

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. Monday, April 18 2022 and this year, we're excited to take you on a week by week tour fish across the country with guests from all walks of life. I'm Katrina Liebich with the US Fish and Wildlife Service in Alaska,

and I'm Guy Eroh. I'm a big college football fan. I'm really looking forward to where all my Georgia Bulldogs are going to go in the draft this year, I bet you we can get five first rounders really excited.

Maybe our fish. Okay, so most of our episodes to date have covered fish that you can catch. You can see if you take time to poke your head underwater if you're snorkeling or doing scuba diving. But the fish recovering on this episode, the Pacific footballfish, it's one we're lucky enough to learn about when it washes ashore. So we've got two guests from California today where a few of these fish have been found by beachgoers. We've got Ben Frable, who's an ichthyology and the collections manager of fishes at Scripps Institution of Oceanography. We've also got Bill Ludt, who's with us, and Bill's the curator at the Natural History Museum of Los Angeles County. So welcome you two.

It's great to be here.

Okay, so I mentioned I'm actually sitting at a hotel here in Anaheim, California, I've probably never been closer to a footballfish sighting or a museum that's lucky enough to have one. And I'm guessing there probably aren't a lot of people in the world who've handled this species. So first things first, we were hoping that either both of you could kind of just describe what this fish looks like if you've got it in your hands.

Alright, so the Pacific footballfish, like most deep-sea anglerfishes, some might describe it as horrific or terrifying. Because basically, it's a giant mouth. If you think about it, it's a big globulous thing, it's basically - it's very round, looks kind of like a large tar ball because it's pitch black. And it has a very big mouth with pretty sharp teeth. I don't think it's horrifying or terrifying. I think it's a beautiful fish. It's fantastic and remarkable. It has on the top of its head, a modified first dorsal fin spine, that is called the illicium. And at the tip of that is a bioluminescent organ called the esca. And if you can just think of it like a fishing rod essentially, is what it would look like. At the tip of that esca though, it has all these extra appendages that come off all these little kind of tentacles that come off of it too. And they all have silvery tips. So overall, you got a really big, black blob that has a fishing rod off of it and a big mouth. That's kind of how I explained it. It's really hard to describe what do you think, Ben?

I mean, yeah, that's pretty much how I put it, you know, just a giant swimming head.

Nice.

Seems like a lot of these fishes are living the deep sea of of all these really big mouths. What's...is there a reason for that? What's the selective pressure for that?

Well, there's not a whole lot of food in the deep ocean, it's pretty sparsely spread around. Not really high densities, in most cases. And so if you got a big mouth, you can eat whatever you come across.

And I think that's really the reason why so many of these deep-sea predators have these huge mounds, especially with the big teeth, too. And some of the teeth on the footballfish point back into the mouth. So anything that catches make sure that it doesn't get out.

Wow, so it's kind of more like it's acting like a jail cell rather than like daggers to try and hold on to the food.

Yeah, and you tend to see that a lot. You know, a lot of these deep-water fish, not just angler fish, but things like Dragonfish, Viperfish, you know, the ones the classic big teeth fishes, you know, those teeth are actually fairly fragile. So they're not really using those for chopping. Those are those are pretty much as you said, acting like cages.

Where does this name come from? Cause you know I was looking at I was excited, you know, football fish, but really looks more like a fuotball fish if you ask me. So where does this come from?

Yeah, to me, to me, it's definitely more round and not necessarily like an American football. To me. It looks more like a soccer ball.

Oh, nice.

Yeah, so I've been trying to get a source on the common name. I don't know if Bill's had any better luck. I haven't really found anything. But you do occasionally find articles that, you know, the original footballfish, which is actually we can get to later the first species of anglerfish ever discovered was the Atlantic footballfish in Greenland. And they're actually a quite a bit more common in the North Atlantic. So people are encountering them in places like Sweden, Norway, Denmark, France, places where they play soccer, not so much football, and also looking at the fish. So you can just surmise that the name is probably a reference to what the rest of the world calls soccer. And rather than American football.

I'm gonna start calling it the soccer ball fish.

they're kind of spiky looking too right the first thing that came to mind for me was like a freshly picked pickle. I don't know if that has anything of bearing to you guys, I guess I don't do football, but

Yeah.

