Oceanology with Ayana Johnson
Ologies Podcast
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Oh heeyyy, it's your ol' Pop here, just out mowing the lawn in those shorts your mother wishes I'd throw away, Alie Ward, back with another episode of Ologies. Now in this episode, let's just belly up to the coast. Let's gaze out over a craggy cliff and stare into the glimmering sea. [*ocean waves, seagulls throughout intro*] What wonders, what mystery, what possibility, what a shitshow we've made it.

But is there hope? I don't know. I'm not an oceanologist! But that's okay, because other people are. And you're going to get the real-time scoop on whether or not we have missed the boat on saving the sea and what we are doing to make it better. So hang tight, because before we set sail, a few things you can do to help keep this podcast afloat.

Thank you to the patrons who pledge a buck or more a month to the show. You have kept it running almost a full year now! Can you even?! It's almost our anniversary! Your questions are great, your hearts are greater. If you wanna support Ologies via items, OlogiesMerch.com has you covered, literally. The link is in the show notes. And if you spent all your money on a very tiny baseball jersey for your hamster, I get it. You can support Ologies with just your words and your thumbs by telling friends and tweeting and 'gramming and making sure you're subscribed. Reviews and ratings are free to do. You can just do 'em. And kinda like a rodent in clothes, I'm just a little creepy and I read every single review, because it's really nice that you leave them and it makes me remember that there are real human beings in the void listening to this. So this week, I just wanna say thank you to JennieFarn, who says:

> *Every day I commute an hour each way to my job...*

Hoooh, god bless you.

> *...teaching elementary school art, and this podcast is like a billion mini hot tubs for my overworked brain cells, while also giving me cool stuff to talk to the kids about, like shark vomit and why the darn sky is blue, but not on Mars. Also, I've stolen, 'berbye' as my favorite way to exit conversations with hyper six-year olds and online conversations that have taken a bad turn. Thanks for everything!*

You're very welcome, Jen.

Okay, oceanology. Ward, are you saying oceanography wrong? No, no my tender bitches, I am not. So, oceanology is a thing. It's defined as, "The branch of technology and economics dealing with human use of the sea." So heck yes, this person is very much an oceanologist. Now, warning: is this the cheeriest of episodes? Is it full of warm fuzzies? NO! No, it's not. But is it important? Yes, yes it is. I did my best to balance the gloom with some wonder, and I promise you it is important enough to stick with the entire episode. There's so much good information. Also, a special thank you to one of my favorite science and politics and internet heroes, Baratunde Thurston, for hooking me up with this ologist who I nervously emailed the all-caps question: [*Alie crying out*] HOW SCREWED ARE THESE OCEANS??? Keep listening to hear her answer. She's based on the east coast, so I had her on my wish list. And one day in August, I got myself to her native Brooklyn and I tried to

pretend like I was cool enough to be there. We met up at an audio studio at Pioneer Works, which is this beautiful art and cultural center and event space where I would love to live as a stowaway if they would never find me out.

Now, as a marine biologist and a policy strategist, she does *TED Talks*, she's worked with the Environmental Protection Agency and the National Oceanic and Atmospheric Administration. She's an adjunct professor at NYU. She's also an environmental advocate. She travels the world working with politicians and communities to make their relationship to the oceans healthier. I am just in gentle awe of her. She had just gotten back from an occupational adventure the night before, and I just had the tape rolling as I waited for her arrival in the studio, way too eager, didn't want to miss a second. We talked about her favorite aspects of the ocean, when she fell in love with it, coral reefs, parrotfish, their butts, disgusting whale trivia, even more disgusting plastic trivia, the amount of doomed we are, what fish you shouldn't eat, and whether or not plastic straws really deserve their evil reputation. So it's not all sunny, but she is an expert who will real-talk us all into action. So please, get ready to listen to the crashing waves of wisdom from oceanologist, Dr. Ayana Elizabeth Johnson.

Alie Ward: So, do you need a minute? Do you need anything else?

Ayana Johnson: I'm good!

Alie: Or do you want me to just start lobbing questions about oceans at you?

Ayana: Ask me anything. I just got back from the ocean.

Alie: So you just got back from the ocean like five minutes ago, pretty much. How much of your work is in the field, in the ocean, and how much is travelling around making policy? Because I know that you do both.

Ayana: I don't have an active research program right now, so when I'm in the ocean I'm just like, checking it out, or hanging out, keeping in touch with the ecosystems and what's going on down there. So most of my work is, more so than policy specifically, just strategy work. How do all these different organizations make their campaigns better, their communications better, their policy work more strategic? Ocean Collectiv, a company I founded, is a consulting group that supports other organizations trying to amp up the impact of their conservation efforts. It's 13 incredible experts from professional surfers, marine biologists, underwater robot makers, filmmakers, policy experts, and we are all just coming together as this team to try to see what we can do to help.

Alie: Can we talk about your background a little bit, about your [*Alie sings*] love of the ocean?

Ayana: That was so melodic, I thought you were gonna ask me questions about my former a cappella career. [*laughs*]

Alie: Did you have a former a cappella career?

Ayana: I maybe did. Yeah, I was a jazz singer for most of my youth.

Alie: Really?!

Aside: Side note: I'm sorry I sang at you, and also, I asked if she had any music of hers that I could put in here and she said, "No, no jazz clips to share. Sorry about that." So I did try, okay? Okay, back to the sea.

Alie: When did you get into oceans and marine biology? When did you decide to take that path?

Ayana: When I was five. I learned how to swim in the Florida Keys on a family vacation. My parents took me down there specifically to teach me to swim. I went on a glass bottom boat and I saw a coral reef for the first time and it blew my damn mind. [*DJ airhorn*] It was so incredible. It's like a window to another world, right? You look down and there's just fish and coral and all these colorful things that you could never have imagined. So, that for me was the moment that I just wanted to know everything about the ocean.

Aside: So, Ayana went on to get a bachelor's degree from this little startup college called [*Alie distant and echoey*] Harvard University in the field of environmental science and public policy. She also obtained a PhD from Scripps Institute of Oceanography in marine biology, studying coral reef sustainability. Now during all of that, did she ever think like, "Maybe I should switch my major to bagpiping," to just take a turn into something totally non-oceanic?

Ayana: I decided pretty early on not to take any turns. [*laughs*] So, my PhD is technically in marine biology but it was done through an interdisciplinary program at the Scripps Institution of Oceanography that was partnering with the economics department to make sure that ocean conservation was integrating all these different things because it's really a puzzle, right? There's the science and there's the policy, there's the communication, there's the law and economics. I wanted to make sure that I had at least a reasonable handle on all these different pieces of the puzzle so that I could go out into the world and help to try to solve it in a broader sense. There's obviously a strong need for people to go really deeply into each of those. Like for example, I'm really glad there are people out there who just study octopuses and tell us everything they learn because they're amazing, [*laughs*] But the way my mind works and what I'm passionate about is that bigger picture puzzle and how we can really shift the human relationship with the ocean, because the ocean is obviously doing everything right, it's humans that are causing all these challenges. So that's the piece that I focus on.

Alie: So here's how I thought I would split up the episode. Everyone is like, "How can we make the ocean less fucked?" Like, we really messed up.

Ayana: That's the question.

Alie: I thought we would start with, let's talk about the good things about the ocean. [*laughs*]

Ayana: Sure, there's lots!

Alie: I'm gonna essentially play good cop, bad cop.

Ayana: [*laughs*]

Alie: I'm gonna ask you all the good questions and I'm gonna let the patrons ask all the, "What are we gonna do?", "Plastic, oh my god we're all gonna die!" questions. So, I'm going to ask you the happy questions about the ocean before we get to, "Oh my god, what are we all gonna do?" It sounds like when you were looking in the glass bottom boat that you had kinda an epiphany that there's this whole world under the sea that you never realized. Have you had any other kind of epiphanies about the ocean or any other moments you've had?

