Zach Mason: This is Zach Mason, and it is August 12, 2020, and I am remotely interviewing Sarah Fangman. I'm calling in from my home in Baltimore, Maryland. Sarah, if you could please introduce yourself and tell us what your current job title is.

Sarah Fangman: My name is Sarah Fangman, and I am the superintendent of the Florida Keys National Marine Sanctuary, and I am chatting with you from my home office in Key West, Florida.

ZM: Excellent. Thanks, Sarah. So, let's just start from the very beginning. Could you tell me when and where were you born?

SF: I was born in Minneapolis, Minnesota, about as far from the ocean as you can be in the United States, and I was born - you want the year? You're going to make me reveal how old I am?

ZM: Yes. What about just the decade, the month?

SF: Well, it was late in a decade. If I say the decade - I was born in 1968. Okay.

ZM: I was going to say you could round up yes, too late. Okay, thank you. Thank you, Minnesota. So, what was your first experience with the water?

SF: Well, with salty water, the most memorable, was a trip that my family took when I was in sixth grade. If you are lucky and if you are able, when you live in Minnesota, you leave in the winter. So, my family took a trip to Grand Cayman, and at that time it was not as developed and as well-known because, again, I was born in 1968 - that was a long time ago, but I had the opportunity to put a snorkel in my mouth and a mask on my face and I was absolutely hooked. I spent the entire vacation with my face in the water, just swimming around, looking at the underwater world and I was captivated.

ZM: Do you remember, sorry if I missed it, how old were you? About?

SF: I was in 6th grade. What does that make you? Yes, I don't remember how old a 6th grader is, to be honest. I was young and impressionable, let me tell you that. I had no idea there was such a world coming from Minnesota. That was magical to me.

ZM: Did you ever happen to get up to the Great Lakes or anything before that, or was this your first experience…

SF: I had been to a big body of water where you can't see the other side. Yes. I had seen Lake Superior, but it's really cold and not enticing. You don't necessarily want to go in and spend a long time and I don't remember ever putting my face in the water and opening my eyes. So, it was a completely different world. Warm tropical waters. Yes. That left an impression.

ZM: Yes. your first trip to warm tropical water, I guess was your first time seeing anything like a coral reef as well? Can you elaborate a little bit on what that felt like, especially coming from Minnesota. Did you have an idea that that's what you're going to see before you went there?

SF: No way. No way. My imagination was not that vivid or wild, I guess, even as a child, to understand and appreciate. And again, it was a long time ago and the reefs everywhere were much healthier. And I'm sure if I were to go there and in fact, I intentionally haven't gone back actually, I have intentionally not gone back to Grand Cayman because I don't want to see what it probably has become. I like the memory of the magical, healthy, vibrant, colorful reefs that impressed me at that age. And I know they wouldn't look like that now. But to answer your question, yes, it was just mesmerizing. And we could find beautiful, healthy reefs right from walking in from the beach, snorkeling out a little ways, and they were right there. I happen to know it's harder and harder to find really healthy, vibrant reefs right close to shore, almost anywhere anymore because all of the development that has occurred and all of the issues that are impacting those reefs. It's just not an experience that people get to have very many places anymore, where you get to get in the water right from shore, just swim a little bit of distance in those shallow waters, you don't have to strap a scuba tank on your back, you just snorkel and can see the tropical fish and the corals and the sea fans and the sponges. So, that's what captivated me as a young child.

ZM: About that time, I think probably, Jacques Cousteau was getting pretty famous. Do you remember him having any influence on you at all, maybe after that experience?

SF: Oh, without a doubt, yes. But what I will say is being a child in Minnesota, even though I had that experience and others afterwards and other years as I got a little older, we did a couple of other trips, but it still was this magical other world that as a young girl in Minnesota, and even as I got older, I didn't realize that it was available to me in any way other than a magical trip once in a while. So, the world of Jacques Cousteau, while captivating, was still something so foreign to my consciousness. Now, it's interesting to have this conversation because looking back and to imagine that I've had the career that I have is pretty amazing. It would have blown my mind as a little girl getting out of that water in Grand Cayman, to think what I'm doing now and what I've done in my career, I would never, ever have imagined it.

ZM: I'm really jumping forward a lot here, but because we're kind of talking about it already, it's not an easy career to get into, right? There's a lot of schooling involved. There's a lot of tough manual labor in anything marine science related. I don't think people think about that when they first decide to get into it. Looking back now, are you happy that you made the decision to get into marine science?

SF: Without question. I think often, not every day, but often I think how lucky I am to have the career that I have to do the job that I do. I'm passionate about it. I'm really committed to it. And I don't often think about that experience in Grand Cayman, but when I interact with young girls that are that age and I think about what they're seeing versus what I saw, it inspires me because I want for them, when they're my age, to say what they saw in the opposite direction. Right. I saw when it was a lot better. They're seeing it when it's a lot worse. I want them, when they're being interviewed at 52 years old, to be talking about how great it became. That's what inspires me, is to make that their story. My story is one of, “wow, I've really got concerns. I've seen this system struggle. I've seen this system decline.” I want their story to be the absolute opposite. “Wow. I got in the water, and it was cool, but I could tell it wasn't right. And now, boom. Wow, we've really figured out how to protect, restore, and really make this system better.” That's what inspires me.

ZM: So, just taking a quick step back when you said that this was still kind of a separate magical world that you would only get to experience occasionally, when did you make the jump to, “oh, I could do this all the time. I want to do this as my job as a profession.”