They are spiky indeed, in fact that especially the large females that Ben and I have in our collections, they have these really robust spines all around their body. And our collections manager here at the Natural History Museum, Todd Clardy, unfortunately, found out the hard way that these are deep, really sharp, and that they can puncture gloves, and they can draw blood.

So you guys mentioned you mostly have females. And this brings up a really interesting point about these fish. Can you tell us a little bit about the males?

Which I hear look a little bit more like footballs, although maybe a little smaller.

A little bit smaller

More fusiform so to say,

Yeah, just a wee bit smaller, I mean, so let's just talk deep-sea anglerfishes in general, because this pattern is going to hold true across all of them. Males are much smaller than females, females can get quite large, especially in the footballfishes, whereas males are going to be dramatically smaller. I mean, in the family that the footballfishes are in, I think males get maybe the size of your thumb at the maximum I think they can get the record that I saw was up to one and a half inches, whereas females of footballfishes in general, not just Pacific footballfish, but I think the maximum size for females in football fishes gets up to something like 15, 16 inches. So very difference in size between those. Males also don't have the bioluminescent organ, the esca, that females have and basically are just swimming around trying to find a female to latch on to.

Yep, and once they latch on, they kind of lose themselves, right? They just kind of ended up being there for her purposes,

Not necessarily. So there are 165 species of deep-sea anglerfish, and only less than half of them do full fusion. But it seems that most male anglerfish do latch on at least for reproductive purposes. Some of them latch on just to you know, spawn, and then they like go and probably wither away and die. But what you're referring to is seen in some other groups not actually seen in the footballfish

Oh okay!

The male once he bites down, you know, his skin from the front of his head starts to fuse with the skin of the female anglerfish. Eventually, it seems their blood vessels start to fuse together their circulatory systems fuse, and you have probably the most romantic relationship that you can have in the deep ocean.

Yeah, most romantic relationship a parasitic male that does nothing other than provide sperm.

They call it parasitic males. But I feel like they are really getting the short end of the stick on that one. So it's sort of a derogatory term for when they're losing out.

Yeah, people love and rightfully so love the parasitic male story because it's so frickin bizarre, you know, but at the same time, yeah, none have been recorded on footballfishes. So of all the footballfishes of any species of footballfish in collections worldwide, none of them have had an attached male. So that leads us to believe that in this group, males aren't parasitic.

Have folks found males that were unattached to the females for the footballfishes?

Yeah. And actually, male footballfishes are the largest males of any type of anglerfish. As Bill said, they can get up to about you know, one and a half inches long or so. And that's, that's way larger than all other male anglerfishes.

Yeah. Good for them.

Can we talk a little bit about where they live and kind of what like, you know what that pressure does the body forms of fishes down that deep. I mean, these guys are pretty deep down.

Yeah, actually, it's kind of funny with footballfishes, because a lot of these large females like the ones that we encountered are actually only really known from either being found on beaches or sometimes in the stomachs of sperm whales, or in a few cases caught in commercial bottom trawl fisheries, it seems that the large females like this actually occur in slightly shallower water than you'd expect normal, like, when you think about an anglerfish, you know, the guests that folks have a lot of stuff with anglerfishes is guessing because they're so rarely encountered, is that footballfish generally occur between 200 and 800 meters, so that's, like 600 feet down to like 2500/2600 feet underwater. And these large females may be a little more associated with the bottom more so than up in the water column. And now, you know, talking about this body shape and what kind of pressure does to it, it's, you know, some of it doesn't necessarily have to do with pressure so much as the lifestyle of the deep-sea anglerfish, you know, they have this little lure and they are trying to attract prey to themselves rather than pursuing prey. So they, you know, they've been able to focus on putting a lot of energy into being a giant mouth. Not so much on trying to chase stuff, because they're letting it come to them. So yeah, so they're generally very flabby, not very muscular, kind of how I was feeling, you know, in COVID. And they're not very strong swimmers, as far as folks can tell, you know, deep-sea anglerfish also haven't really been observed that much in the wild. But there's a few instances where they put them in aquaria or ROV's have seen them, and they're just kind of like hovering until they get poked, and then they kind of like, "ohhhh" and some way.