Ayana: When I started my PhD research I was thinking about fishing and how it can be really wasteful. You catch fish you don't end up using and in fact a recent research project I've been doing for the World Wildlife Fund, I learned that HALF of the seafood we catch in the US and EU is wasted somewhere along the supply chain. It's just insane.

Alie: [*gasp!*] No!

Ayana: But there's also the unsustainable aspects of fishing. They're both problems. I'm already diving into the problems, [*laughs*] I swear I'm getting into the good stuff! Overfishing and unsustainable fishing are a problem, and what we do with what we catch is a whole separate issue. But I was focused on how can we redesign fishing gear to make it more sustainable. So I worked with fishermen and the Fisheries Department in, in the Caribbean, to redesign their fish traps to let the baby fish and the ornamental, Nemo-shaped, skinny species out of the traps. It turns out you can let out 80% of the bycatch —the fish you don't mean to catch— without hurting fishermen's incomes, because all the valuable fish stay inside. It's basically just an inch-wide slot down the side of the trap that lets all the little guys out. And you can't do it by just making it a larger mesh size because then you have a big hole that any fish can get out of, including the valuable ones.

Aside: So, do Google her paper entitled, *Reducing Bycatch in Coral Reef Trap Fisheries: Escape Gaps as a Step Towards Sustainability,* for more on this. I did and then reading the abstract I did a little, "Yaaaaay, way to go!" squeal about it. Now there are also diagrams online and the regular fish traps that snag all those other little fishies can just be retrofitted with side panels that have little narrow slits for little fishies to sneak out and say, "Later days, dude, I have more growing to do," or, "You don't even eat my species." It's essentially the equivalent of the Irish goodbye for coral reef fish.

Ayana: So that was really exciting to me because it was a moment where I saw that you don't actually need super high technology in all these cases. You just need to think practically about solutions, and if you work *with* the fishing community and *with* the government these things can actually become law. So in, that type of trap design is now required and in a few other places as well, in Barbuda, and I think they're using it in Kenya. That was super exciting to me because the idea of low-tech solutions I think is underappreciated. That was a really eye-opening moment, which led to the next one, which was: it's not actually about fish.

Aside: Wait, it's not about the fish? Did I hear that right? [*Ayana: "It's not actually about fish."*] This reminds me of one of my favorite scenes from one of my favorite movies, *Adaptation*, which bears the iconic line from a former aquarium enthusiast:

[*John Laroche: "I once fell deeply, profoundly in love with tropical fish."*] Until he grows bored. [*John Laroche: "And then one day I say, 'Fuck fish. I renounce fish! I vow never to set foot in that ocean again!' That's how much fuck fish."*] Now two things: That clip from *Adaptation* is so beloved that someone has built a website at fuck.fish that's only that clip from the movie. You just press play and enjoy. Secondly, that wasn't Ayana's deal at all. When she says [*Ayana: "It's not actually about fish,"*] she means that she loves fish so much, she had to take a step back and look at the bigger picture.

Ayana: I had done all this work, counting fish and surveying fish populations on coral reefs and then I was like, "Actually it's about fishermen. It's about coastal communities. It's about the tourism sector and how people are impacting the ocean." So that's when my research shifted to doing hundreds of these socioeconomic interviews with people across the Caribbean from this mindset that I had to understand people, how people were using the ocean, what problems *they* saw, what solutions *they* would support, ask them, if *they* could write the laws to manage the ocean what would they be? And then see what I could learn from all these experts who spent more hours than I ever have in and on the ocean.

Alie: So in order to save species in the ocean, we have to look at the humans on land and what they're even doing.

Ayana: Yeah, it's human behavior and what makes us tick and our incentives and motivations and culture.

Alie: That makes so much sense, because the fish are like, "Don't look at me dude! I'm not the one ruining things!"

Ayana: [*laughs*] Exactly! "I'm just swimming around, trying to find a snack, make some babies, not get munched by a shark or whatever."

Alie: So you're like, "Hey humans, let's put the microscope on you guys for a minute."

Ayana: Yeah, time out. Let's think through this.

Aside: So oceans, it's not you, it's us. It really, really, really, really, really is us. But anyway. Okay, sorry. This portion is the positive portion of the episode. Let's try to stick to the light, fun stuff before the conversation gets a little bleak.

Alie: Can you give an anatomy lesson of the ocean? Some zones, what's an ocean versus what's a sea? Just basic, dumb questions.

Ayana: The way that we talk about the ocean has changed a lot in the past decade and now we say *the* ocean. It's really one ocean. It's all connected, and there's these different sort of parts that we've named seas and different ocean titles. But there's currents that run through and connect everything. I guess the easy answer is it's just *the* ocean. So there's the Caribbean Sea and the Mediterranean Sea, and there's the Atlantic, Pacific, Indian, all these oceans, but really it's all one big thing. The zones that are more important, when I think about the ocean I think about the depths of the ocean, the shallower waters where there's more sunlight have a very different thing going on than super deep parts of the ocean. A lot of it is about temperature and sunlight that creates these different zones.

Aside: Okay, quick rundown of ocean zones. We covered this in the ichthyology (fish) episode, but who doesn't love a refresher course? So let's break it down: Epipelagic is at the top. This zone, from the surface to about 200 meters or 600 feet down, gets some sunshine, so plants grow and the bulk of ocean life hangs out there. Below that are the mesopelagic, bathypelagic, abyssopelagic, and finally at the very bottom, the hadal zones. Now the average depth of the ocean is about 3700 meters and its deepest known point is almost *seven miles below the surface* in a trench near Guam. I'm just thirsty for stats. Here's another good one:

Ayana: 97% of the water on Earth is in the ocean, so when we think about freshwater and drinking water, that's a good reality check on how important it is to be careful with our water.

Alie: I'm sure children ask you this, but the ocean, why is it salty? [*Ayana laughs*] I'm just gonna ask. I'm gonna ask.

Ayana: The ocean was formed by all this stuff that comes off of land, right? So all the rocks that are sort of eroding over time into the sea, have different things in them that make the ocean salty. I think over time, things change as evaporation happens, and things like that, so salinity can fluctuate a bit. That's actually part of what creates these large ocean currents, is how salinity has an effect on things. Because if you've ever had the chance to go in the ocean after it rains, you'll realize that —in the Caribbean anyway— this just happened to me. I jumped in the Caribbean Sea after a rainstorm and there's a layer of fresh water on top that's cold, like cool rain, and then the ocean underneath it is salty and warm, because saltwater is heavier, it's more dense, so it sinks. Colder water is also more dense, and it sinks. So that can set up either layers or currents that are moved just by these gradients in salinity and temperature.

Aside: So imagine dense, cold water and dense, saltwater doing a very fluid kind of sensual tango. Now, I'm still trying to keep this half of the episode light and sunny so, ummm, let's see… questions about the ocean that are not depressing. Okay, alright. Was she always into messages in a bottle? Like the world's oldest one was found earlier this year in western Australia, bearing a note from a German naval vessel from 1886. Maybe that's fun.

Ayana: I was super into picking up shells and pieces of sea glass and things like that. I was always enamored by the things you would find on the beach, but not messages per se.

Alie: Right. Do you still have any of your seashells?

Ayana: Oh, totally. Yeah, I started a shell collection when I was five in Key West, Florida, and I usually find one shell from every beach I go to. I don't wanna take all the pretty things, and sometimes I take just a little, tiny fleck of something. I have a fishbowl full of one tiny thing from each beach I've ever been to.

Alie: Really? Do you have a name for that fishbowl or is it just a fish bowl?

