sharks a year per person,

if you keep if you retain them. Do you have any final take homes that you'd like to share with people about the sharks or the value they hold or just in general?

Sure. Sharks are rad. Sharks are cool. They are I mean, we that's why we're talking about them. Sharks are not the man eaters that a lot of TV shows like to dramatize it as an they're also not the voracious hunting predators out to destroy all of this fish stocks that we eat. They're just doing their Sharky thing, and we're becoming more aware of what their Sharky things are. I think that's really

important to remember that the salmon shark and all these sharks have been around a lot longer than humans have. Be safe when you bring one on board.

If you get to see a salmon shark or any of the sharks that we have here in Alaska, I would just take that opportunity to be grateful to encounter such an awesome, awesome fish.

Great, thank you guys so much. Thank you fascinating chat about sharks and we hope everybody gets out there and enjoys all the fish including sharks.

Thank you.

Thanks.

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 is Citizen Racecar produced and story edited by Charlotte Moore production management by Gabrielle Montequin. Post production by Alex Brower. Fish of the Week! is a production of the US Fish and Wildlife Service, Alaska Region Office of External Affairs. As the Service reflects on 150 years of fisheries conservation, we honor think 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.