What kind of stuff are they eating? Have you found anything in their stomachs? And the ones that have washed ashore?

No, no, in fact, the stomachs are always empty. We don't really know their diet. Presumably they're eating either smaller fishes or other small invertebrates in the deep sea, like some squid. In fact, I think we did not affect the one that we got last May, because we knew that we were going to put on display, but Ben did dissect his and I think all he found was just a stomach full of sand right Ben?

Yeah, quite a lot of sand in there. Although I didn't get too invasive because I want to save it for kind of a less destructive investigation in the future, maybe with like a CT scanner or something along those lines.

But they're not eating sand. That's probably reflective of just washing ashore.

I've heard rumblings whispers out there about people maybe trying to harvest mesopelagic fishes at some point in the future and was wondering if you guys could speak on that?

Well, the mesoelagic. So that's, you know, the slightly shallower part of the deep ocean, we're talking anglerfish we're kind of talking about the bathypelagic, a little bit deeper, kind of below about 1000 meters. The Mesopelagic actually has a fairly decent density of organisms, quite a lot of lantern fish, hatchet fish those types of things, and also squid and shrimp. But a lot of these organisms because they vertically migrate at night, they'll come into slightly shallower water and then go down into the deep ocean. They don't have gas bladders to regulate buoyancy. Generally, a lot of the fish will rely on molecules, especially molecules called waxy esters to help regulate their buoyancy. And the problem for us is that when we eat waxy esters, we get a thing called keriorrhea. So here, the "orrhea" part..

Yep...you poop yourself.

It doesn't go over well.

I ate one of those fish. I ate escolar in Hawaii.

Oh some escolar? So good. It's probably the tastiest fish I've ever had.

They're super tasty.

You gotta be careful. So historically, you know, deep water fish has not really been on the menu because of the health effects. But in recent years, they've kind of come up with industrialized ways of denaturing, the waxy esters and making them more digestible not just to humans, I mean, this is an issue for some species of even shallow water, fish and other mammals or something that we'd want to feed fish meal to. And so that's really kind of where this idea of pursuing midwater fish as a potential protein source is coming from now that we have potential abilities to industrialize that kind of the breakdown of waxy esters, but it's a concern. You know, we don't have baselines for a lot of these things. We don't know like most deep sea fish, we don't know how old they are. And people don't really understand how to read their otoliths very well we don't know how long they live we don't know what their life cycles are like. So the idea of kind of starting to harvest them is a little a little scary, just because there's a lot of that baseline data we still don't have.

So with those females you've gotten your hands on Have you been able to take out the odorless and do an aging or just very different?

I'm not gonna I'm not gonna cut into that skull.

Okay, okay.

Yeah, we I didn't want to I didn't want to damage the one that we had because again, we wanted to put it on display because it's such a such a rare find to get such a good specimen that's in really good condition because a lot of deep sea fishes come up and fishing nets are really beat up when you see them. But when the footballfish washes ashore, it's actually pretty immaculate condition. So we didn't want to cut into the head of ours. But I will say this about the Pacific football fish that we have in

LA...Holding that thing and looking at it, I would not want to eat it. It doesn't look really appetizing. There are some Lophiiform fishes that we do eat. We do eat monkfish, that's a type of lophiiform fish. But looking at that footballfish with the spines on the side, it's not really something that I want to eat.

I was curious what the filet would look like. I eat a lot of different fish and I was just kind of...Yeah, I know you guys and fillet that one but...

It's very white, the meat's very white, but it's also got a lot of water in it. So this is the kind of the case with a lot of these kind of not really not very good swimming deep mid water fish. You can start with a six inch fillet, but once you start heating that thing up, it goes down to a couple inches really quickly. So...

Interesting.

So it sounds like we don't know a ton about their behavior and whatnot. But we do know about their anatomy. And I want to ask more about this esca and how it works a little more. Are they producing that bioluminescence themselves? Or do they have some other organisms in there, they're helping them out with that?

Yeah, so they're not actually doing it themselves. You would think it's attached to their body, they're doing this light show underwater. But that's not actually the case, it's bacteria in the esca. And so the bacteria is what's luminescent. However, we do think that they can control how much light is shown. And they can control it either it's thought through the amount of oxygen that they supply in the blood to the esca. And also there are muscles around it. And so they might be able to contract some of these muscles to constrict the amount of light that is emitted from the esca. So it looks like they can control it, even though they're not the ones particularly producing it. It's the bacteria in the esca.