Ayana: No… [*laughs*]

Alie: Have you been to all of the what would've been considered oceans?

Ayana: I've spent a lot of time in the Caribbean, a little bit of time in the Mediterranean, the Atlantic, but very little time in the Pacific. There's a whole world of Pacific islands I haven't been to yet.

Alie: Now is it true that the Pacific Ocean was named that because they thought it was calmer?

Ayana: I think that's right, but turns out *not* to be the case.

Aside: A little backstory: Portuguese explorer Magellan had hit some shitty conditions through what's now known as the Straits of Magellan, near the southern tip of Chile. This was in the 1500s, and rounding the corner into the Pacific Basin he was like, "Ahhh, so much better. It's so calm here, it's so pacific." Hence, the name. But not all of it is calm, however. But in the equatorial region of the sea, that part tends to have more of a chill vibe. Less wind activity. And it's technically called, 'the doldrums.' That is the maritime term for it. So the next time you're having like a ho-hum period of your life, I guess just take comfort that life isn't tossing you around and making you barf into its violent currents. See? This is the optimistic part of the episode!

Alie: Do you listen to any ocean apps on your phone to chill out?

Ayana: Like ocean sounds? [*background ocean sounds start*] No, I put earplugs in and just zone all the way out.

Alie: I wasn't sure if someone who has studies the ocean and has dedicated their life to essentially saving the ocean would be like, "I don't want to hear an app because it's just a bad simulation."

Ayana: Ah, yeah. I'm a pretty light sleeper, so I like complete silence. [*record scratch, background ocean sounds end*] And as someone who is 95% vegan and who never eats fake meat, it's maybe the same thing. I'm not going to have a soy hotdog and I'm not going to listen to fake ocean sounds [*laughs*]

Alie: Do you do a lot of diving? Did you have to do a lot of diving?

Ayana: I used to, yeah. For my PhD research I did 300 or 400 dives.

Alie: Do you like being underwater? I know some people are like, "It's so beautiful, it's like I'm flying!" And other people are like, "It's so big, it's terrifying!"

Ayana: It's pretty cool. Some people think that if you don't scuba dive you can't experience the ocean fully and I totally disagree with that. I think that scuba diving is nice because I can't hold my breath for an hour.

Alie: Yeah neither can I.

Ayana: I only learned to dive when I realized that I needed to as a tool for my scientific research. And it's pretty neat! To be able to be underwater long enough to really watch the behavior of an octopus or a parrotfish or whatever it is, is an amazing opportunity. But I think snorkeling is underrated. I think more people should get super into snorkeling because you can see so much just by diving down and taking a look and

being in shallow water. I hate the thought that people think that if you're not scuba diving then why bother. Because there's so much you can learn about the sea and just enjoy the spectacular creatures from the surface or from a shallow dive down with your mask on.

Alie: You just gotta learn that trick where you blow the water out when you surface, right? Is that hard to master?

Ayana: No, you can totally do it. Anyone can do it. Or, sometimes, when I don't have enough air left in my lungs when I go up to the surface for whatever reason, I just take the mouthpiece out and just breathe the air normally. [*laughs*]

Alie: I guess you could do that, too. [*laughs*]

Ayana: There are definitely ways that anyone can figure this out.

Aside: But as long as we are bandying about some facts: why is the sea such a pretty blue? Well, same reason the sky is. The water absorbs the redder part of the visible spectrum and the shorter, bluer wavelengths bounce back at our faces. Most scientists, especially oceanologists, agree that this is very pretty.

Ayana: The one thing it reminds me of is how the color of blue in shallower water changes based on the color of the sand. So if you have really white sand, you have really bright turquoise in the shallow water, and then as the sand gets different colors, you get different colors of blue. So it matters what the bottom is. If you have a dark rocky bottom or volcanic bottom, it's different.

Alie: And I didn't realize that a lot of white sand is coral sand, right?

Ayana: Yeah, and a lot of it came out of a parrotfish's butt.

Alie: Whaaaaatt?

Ayana: So parrotfish are my favorite fish. They have a beak like a parrot and they come in all these teal, yellow, green, red, magenta, amazing colors. They scrape algae off the reef, basically they're the lawn mowers of the reef, a very important job. As they're doing that scraping they get bits of dead coral or rocks and then they digest that and they poop sand.

Alie: WHAAAAT!? [*laughs*]

Ayana: So if you're on a reef with a lot parrotfish —and this is where it's actually very cool to be diving— you look at the landscape of the reef and you see all these fish swimming over it. A lot of them are parrotfish and they're just leaving trails of sand in the water behind them. It looks like these contrails of parrotfish poop as if the sea was the sky and they were airplanes.

Alie: I had no idea!

Ayana: It's pretty amazing. Some beaches are like 90-something-% parrotfish poop sand. I mean it is coral and rocks and stuff, but that's how it's been pulverized.

Alie: You're like, "Thanks, dudes!"

Ayana: Thank you so much. So there's a push right now to protect these fish because they're doing such important work of taking algae off the reef, because algae grows so much faster than coral. Coral only grows a centimeter or so a year, whereas algae plants just go gangbusters. And as more nutrients are running off into the ocean from different kinds of human pollution, agriculture in particular, you're seeing that the algae is basically being fertilized, so its growing even faster and there's more of it. So, we need these parrotfish, these lawnmowers, more than ever. There's a bunch of people working on campaigns around the world to protect parrotfish.

Alie: Protect sandbutts!

Ayana: Protect the sand poopers!

Alie: What's the most beautiful thing you've ever seen in the ocean?

Ayana: Ohhhhh, that's such a good question. Oddly, because we were just talking about the colors of blue, the thing that comes to mind for me is just really, really clear water and being able to see like a hundred feet. That's pretty amazing, that clarity of being underwater and really being able to see.

Aside: Here we veered off into a whole discussion about the horrors of shrimp, but I'm just going to stick with this format of a happy first half of the episode. More on shrimp in just a few minutes. Just a few more wistful, positive things, and then we're going to get to patreon questions and ocean sadness. I'm just trying to stick with this vision. It's hard.

Alie: Do you have a favorite movie or book set in or about the ocean? Do you have an escapist movie where you're like, "Ah, love that ocean."?

Ayana: *The Life Aquatic* is pretty good.

Alie: Really?! I've never seen it!

Ayana: That cracks me up, especially because it captures the ridiculousness of life on boats and trying to capture rare creatures and get along in tight living quarters with a bunch of weird scientists. Yeah, that's a good one. And I'm writing a children's book about the ocean.

Alie: Aww! What's it about?

Ayana: Ohhh, it's about a little black girl from Brooklyn who goes to the Caribbean, falls in love with the ocean, and decides to try to save it.

Alie: Where on Earth did you get that idea?

Ayana: I don't know, it just came to me in a dream! [*laughter*]

Alie: Do you have a title for it yet? Can you say?

Ayana: No, not yet. I'm just starting to finish up the very first draft, so I don't have an agent or anything for it yet, but stay tuned.

Alie: Oh my god!

Aside: Heads up. If you are a literary agent listening to this and you're not the one to reach out to Dr. Johnson to get this idea made, I feel bad for you, because this book is going to be so good. Also, as she was grabbing something out of her purse at this moment, she told me a very wonderful story.

Ayana: [*from a distance*] …And I think that it was a book that I would have loved to have.

Alie: That's so great.

Ayana: [*still in the distance*] I do have a swimsuit in my purse.

Alie: [*laughs*] Never leave the house without one!

Ayana: Yeah, I have a friend who does a lot of theater work. I met up with her when I was just coming back from a trip out to Long Island and I was telling her about it and she introduced me to another person as a marine biologist. Then I was like, "Yeah, but I didn't even use my snorkel this weekend," and I pulled it out of my purse. She was like, "I would never even use that in a play! It's just so over-the-top that you carry this in your bag!" [*Alie laughs*] I don't always, but sometimes I pull snorkels out of my handbag.

Alie: Okay. This is where we're going to take a turn... [*suspenseful music*]

Ayana: Alright, I'm ready.

Alie: We're going to ask some questions from patrons. Now, we've talked about how wonderful the ocean is, it's time to get into maybe the darker stuff. This is where the sad music would be queued. [*sad, slow, tragic piano in background*] You've really fallen in love with a character in a movie and then you find out that they have a horrible disease. Okay, let's do it. Let's get into this sad stuff via questions from the Ologies Patreon patrons. [*synth Alie voice: "Let's dive in!"*] So Becca asked point blank: How bad have we fucked up the oceans? Is it salvageable or are we just playing a sad waiting game? She says, "It makes me really emotional to think about the disgusting and terrifying things down there who are gonna die because people are assholes." And then Momma_Awesome said, "This is also my question." So this is the big question!

Ayana: How bad? Really bad is the answer. It's really bad

Aside: [*Alie very low and slow: "Ohhhhh man."*] This is like the scene where a corseted heroine coughs blood into a white kerchief. Here we go.

Ayana: I mean, we have done an amazing job of messing up the ocean on a planetary scale. We've completely changed the chemistry of seawater through polluting the air with carbon dioxide. The ocean is absorbing 30% of that, so it's acidifying the oceans, which makes it hard for things with shells to grow their shells. It makes it hard for fish to smell their homes and navigate and makes them a little bit delusional and not run away from predators. There's all these different things that we are just learning about that

changing the very chemistry of the ocean is doing. So that's pretty bad, and just the warming of it, all these creatures who have been adapted to specific temperature ranges and now those ranges are changing and so they're trying to migrate so they don't melt, their metabolisms can't necessarily handle all this, between the acidification and the warming that are associated with climate change. Then overfishing is a big one, we've taken out about 90% percent of the big fish in the ocean since 1950.

Alie: [*gasps*] What??

Ayana: Right now, 90% of fish populations around the world are either fished to capacity or overfished, so there's 10% that are not fully exploited. The other 90% are fully exploited or overexploited. So there's not a lot of room left to take more, and we've also been fishing further from shore into deeper waters using more and more high-tech tools. All the radar and sonar and helicopters and these things that were developed to fight wars are being used to find the last fish. We have these really high-tech boats and high-tech equipment that we have to use because the fish have become so rare. Then with coastal development, we're destroying the habitats along the coast, whether that's mangroves or wetlands or whatever that is, and those are the nursery habitats for the sea and those are the natural filtration systems from land to sea.

Aside: As long as we are in the sad half, let's get some straight talk about shrimp, one of my favorite foods, which I also always assumed was relatively sustainable, because they are like the ocean's cockroaches. They're small, they're gross, they're plentiful, right?

Ayana: 99% of shrimp is horrifically unsustainable.

Alie: Really????

Ayana: It's caught with a net the size of a football field, in industrial fishing, and it's dragged along the seafloor taking up everything with it.

Alie: [*gasp!*] Noooo!!

Ayana: A large portion of what's caught, like up to half or so of what's caught, might be thrown back dead and wasted as bycatch. So, that's no good. And that portion can actually be even worse. And it bulldozes the habitat while that's happening as well.

Alie: Oh, that's terrible. What about farmed fish?

Ayana: Yeah, so farmed shrimp is often farmed by bulldozing mangroves along the coast to make these ponds for them. The mangroves are the nursery habitat for all the fish on the reef, they filter pollution running off from shore, and they protect places from storms. Like in the tsunami in Indonesia, about ten years ago or more, the places that had intact mangroves faired a lot better because that buffers the waves. When we bulldoze that ecosystem, that's the protection, it's the nursery habitat, it's all of these functions that we're losing. Then we just pollute it with shrimp growing in high density and feed them all this stuff and antibiotics because we are growing them in such close quarters that they're all getting sick. So it's not really a great way to do it either. Then

there's been some exposés in the last few years that a lot of shrimp grown in southeast Asia is probably peeled by slaves.

Alie: Oh my god!!

Ayana: So whether you care about the human rights angle or the sustainability angle, I'd stay away from shrimp.

Aside: So ask your fish sellers where the shrimp comes from. Ayana says there are domestic shrimp farms in Florida and Oregon that are doing a really good job bringing less guilt laden shrimp to market, but it'll cost a little more for obvious reasons.

Ayana: If you're not paying like $20 a pound for shrimp, it's not good for the planet or for people. And it's all laden with these antibiotics and chemicals from the processing, so it's not healthy for *you* either.

Alie: [*sheepishly*] Oh my god. I ate shrimp yesterday.

Ayana: It's the most popular seafood in America!

Alie: I ate it yesterday!!

Ayana: People don't know this stuff! It's all these buffets!

Alie: It's probably still in my colon! [*Ayana laughs*] I'm a monster! I had no idea!

Ayana: You're not a monster! That's the thing, people don't know about it.

Alie: You figure that they're lower on the food chain, they're kinda buggy. They're a little bit insect-like, maybe it's fine. Oh my god. I had no idea!

Ayana: I think the challenge is, and this is another one of those moments when I had a realization about ocean conservation, is that traditions don't necessarily scale. The things humans could eat and the ways we could fish and use the ocean when there were 1 billion people on the planet or less, is just very different from what we can get away with as we are approaching 8 billion. We just can't do things in the same way. And that's a really hard conversation to have with communities that have these strong traditions tied to the sea, but whose populations are growing and being impacted by what's happening in other places because the ocean is all connected. So yeah, we are at this moment where we just need to rethink our relationship with the ocean. That doesn't mean we can't still enjoy it and there is such a thing as sustainable seafood, but we just need to be more careful and change our expectations for how we are gonna be able to use it and be ready to make some adaptations.

Alie: Ugh, I'm just thinking of cruise ship shrimp buffets. What a horror show. It's a house of horrors!

Aside: Listen, I warned you that this episode would be more on the tragic side, so let's just dive deeper.

Ayana: So, between coastal development and overfishing and climate impacts and then just like straight up pollution, everybody knows at this point about plastic pollution in the ocean, but there's also a lot of pollution that comes from the runoff of all the pesticides and herbicides we put onto our farms. When it rains, it runs into the rivers, and then that runs into the sea. Even if you're inland, there's still that connection. So yeah, we've done a really good job of thoroughly screwing up the ocean. But there are a lot of reasons to not give up, because I'm also extremely good at sitting on my couch eating popcorn and watching trashy television, so I would hone that craft if I thought the ocean were just not worth it anymore. [*laughs*] So instead, I'm seasons behind on everything and really focused on this because I feel like we have an incredible opportunity to really make a difference. We've seen so many examples of things that work when you change the way that fishing happens, when you establish a protected area, when you work with hotels and companies to change the way they manage their waste, when you work with farmers to explain how things connect to the sea and they change their practices. There are just more and more and more stories about things that are working, and so it's about replicating what's working and scaling that work. So definitely don't give up, but obviously I'm not sugarcoating it either. It is bad. The ocean is different than it was when we were born and we are not even that old. So the ocean that I saw in 1985, when I first saw the ocean, is different now and perhaps permanently so. The way that I deal with this sort of existential crisis of like, "Oh my god, the planet is dying what do I do? Should I just drink a bottle of whiskey and forget about it?" [*Alie laughs*] And the answer is no, I can't be hungover because there's all this great work to do. And it's not a matter of a totally dead ocean or a 100% healthy ocean. It's where we're going to fall in between, because with 8 billion people on the planet, we can't go back to a perfectly pristine ocean, but we can aim for 80% or 60% or even 30% is much better than zero. Our livelihoods, our food security, our health hangs in the balance. Depending on the day I'm either fighting for 20% or 80%, but any of it is better than zero.