So how did the bacteria get in there in the first place? And then what are they getting out of this relationship?

Yeah, so that's, that's a good question. And it's another classic anglerfish type answer where we don't actually know. But it's thought that a lot of the escas have a little opening on the back of them. And so it's thought that either the bacteria come from the water and are attracted to the angler fish because it's providing some sort of chemical cue or medium for them to settle on. Or it may actually be on the mucus of the fish, you know, from its larval stage and lives on the mucus. And then as the fish develops into its adult form, the bacteria kind of gets into this little bulb on the tip of the esca.

Before they're mature, though, they don't have bacteria in the basket.

Yeah, sorry, I should have said that.

So that kind of brings up my next question with reproduction. I mean, how are the juveniles eating? Do we know much about like how you know what happens with the eggs? Are the juveniles inhabiting a different area of the water column?

Yeah, so juveniles are definitely shallower in the water column, they're closer to the surface. And then when they metamorphose into their adult forms of either male or female, they can also be found at different depths. So as Ben mentioned, the really large females that we've gotten for football fishes, pretty much washed up on shore, have some of them have been caught in nets, but a lot of them are found washing up on shore, we're not exactly sure why. Males, though that have been collected of footballfishes are typically pretty deep. And so I don't think the females are hanging out in a different area of the water column than the males, obviously, they do have to reproduce at some point. So females are probably deeper too at some point in their life, but the juveniles are up in the upper water column.

And they're pretty voracious, they'll eat, you know, any sort of small invertebrates, copepods, amphipods, that kind of stuff.

And what's what is their shape look like?

Also a little blobs.

Little blobs ok.

The males and females look pretty similar to a point in the larval development, and then the females kind of get more globular, and the males are a little more elongated, and they start to differentiate. So the males do feed as larvae, and juveniles. But once they kind of transform into more adult morphology, the males almost as far as we can tell, the males do not feed as adults. So they're kind of just relying on you know, whatever energy they gained as a as a larvae. Similar to what you see in a lot of like insects or invertebrates,

Right, we even see that with, you know, salmon and lampreys a lot of stuff when they start getting ready to get that final stage. You know, it's all for reproduction and nothing else. So...

Yeah, exactly.

Why is this like that they're producing attractive to whatever prey may be coming in? You'd think down there, maybe they evolved to avoid something like that, unless there's other things out there that are enticing that light up sort of like that. So why is show working for him?

Why is a bug and tracked into a bugs app? Any answer that we give what kind of anthropomorphize it a lot, too, but there's not much going on in the deep sea, right, you're in a pitch black environment. And you see some stimulus out there some light show going on? I mean, what do you think Ben?

What else are you gonna do?

Yeah, yeah. And you know, you also have to put it in the context. You know, a lot of creatures in the deep ocean and even the shallow ocean, biologically produced light, and they don't just use it for attracting prey. A lot of them do use it, but a lot of them use it for communication for species recognition. So there you know, there are shrimp. There are fish swimming around glowing. Is it dangerous to illuminate yourself, but when you're trying to find a mate, you know, it may become important or honestly to even distract predators. If you're in a school with other lantern fish or something like that. And you're all glowing. It's like zebra stripes, you can't really see it. So you see a lone glowing object sitting out there. It could just be you know, an injured shrimp that's swimming around not realized or squid that's not realizing it's glowing, you swim up. classic scene from Finding Nemo turns out to be a giant mouth, you get involved. That's the end of you.

I think another important thing to say too, is we commonly always say that they anglerfish light is for attracting prey. There's also a distinct possibility that that light is not just for attracting prey that they also use it for communication as well. So there could be multiple uses for that light

I want to move this conversation in a slightly different direction now. And it's really around the importance of, you know, finding a fish like this, it's really a treasure trove of information, folks aren't finding a lot, I kind of want to ask you guys about the process. So someone finds a fish like this on the beach, what do they do? And then how does it go after that? Like, does it go directly to you guys? Or who takes the call? And then how do you preserve it? And what happens exactly?