Alie: And now ocean cleanup, Carrie Stuard and Rob Smith both had the same question: Does supporting a group like 4ocean really help clean up the ocean of plastic? Are any of those methods of getting things out of the ocean, are those really going to work, or do we want to believe that they work?

Ayana: We definitely want to believe that they work, oh my gosh, do we want to believe that they work. A lot of people have been fooled into thinking that a problem is solved, like, "There's this technology that will just clean it up and we don't have to worry about it anymore!" But that technology is far from being proven, very far from being proven, and if we think about the challenges of cleaning up something as big as the ocean…

Alie: [*in despair*] Oh my god…

Ayana: ...which is 72% of the planet, that's a tall order. Not to say we shouldn't try, but I think the question is where are we going to devote our resources and energy? So when I think about it, I think about how do we stop the flow of plastics into the ocean?

Aside: This is a good point, and gird your hearts for another horrifying statistic.

Ayana: The cleanups don't matter if we are still dumping one ton of plastic into the ocean every four seconds.

Alie: Whaaat?!

Ayana: I worked with this group Lonely Whale, I've been working with them on making these calculations. How much are we actually putting in? Where is it coming from? What types of sources is it? And that's the number we came up with: one ton of plastic is entering the ocean every four seconds globally. When we think about that, I spend my time thinking about how to prevent every second of plastic entering the ocean.

Aside: Quick history: how long has plastic been around? Technically, since 1856, but it wasn't until World War II that mass production started. Now around 1954, DuPont and Dow Chemical invented and licensed expanded polystyrene, which is used in packaging and bottles, although there's a bunch of different types of plastic. So yeah, in the 1960s we saw an explosion of plastics in commercial uses. Now, 1967's classic film *The Graduate* was sadly on point about one piece of career advice:

[*clip from The Graduate*]

Mr. Maguire: *I just want to say one word to you. Just one word.*

Benjamin Braddock: *Yes, sir.*

Mr. Maguire: *Are you listening?*

Benjamin Braddock: *Yes I am.*

Mr. Maguire: *Plastics.*

So, what can we do?

Ayana: I think beach cleanups are great. They raise awareness, they build community. We obviously should pick up what we can. I think the focus should be more on coastal cleanups as opposed to way out in the ocean, because once you get way out in the ocean, you're dealing with a lot of interesting physics and oceanography challenges, but also the fact that if you're just scooping everything up, you're scooping up the marine life as well. So there's a lot of opportunity to just clean up along the coast, but then to really force corporations and governments to do *their* part. This shouldn't be about you and me going and picking up straws and bottles from the coast. It should be about us refusing to use them, but it should really be corporations changing the way they are manufacturing things and governments improving their recycling capacity and demanding that companies produce only recyclable things. So much of the plastic that's produced is not even recyclable.

Alie: Oh, I didn't know that.

Aside: Just checked out a *National Geographic* article from last year that said 91% of the world's plastic isn't recycled, and I audibly whimpered in a public coffee shop. So, you know how plastics usually have a triangle with a number in the middle on the bottom? Not all of those will be reincarnated into other objects. One and two usually

can, four and five are *maybe*, and three, six, and seven are usually not accepted by recycling programs, so read up on the hot goss between the numbers, because some types of plastics even contain fun chemicals like BPAs that have been shown to contribute to infertility.

Did I warn you that this podcast would be a bummer? Because I know I did. Welcome to hell. Now luckily, people like Ayana are out there working on better public policy. She's like the Amal Clooney of the sea. Also, some folks in the other room while we were recording this were having a spirited discussion, so if you hear their chatter, just pretend we're having a fun time at a cocktail party chatting about preventing environmental doom.

Ayana: There's a lot of room for improvement there, but I think we are actually seeing some really positive signs in that direction. The UN has been organizing something called the Clean Seas Initiative and they have gotten I think three dozen countries to sign on and make commitments to reducing ocean plastic pollution. So we're starting to see commitments at not just the individual level, "I will give up bags and straws and carry my own water bottle." These are all great things to do, I do them, but what really inspires me is Kenya and Rwanda banning plastic bags; Costa Rica pledging to go completely without single use plastics by 2020; the EU is starting to make some big policies. All around the world we are starting to see these shifts. I think Chile just banned plastic bags as well. So yeah, there's a lot of good stuff happening there. We're starting to see a lot of momentum there and I think that's great because it's also an opening to talk about ocean problems more generally. Great, now that you care about a straw in a turtle's nose, let's talk about what else is happening to those turtles. Let's talk about overfishing and poaching and the state of the habitats that they are trying to live in.

Alie: Right. So what you're saying is the tide is changing?

Ayana: [*laughs*] The tide is turning!

Alie: Sorry! Of course, I got this question and I'll just touch on it just in case there's anything that you didn't just answer in that, but Maria Kumro, Jen Borlick, and Sarah Millington all wanted to know: How much positive impact on marine plastic debris will the plastic straw ban really have? They all kinda wanted to know what's your thought on, "Plastic straws are the problem!" Like, they are, but...

Ayana: Plastic straws are a really big problem because they cannot be recycled. They are too small for municipal recycling to deal with. So that's one of the reasons they're a particular problem. There's obviously a lot of other problems. We're using a million plastic bottles every minute, so that's not good.

Aside: Just personal shout-out to companies like Elkay and Halsey Taylor for making public water bottle filling stations so we can stop buying plastic bottles when we're parched and in public. They're so great. Look for the little bottle silhouette near a water fountain. You can roll up with your Thermos and just fill 'er up, boss! For zero dollars! It's great. And they have these little counters that tick off the number of plastic

bottles they've prevented from being on Earth, so when your bottle's done filling, the number goes up one more. It's very fulfilling.

Ayana: And bags, I think the average plastic bag is used for 12 minutes before it's thrown out, so there's a lot of other issues. But straws are problematic because they can't be recycled and they are also one of the top items you find in beach clean ups. They're small, so they kinda escape garbage cans and they end up on the beach a lot. That means they end up in the ocean a lot. They're one of the top five items that the Ocean Conservancy has been constantly finding when they organize these global international ocean cleanups and they collect data on what is really out there; what are the top ten. Plastic straws are always in the top five. Can you guess what number one is?

Alie: Oh no. I would say bottles, but I don't know.

Ayana: It's cigarette butts.

Alie: WHAT?!

Ayana: The number one beach pollution, by the number of items not by mass, is cigarette butts. It's those plastic filters at the end, and of course that's all the chemicals from the cigarette, a lot of them are trapped in that filter. So, they're pretty toxic, too. Don't just throw your cigarette butts in the sand!

Alie: Oh my god, they're like plastic cancer tampons. [*Ayana laughs*] That's the worst!

Ayana: It's pretty bad.

Alie: It's funny that culturally it's like, "Oh, I'd never drop a wrapper on the ground," but people just flick their cigarette butts on the ground. Where do they think that goes, like raccoons are eating them? No! Nobody wants those! That's really illuminating, I had no idea. I wasn't sure if plastic straws were being a scapegoat, but that's good to know.

Ayana: Yeah, I think they are, not necessarily a scapegoat, but they're symbolic. For most people they are completely unnecessary. Reapply your lipstick if that's your issue. [*laughter*] I think there is a really important exception that needs to be made for the disability community. There are people who need to use straws and that's fine because that would be a scapegoat. If we're saying, "There are a few people who really need them because that's how they drink," that's fine. We should absolutely avoid making these blanket statements that are problematic for folks who need them. But most of us really, really, really don't need them. The way that drinks are made, they just come with straws in them. So I think even just the flip from straws automatically to straws only on request would make a really big difference.

Alie: What about those lids that are like, "Don't worry, you don't need a straw," but they're more plastic?

Ayana: I think that's ridiculous.

Alie: Okay, that's what I thought.

Ayana: This is probably an uncouth opinion, but I thought Starbucks really punted on that one. [*Alie laughs*] I mean, it's already like adult sippy cups is their whole thing, and they just doubled down on it. [*laughs*]

Alie: I saw someone drinking out of that and I was like, "What is that? Oh, it's no straw!" And then I read something later that day that was like, "It uses plastic," and I was like, [*frustrated whisper*] "god damn it."

Ayana: It's silly. Although the alternative, which I do when I'm going to have an urgent need for an iced coffee, is I always order it in a paper cup without a lid.

Alie: Oh, good to know!

Ayana: So that's my hack for that, because obviously iced coffee is delicious and I sometimes don't get enough sleep.

Alie: I get it!

Ayana: There are ways to work around this. I think another really big opportunity that anyone can do, and that it shouldn't be just about individual responsibility, but restaurants and cafés should do is ask you, "Do you want it for here or to go?" Because if you go into a café and you look around, everyone's using to-go containers and they're all sitting there and it drives me bonkers!

Alie: I know!

Ayana: I think it's like no one wants to wash the dishes or they haven't actually built these cafés with enough dishwashers or whatever, so I think there's a shift that needs to happen there and just ask me, "Do you want it for here or to go?"

Alie: Yeah, I drank a cup of tea in a café before this that was given to me in a paper cup. No lid, thank god. But still, I got it and I had it in my hand and I was like, "Oh no. Oh, I don't need this. I'm such a jerk."

Okay, question about the garbage patch. Let's talk about the garbage patch. Blair Nelson and Eva both ask: What's going on with the Great Pacific garbage patch? Which honestly sounds like it's not even a real thing. I mean, I know it's very real, but it's just so fancifully, horribly named. And then: What should we do about it, and what's happening with the microbeads and tiny, tiny particulate plastic?

Ayana: So, for the Great Pacific garbage patch, that's a thing. The reason it exists is because of ocean currents that swirl around in these gyres and then collect things.

Aside: A gyre is like a spiral or a whirl. It's kinda like a cowlick of the ocean.

Ayana: And so since there's plastic, that gets concentrated into this patch. Most of the plastic in that patch is really small. It's like the size of your pinky fingernail. It's not a bunch of bottles floating on the surface and it's not actually like an island you could walk across. So, I think the initial reporting on that was great because it got people to care about it, but it also created a false image in our heads of what it looks like. It's just a higher

concentration of plastic in that part of the ocean, which makes it a lot harder to clean up, because it is quite diffuse.

Aside: I watched some videos and the plastics hauled from the oceans range from mountains of soggy fishing nets to tiny, tiny flecks of broken-down bottles and toys. And the Great Pacific garbage patch is estimated to be between the size of Texas to the size of Russia, somewhere in between there. Now it may be the largest on the planet, but it's not alone. It has other garbage patch friends.

Ayana: And there's one of these garbage patches in every ocean gyre. So there are five major ocean gyres and there's a garbage concentration or garbage patch in every single one.

Alie: [*whispers*] Oh no…

Ayana: So what we can do about it, is lobby for changes in corporate and government practices regarding plastic to prevent this one ton of plastic entering the ocean every four seconds. We can obviously change our individual behavior and we can support conservation groups that are doing really practical things to turn that around. There's a few groups that I think are really exciting. Lonely Whale is doing really good work on the corporate level, gathering together partners for that, to push there and working with the UN. The Ocean Conservancy started something called the Trash Free Seas Alliance that's also working with corporations and governments to shift policy and the status quo. Surfrider, which is an organization that's focused on the surfing community and activating people who love the ocean to help protect it. They have been really active in campaigns against single use plastic. I think that's the term we need to think about is 'single use plastic.' There are certainly some medical uses of plastic that I'm happy to have for safety and sanitary reasons, but I think the disposability of everything all the time in our daily lives is problematic and actually creates this mindset of, "Oh, I'll just get a new one." And it's feeding this really unsustainable, consumerist, disposable mindset that I think is not super great.

Alie: Not good!

Ayana: There's a lot of things we can do about it, so support groups like that. There's also a lot of cool, low-tech solutions that are out there, and my favorite is this one called Mister Trash Wheel. Which is basically like, you know those old-fashioned steamboats that have a big water wheel at the back? It's basically this huge water wheel and then behind it is a dumpster.

Aside: So I just checked out a video of Mister Trash Wheel and it's the happiest I've been during the entire making of this episode. I was not prepared for how cute this garbage gobbling machine is. So picture a water wheel on one side, and then a domed canopy that looks kinda like a covered wagon, but with one end, a big mouth fed by a conveyor belt of trash. Atop this whole structure: two huge googly eyes, giving this giant trash apparatus the look of this hungry, floating, Earth-saving cartoon. I wanna hug it, even though it's the size of a motorhome, and also probably very smelly, and would eat me, and throw me in a dumpster, but with good intentions.

Ayana: So you put this water wheel in a harbor or a river, and as pollution runs down the river it gets funneled towards this water wheel. Then as this wheel spins, it picks up bottles or tires or whatever's floating down, and just deposits it as it turns in the dumpster behind it. Then you take away the dumpster and dispose of it properly in the dump. And so you're preventing all this stuff from ever even getting to the sea. This is in Baltimore. There's Mister Trash Wheel and then there's Professor Trash Wheel, so there's two. They did a big social media reveal where they revealed Professor Trash Wheel was a woman, [*DJ airhorn*] which I was obviously amused by. [*laughter*] So stuff like that I think is really promising. Instead of thinking about cleaning up the middle of the ocean, there's so much that we can be doing closer to land and should be doing.

Alie: It's amazing that you're like, "Oh wait, we didn't have something to prevent that from going out there this whole time? What are we doing?" Oh my god. Iolanthe wants to know: How can we save the Great Barrier Reef?

Ayana: We could stop climate change. That would be like the thing.

Alie: Oh, okay, cool. What about sunscreens? I hear that's a factor.

Ayana: It is a factor and Hawaii just banned sunscreens with these chemicals that are harmful to corals. I can't remember the name of them.

Alie: Oxybenzones, I think, yeah. They also screw up your hormones.

Ayana: Yeah.

Alie: So, that's fun.

Aside: So, it's worth it to do a little more reading on chemicals like oxybenzone, which can lower testosterone in adolescent boys, it can leach into mothers' breast milk, and cause endocrine disruption among humans. Even if you have a personal beef against coral reefs, and you don't care if they die, you might want to switch to mineral sunscreens for the sake of your own gonads.

Ayana: Basically we should only be using mineral sunscreens with zinc that make you look weird and pasty, like that's the one you want. Or just, what I do, I just wear long sleeves or sit in the shade when I've had too much sun. That's also super effective.

Alie: The mineral ones are great for summer goths. [*laughter*] That's a great way to do that.

Ayana: A hundred percent. I think it's great that Hawaii is leading the way on that. That makes a difference. Fishermen that I've talked to in the Caribbean have said that when the cruise ships come in and all the tourists slather on all this sunscreen and then jump in the ocean to go snorkeling, it looks like this oil slick of shiny iridescent stuff on the surface. And there's like, "Obviously this is bad for the fish and the coral." So it's a problem in places where there are high densities of people more so, but there's tons of great options of mineral sunscreen, so just look for things with zinc in them.

Alie: And my question here: What's gonna bone the ocean more? Is it gonna be the acidification, the plastics, or the rising temperatures?