Well, what we hope happens is that when someone finds a fish like this, especially with the footballfishes, the really mature females that seem to just wash ashore, is that they report it to some authority and that they don't just take it off the beach. You never know what's going to happen when someone just wanders across a fish. And we probably lose more specimens than we realize. But we hope that you report it somewhere, either to a lifeguard or if you're at a national park, you can talk to the park authorities, but report it is what we would definitely recommend. And then those people will contact us. Or honestly, with the case of the first footballfish, I just randomly got a text from Ben when it first washed up because it was making its rounds very quickly on social media.

You guys lost one, right? There's three that came up, but you only got your hands on two of them. Right?

Yeah. So that's sad story with the second one, I guess from last year is that I didn't find out about that one. That one washed up on a beach just literally a mile north of Scripps right here. And the person who saw it sent a picture to a local news station and the local news station, emailed Scripps, but they took a few days to email us and we're like, "Hey, what's this fish?" And so I saw it immediately was already, you know, primed, because the one that ended up with Bill at Los Angeles County had washed up a few months previously. So I was like, "Where Where was this picture? When was this picture?" And like it, you know, it took a couple hours to get a hold of the person who took the picture. And then it turned out that the picture have been taken a week earlier. And so

Oh, no



Long gone. Long gone.

So I mean, it looked like pretty good conditions. The one that I've you know, I've seen some pictures online. If somebody finds when should they put it on ice? Like what should they do to help preserve it in the you know, before you guys get your hands on it?

I think as Bill said, the main thing is they shouldn't do anything, they should go to a lifeguard. The third football fish, the one that we have that we just put on display, and that is in good condition. That one actually washed up in a marine protected area. So if somebody took that off the beach, that's illegal. Right? So we don't want you to take it. The lifeguard if you're a lifeguard, or fish and wildlife staff, yeah, put it on ice. You put it in the fridge, put it on some ice, you can even freeze it, that's fine with us too.

The one that we got the park authorities washed up and Crystal Cove State Park and those people give props to them because they knew what to do they they wrapped it up a couple times in a garbage bag, basically. And they put it into a freezer and froze it for us. So they made sure to also they put the esca they put it up to the next to the body. So it froze with the body not out so it wouldn't bust off which was great. And he put it on nice contact us quickly or contact whoever is relevant quickly. If you freeze it, it can wait a little bit longer.

Yeah. And then once you get it, how do you preserve it for display at the museum or for study.

So you know, the kind of the traditional method of preserving fish specimens and collections as we will take tissue samples and any sort of photographs measurements, building talked about this in a second look for bio fluorescence. And then we do what's called fixing. We fix the specimen or preserve the specimen in formalin or formaldehyde, this kind of, you know, causes the proteins to bind up on themselves, so they won't decay, it also kills bacteria and anything else living in there, it's kind of a sterilize. But formalin is pretty nasty, it can get very acidic over time. So we only fix the fish in there for a few weeks. And then we transition them into alcohol for long term storage. So it's kind of like pickling I guess.

Back to the pickles.

They can stay in alcohol, you know, to keep some moisture out of the tissue. So it keeps it a little taut. But it also keeps any fungus or bacteria from growing. And they seem to be able to stay that way for for hundreds of years as far as we can tell.

Being museum folks, do you guys subscribe to the practice of only messing around with the right side of the fish? Or do you chop it all up when you're digging around in them.

I mean, you work with the fish that you got, right and so sometimes there's a pretty side and an ugly side. And if that's the case, I mean I'm gonna personally take pictures of both sides, but I might present the prettier side. But yeah, the photograph the nice side that you're supposed to present industry standards as you will would be the left side of the fish and anything destructive you would try to do on the right side of the fish.

Being that there's so few of these specimens around. I'm just thinking, if I was in that position, I'd give them all personal names, not just museum specimen names. Do you guys do that at all? Even informally, or no?

I am not a fan of the practice, necessarily. But we did name ours, there was a twitter poll for our museum to name ours that washed up last day, and the name that went was was Spiny Baby Cakes.

Oh!

If you come across another one this year, because it sounds like maybe there's more of them. Maybe that's just a coincidence or not, I don't know. Named after Jordan Davis. He was my favorite Bulldog this year. Hope he goes in the first round. Just to request you don't have to do it. But think about it.