Ayana: I can kinda cheat and just say climate change, because the acidification and rising temperatures are both effects of climate change, as is sea level rise, which is doing some crazy stuff to coastal ecosystems, too. Not to mention to our homes and our infrastructure. So, I think climate change is number one. Plastic is pretty insidious, and the rate at which we're just taking things out of the ocean through overfishing is pretty wild, but the ocean is incredibly resilient. It will be fine without us. Like if we really screw this up and kill the ocean, which means we're killing the planet, which means we're killing ourselves, when humans go extinct, the ocean will be fine. It will be different, but it'll be fine. It's really our survival that we should be worried about. So for those who need a more self-centered motivation [*laughs*] for ocean conservation, there you go. Save the ocean to save yourself.

Alie: Paula Herrera asked: Were the boys in my middle school right? How much of the ocean is actually whale sperm? I don't think that's quantifiable, correct?

Ayana: That is not a number that I have heard. Although they do have enormous penises.

Aside: Hey, Mom, Dad? Fast forward like thirty seconds, okay? So, writing this in a coffee shop, I made sure to angle my screen before hesitantly typing into Google, "How big are whale dicks?" And in huge font, the answer popped up: 12 inches. I was like, "Oh, okay." Then I realized that was the diameter. The length is 10 feet. Also, whales can pee up to 250 gallons a day, sometimes floating on their backs and just becoming tinkling geysers. Ayana delightfully topped that fact with this:

Ayana: Barnacles have the largest penis-to-body size ratio of anything because they have to have sex without moving. [*Alie hysterically laughing in background*] They're like stuck on rocks and the penis comes out of one barnacle, finds another barnacle, knocks on the door. [*door knock*] They open their shell, let this penis in. Can you even imagine?

Alie: Oh my god, you're in a long-distance relationship. [*Ayana laughs*] The only way to get in touch is to send your dick over. It's like a Dick-o-Gram:

Ayana: Basically…

Alie: "Hiiii, let's have 50,000 babies!" Christa Avampato, Jenny Coloda [phonetic] and Anne-Sophie Caron all pretty much asked about your job: Where would someone begin becoming a marine biologist or someone who works on science policy? Like how do people become you?

Ayana: I don't advise becoming me exactly, but I would love for more people to join Team Ocean, because there's really exciting work to do and it's a wonderful community of folks. I don't know if my personal story is super instructive. I think there's a lot of different paths to get to this type of work. I took the science path towards policy because at the time it seemed like there were a lot of lawyers going towards ocean policy but not a lot of scientists meeting them halfway, so that's the direction I took. But you can go straight into law and policy, you can do communications. We obviously have a lot we can do to better tell the story and engage people.

There's a lot of really amazing art happening around community engagement for oceans. This organization that I mentioned, TBA 21 and their academies, are supporting a lot of really amazing ocean art. Places like Pioneer Work, where we are now, they are integrating the science studio with the arts exhibitions here, are really important to changing the cultural narrative. I guess I would say it depends on what you are passionate about. What are you good at? Then how can you do that in service of the ocean? Whether that's art or science or law or communications or writing, I think there's an opportunity to rewrite our relationship with the ocean. I'm doing more and more writing now because I feel like there's just not enough literature out there about our changing planet and how we relate to it. Not in a depressing way, but just, "What does it mean to be human in this day and age?"

That was probably not super helpful, but there's lots of different fellowships and internships and positions in all these organizations. So, an organization like the Ocean Conservancy, a big non-governmental organization, or Oceana, World Wildlife Fund, Wildlife Conservancy Society, Nature Conservancy, Conservation International, they all have global ocean conservation efforts and to run an organization like that, you need secretaries and janitors, too, who are committed to keeping that going. You need accountants, you need lawyers, you need policy nerds, you need science experts, you need people running social media. It's all those things. You need caterers, and boy do we need better sustainability in events. So, I think there's a million ways to get involved to do it either full time or start an adjacent business or join something that's related to it. Hop on in!

Alie: That's great. Find what you're good at and then approach it that way instead of trying to shoehorn yourself into...

Ayana: Yeah, because not everyone wants to be a marine biologist. Some people think scuba diving is scary, and that doesn't mean you can't be helpful.

Alie: I would be *the worst* lawyer. [*Ayana laughs*] When I see pictures of you doing policy and you're in a boardroom with a bunch of people in suits and you all have folders, that's scarier to me than being under the ocean in a vast nothing.

Ayana: That's so funny.

Alie: I'm like, "Oh god, there's so many terms that you have to know!" The fact that you have an aptitude for it...

Ayana: There are a lot of different languages to be learned.

Alie: I think you touched on this before, but Mariner Cosplay, [ph.] Neil Williams, Sara Meredith - Smere Tactics, all kinda want to know, in a nutshell, what can the average person do in their life to just help? I know limiting single-use plastic, do not dump a bunch of garbage into the ocean…

Ayana: That's a great place to start. I've got a list actually, on the Ocean Collectiv website, there's a resources page where you can learn more about all this stuff. There's a page on protected areas, and on fishing, and on climate, and on pollution, and there's lots of

articles and facts. You can read all about that, but there's also a list of ten things you can do.

Aside: This full list is up at OceanCollectiv.co.

Ayana: But number one is to vote, because politicians are off the hook on a lot of environmental stuff because their constituents aren't making demands of them. And believe me, I know there's a lot of other issues people are dealing with in the political sphere right now, but if we don't hold our politicians accountable for the state of the environment, because they have a lot of ability to change the rules of the game and give the Earth a better fighting chance. So I think that's the number one thing is to be politically engaged when there are bills that come up on funding ocean cleanups or research into ocean acidification or funding protection of marine parks. We should be chiming in and saying, "Yes, this matters. Yes, we want to end overfishing."

There's a bill that could change the way that fishing is managed and people need to be weighing in and saying, "Excuse me, you want to roll this back and allow people to overfish by law? That doesn't seem to make much sense to me." It seems counterintuitive, but political engagement is the number one. Then obviously we can all be more careful about choosing sustainable seafood and bringing it up at the establishments that we care about and asking for it. Reducing our single use plastic, reducing our carbon footprint because climate change is having such a big impact on the ocean. We can choose resorts when we go on vacation that are more ocean-friendly or sustainable in general. There's no reason to leave your values at home when you go on vacation.

Aside: This goes against literally everything Las Vegas was built on, which is why it's great advice.

Ayana: And so the list kinda goes on from there. I think I maybe got five or six.

Aside: I cross-checked this with the Take Action section of the Ocean Collectiv site and the remaining items were: get informed (you're listening to this, great job), choose other sustainable foods and farms (not just seafood), you can clean up the coast, you can donate to an ocean cause (she has some recommendations on the resources page), and help spread the word. So tell people about this episode, if you feel like it. Okay. Now, what do you do if you're crying into a bowl of fish chowder right now?

Alie: And when it comes to sustainable seafood, is that kinda something that is said to make us feel better or is there really such a thing?

Ayana: No, that's real and I think with aqua culture, that industry kinda got a rough start, but they are figuring out sustainable practices. The most exciting work in that space for me is around integrated farming or vertical ocean farming, or it's called 3D ocean farming, and it's about growing oysters and mussels and clams and all these different kinds of algae together in a simplified ecosystem that creates habitat for other things to swim through. Algae is super, super healthy and underrated— sea vegetables as they are now sometimes called in hip spots. So eat more algae. Farmed shellfish, you can eat with impunity as much as you want, those oysters, mussels, and clams, because they actually

just filter the water, so we don't have to catch wild fish to feed the farmed fish, which is a problem with some other species. Although they're also innovating feeds from plant proteins and insect proteins to feed to fish now. That industry is coming along well. What I personally eat is those things. I eat seaweed. I eat farmed shellfish. And I eat sardines and anchovies, because those tiny fish that reproduce quickly, there's lots of them, those tend to be more sustainable than tunas and swordfish and sharks and those things that take a long time to reproduce. They don't make a ton of babies and they tend to be really heavily targeted by fishing. So from the big picture, I'd say that. But then again, if you're working with and in a local community, if you know your fisherman, if you're part of a community-supported fishery like those vegetable boxes or CSAs (community supported agriculture) they're now doing that for local fisheries, which is cool. Whatever the fisherman caught, you can get a share of the catch.

Aside: This, by the way, is also a great excuse to just casually use the word, "Fishmonger," in conversation. [*three different computerized voices: "Fishmonger, fishmonger, fishmonger."*]

Ayana: And there's also an app that's helpful, which is from the Monterey Bay Aquarium Seafood Watch program that you can download.

Alie: Okay, good! I wasn't sure if that was just hocus pocus.

Ayana: No, that's real. There are things that we can feel comfortable eating, but I think the question is also like how many meals a month or a day should we expect to be wild animals? Because we would never expect to be eating lions and tigers and antelopes as our primary source of protein on land, but that's what we're expecting from the ocean. Tuna are so high up the food chain, and swordfish, and all these things. I think we just need to change the mindset that we can live sustainably off of wild animals from the ocean that are at the top of the food chain.

Alie: Yeah, I guess we see the words, "Seafood Buffet," together too much. [*Ayana laughs*] It really does give a wrong impression of what's out there!

Ayana: And I think that's part of the problem. The price of seafood hasn't skyrocketed in tandem with overfishing. You'd think once something gets more rare, it gets more expensive, but we haven't seen that as much with seafood because it's often really heavily subsidized by governments that are helping to pay for fuel or boats or whatever to send more people out fishing. So you can still get a can of tuna for one or two bucks. If that's the case, why would you think that it's a problem? It's so cheap, there must be a lot of it. I think until the price of things reflects their value and their rarity, then it's going to be really hard to have these conversations that sink in because that price is such a strong signal.

Alie: Right. Can you imagine if a can of tuna was $17?

Aside: I can't stop picturing Mariah Carey Instagramming herself eating tuna from a can with a golden fork and other people seeing it just like, "Man, I will never know that kind of life."

Alie: So aspirational. I always these questions at the very end. What about your jobs suuucks the most? What's the worst thing?

Ayana: Email. The same thing that sucks about many jobs. I spend way too much time answering email.

Alie: Just an endless inbox.

Ayana: But that's also the way I'm able to have colleagues all over the world and avoid video chats, which I *really* hate, so yeah. It's a blessing and a curse.

Alie: And what do you love the most about your job or the ocean?

Ayana: I love jumping into the ocean. I love the look on people's faces when they understand something about it. I think the joy and happiness the ocean brings us is amazing and I appreciate that too, but when a teenager comes up to me and explains to me that parrotfish are important because they eat algae and poop sand, and they have this intense look on their face like, "I'm explaining to you how this ecosystem works and we all need to be on board with this." *That's* what brings me the deepest joy, the confidence and the engagement in solutions that people have when they learn something about it. So that's something that really inspires me.

Alie: It's great when you can see that shift from an ownership of the ocean, like it's ours to exploit, versus a responsibility to the ocean.

Ayana: Absolutely!

Alie: Like a familiarity and an investment in it. And now, where can we find you and your company? Give us some links so we can gently stalk.

Ayana: I'm very easy to stalk online. Search 'Ayana' and 'marine biologist' and you'll find me. Ocean Collectiv is the name of the company and there's no 'e' at the end of collectiv because that's a heavy metal band in Australia, [*Alie laughs*] and obviously we needed all the social handles to be consistent, so OceanCollectiv.co is our website and we're @OceanCollectiv on Twitter and Instagram. Then personally, you can find me @AyanaEliza on Twitter and @Ayana.Elizabeth on Instagram. I think the online ocean community is actually a really cool aspect of the job as well because nerdy ocean jokes are amazing. [*laughter*]

Alie: There's *so* many puns to be made.

Ayana: I actually have an Evernote file full of ocean puns.

Alie: Do you really?

Ayana: This is a thing I have. [*laughs*]

Alie: Do you have to highlight one and just pop it in the end of an email?

Ayana: No, I actually try to avoid them. I'm amused by the list of them and how many there are that you wouldn't know until you're writing an email about the ocean. Then you'd be

like, "Alright, let's dive into this, people and figure it out! Don't be afraid to get your feet wet! Let's just figure out how we're gonna..." And I'm just like, "Ayana, you really can't do this," because it's confusing if you're *actually* talking about the ocean. [*laughter*]

Alie: Does anyone ever write back, "I *sea* what you did there!" [*Ayana laughs*] That's always the best retort.

Ayana: Not yet! Not yet!

Alie: Well, I'm excited for your book to come out, too. Thank you so much for the work that you do! I'm sure the ocean would roar back.

Ayana: Thanks for your great questions and all of your patrons' questions!

Alie: There were so many questions, I had to consolidate into categories. So many people were like, "Woooo!" Thank you for doing this!

Ayana: My pleasure. Anytime!

So we have come to the final credits of this sad, romantic saga, but with a glimmer of hope for maybe a happier sequel. Find Dr. Ayana Johnson all over the internet, watch her amazing TED Talk, her public speaking, check out Ocean Collectiv, and just tell the world about the episode so we can stop losing sleep over the ocean and just start making better choices. Go talk to your fishmonger. You can sign up for a beach or river cleanup. You could donate five bucks to an ocean charity, or start reading up on plastic use. You got this. You're so well-armed now, you got this.

To support the podcast, you can sign up to be a patron if you want at Patreon.com/Ologies. Merch is available at OlogiesMerch.com and there's a grip of back-to-school stuff up as of today: collegiate-crested shirts and things to put you in kinda an autumn frame of mind. Thank you Boni Dutch for all your new designs and Shannon Feltus for helping run the site and for putting on the sold-out Camp Ologies event in Portland in a few weeks, in September. Thank you Erin Talbert and Hannah Lipow for being admins to the Facebook Ologies Podcast group, and thank you as always to podcast-monger Steven Ray Morris for editing and helping produce this. The music was written and performed by Nick Thorburn, who also did *Serial*'s podcast theme. He makes other great music in the band Islands and in solo efforts.

Now, if you stay until the end of the episode you know that I tell you a secret. Thank you so much for all of your support in terms of last week's secret about how I'd never seen any of the *Harry Potter* movies. I'm gonna give you another Harry Potter secret because you guys seem to be passionate about it. I was really afraid of taking the test to find out what house I would be in because I was like, "What if I come up Slytherin? What if I find out I'm kind of lightly evil just through a Harry Potter quiz?" I took the quiz and I guess it turns out I'm Gryffindor. I don't know what that means but I think it's okay. Okay, we are all in this thing together, good job. Berbye.

Transcribed by Emily Staufer, your one friend who always keeps an extra reusable tote and mug in the back of her Subaru for you when go on Target-Starbucks runs together.

Some links which you might find helpful:

Dr. Johnson's OceanCollectiv.co

Dr. Johnson on Twitter @ayanaeliza and Instagram @ayanaeliza

Dr. Johnson's website: ayanaelizabeth.com

"Reducing bycatch in coral reef trap fisheries: escape gaps as a step towards sustainability"

How do these fish traps work?

Ayana made a great fish trap video

fuck.fish

Dr. Ayana Johnson's TEDResidency Talk

Hitting the doldrums: not that bad

Oldest message in a bottle

Terminal Romance Movies — with spoilers

Plastics to make you very sad

BPAs and your crotch

Okay so what can you actually recycle?

The fuq *is* plastic?

Whale pee fun facts

Resources and Take action from Ocean Collectiv

For comments and inquires on this or other transcripts, please contact OlogiteEmily@gmail.com