We'll keep it on the list.

Where else are these fish washing up? I mean, have the other Pacific states had any wash up? Or is it mostly in California?

On this side of the Pacific, I think they have only really washed up in California. Bill can correct me. I think there might be a record from Baja. Or because of Mexico. I can't remember. But there's a couple of records. I think off of Ecuador. I think one closer to Hawaii and then a quite a few from Japan. The scientific name is *Himantolophus sagamius*. So it's just named after Sagami Bay in Japan where the first specimen was found. There's also a couple not big females that have been collected off of Papa New Guinea.

Did you guys mentioned this is the first type of footballfish that was discovered?

No. This is the sister species to the...well supposed sister species. So the first that was discovered and the first was discovered is the Atlantic footballfish. We are creative in the names here. But yeah, the first Atlantic football fish was found on a beach in Greenland in 1833. And actually ended up being the first species of deep-sea anglerfish ever described by science.

Didn't they only collect the esca that fish though and the body is no longer with it?

Yeah, they only saved the esca, they threw at the body I guess.

Oh, that's a bummer.

Who is in charge of that?

And that also is kind of the record for the largest footballfish is from that specimen, which is always kind of sketchy. You trusting these 1800s records. I don't know if the rulers were weird, or not standardized or what. But that's also the largest record even though they only save the lure.

What we found that's remarkable about the Pacific footballfish that washed up in May, is that in addition to bioluminescence, that is the production of light, these deep-sea Pacific footballfish, females also fluoresce. That is the skin around the esca. What we found, will emit a light greenish light under the right fluorescent lighting conditions. And that's really weird because for fluorescence to occur, you need external light, and which is not hard to come by in the ocean for shallow water species. But something that lives in this bathypelagic zone with no light at all. It's very rare to find fluorescence. And so what we think is happening with this is actually the bioluminescence, it's creating a dome light that will cause fluorescence to occur as well.

And that's kind of what also we think is going on. If you look at the esca, all of those filaments have like silvery tips and people have looked at them in the past, they've been found that they're transmitting light to those tips rather than the tips are just reflective tissues. So it's probably reflecting the light from the bulb.

But this is also something that you can only find from a fresh specimen too, which is why, you know, recording a really rare or unique fish, if you see it on the beach is important because we can't go back to preserve specimens. And look at fluorescence. Even though we can keep specimens around in great condition for people to study for hundreds of years, the way that we preserve them, it does limit some of our ability to do some science. And you know, things like color really fade quickly. And preservation. So even though we have tons and tons of specimens in both of our collections been an eye, the colors faded. And all of them they're kind of beige for the most part, even the deep blacks will fade over time. But fluorescence is also something that you need a fresh specimen for. You can't go back and look at fluorescence in preserved specimens.

What we'd like to ask our guests as well is, you know, why should people care about this fish?

It's an important part of the ecosystem, right? So you have not that much food in the deep sea. And yet, it's still part of that trophic structure you don't want to take whenever something is part of the food web of an ecosystem. You don't want to take that species out, right? It really helps with flow of energy through the entire ecosystem.

The deep ocean is the largest habitat on the planet. It is most of our planet. So you know, the fact that us as land mammals don't interact with it that often unless we're famous directors that can afford a submersible. You know, it just makes it something that we just don't think about and you also are like, "Oh, it's cold. It's dark. It's not as affected by the sun or by global warming." But it is it's you know, it's a habitat that is being affected by climate change, by changes in the surface of the ocean, because it's all nutrient cycles, all the nutrients are cycling down there.

People don't think about preserving the deep sea or protecting the deep sea as much as probably shallow water habitats. And probably because they don't know too many species that didn't have it these areas, but something like an angler fish that people do know about is a good kind of flagship species to get support of to recognize that these are important habitats of the ocean as well.

Pacific Footballfish feat. Ben Frable and Bill Ludt

All right, get out there and enjoy all the fish and if you're on the beach and you come across a cool looking fish, please report it to the proper authorities.

Thanks for listening to Fish of the Week! My name is Katrina Liebich. And my co host is Guy Eroh. Our production partner for the series is Citizen Racecar. Produced and story edited by Charlotte Moore-Lambert. Production management by Gabriella 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. 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.