SF: Well, that's another funny story, because I went to college in Vermont, also not an ocean mecca, not somewhere where you think of marine science opportunities, but also a really cold place in the winter. I went to a college where a lot of students spent their junior year abroad, and I was a science major, and they were going to France and England and Spain and studying their languages. Well, as a science major, I was not thinking that was going to work. So, long story short, I found a program in the Virgin Islands where I could go and spend a semester, learn how to scuba dive and study reef ecosystems for a semester. And believe it or not, I was able to convince my parents this was a really good idea, and they supported me packing up, and they bought me scuba gear, the masks of which I still have. I still wear the mask that they bought me for that semester abroad. That is when I realized, whoa, this is possible. This is freaking cool. I am totally in - another escaping the winter story, there's a theme [Sarah and Zach laugh].

ZM: What kind of science did you major in undergrad.

SF: Environmental studies. Middlebury didn't have a marine science program, so it was environmental studies.

ZM: Okay, so it wasn't something completely unrelated, at least.

SF: No, if I was going to leave campus, my parents are like, “you got to get credit that goes towards your degree.” So, lucky me. I found this program and the rest kind was history because I was planning to be a psychologist. To be honest, I thought I was going to be a psychologist, and with no disrespect to the psychologists in the world, they're very important, I'm really glad I turned a corner and ended up where I did.

ZM: After your trip abroad, what did you do? Did you go right to graduate school.

SF: I did not. I took four years between finishing my undergraduate and graduate degree and I actually went back and worked for that organization, field studies, teaching high school and college students about the marine environment, both in a reef environment, but then I also did marine mammals and sea turtles, did research and really loved it. I wasn't quite sure what I wanted to do for graduate school. I knew I wanted to go back to graduate school, but I took those years to get field experience. As you noted, it's hard to get in and it's a lot of work. So, I wanted to kind of use that time to get work experience that would help me refine what I wanted to study in graduate school. Had amazing experiences, loved what I was doing, but finally decided, all right, time to buckle back down and go back to grad school. So, that's what I did.

ZM: You mentioned marine mammals. Was that the Marine Mammal Health and Stranding response program or did that come later?

SF: That came later. Once I finished graduate school and started working for NOAA, which I will admit, when I was working between college and graduate school, my ultimate goal was actually to work for NOAA. That was my dream job. I thought that would be really cool because I saw NOAA scientists doing research on really interesting marine organisms and communities

and habitats, and not just for the purpose of publishing a paper and scratching some intellectual itch, but for the purpose of using that information to better protect the species they were studying. And that was really important to me right from the beginning of my career, which I wouldn't say was a career at that point, but at the beginning of my interest, it was, "I want to do this not just because I'm fascinated by this world, but because I want to help try to protect it."

ZM: Yes, that's actually a really interesting note that I'd like to explore just a little bit further. I feel like when most people that I speak to talk about getting into this kind of a field, it's not immediately to protect it. They get there later when they realize that it needs protecting. This is so early in your career, when did you realize that these kinds of animals, and this environment needed to be protected.

SF: It's really interesting. I hadn't thought about it that way, but that was really immediate. Perhaps it was the dolphins and the sea turtles that really hit that home for me. Sea turtles at that time were getting caught in shrimp nets. They were getting struck because of their tendency to hang out at the surface, and they were getting struck by boats. Their nests were getting predated upon by crabs and other organisms on the beaches. The fact that cars were driving on their nesting beaches made it hard for the little baby turtles to make it to the ocean. If you want to break someone's heart, show them a turtle who can't make it to the ocean. They're just so dedicated, those little guys. They're just working so hard. They're going to exhaust themselves. If you can watch that without feeling like "I want to help them survive," I don't know. Anyway, so those experiences seeing dolphins with prop scars on their dorsal fins, also getting tangled in nets, those kinds of issues were very front and center for me. I was very aware early on that there were perils in the ocean, and we needed to try to address.

ZM: So, you got some field experience, went back to graduate school. Can you tell me a little bit about your graduate school experience? What exactly did you study?

SF: Yes, I went to the University of Washington, which is in Seattle, and went to the School of Marine Affairs, which is a marine policy program. So, I was focused on field research, but again, really wanted to - in the years between college and graduate school, I was focused on field research - but realized that I wanted to understand more about the policy intersection and the application of the information that we were gathering. So, I studied marine policy, fisheries management, maritime law. Loved every minute of it. Fascinating. Fun to be in Seattle with a totally different environment. Prior to that, I'd been in the Caribbean and the southeast U.S. So, entering the land of the almighty salmon was interesting. So, yes, that's what I did. And I actually, as most do when they're leaving graduate school, kind of try to cover your bases, right? You're trying to get a job, and you're trying to find something. So, I both applied for a PhD program and applied to the Presidential Management Fellowship - which would be a route into NOAA, this is an opportunity that recent graduate students and law school students can use to get positions in federal service. And anyway, was fortunate enough to get selected for both. And I turned away from the PhD. No more studying. All I wanted to do was work for NOAA anyway. Why would I not start now? So, I was able to start working for NOAA after my master's degree and have not looked back.

ZM: Wow. So, a couple of things. First question, you had been working in the Caribbean. Why did you decide to go all the way across the country to Washington? Was it because of the strength of that specific program?

SF: Precisely. They had a reputation for being really a strong program. The University of Washington, I think, was at the time, and I believe still is an excellent program for fisheries management, marine policy, oceanography, and quite honestly, I also just was looking to have a new experience. Okay. I was taking classes at Duke Marine Lab while I was working and really enjoying that and could have stayed at Duke, but I thought, why would I do that when I could go somewhere new and learn something different, understand new issues? So, that's what I did.

ZM: Did you do any diving out there in Washington?

SF: I did, and not all that much, because at that time, I was not yet really a fan of cold water diving, but I will never forget it. It was very cold. Really strong current diving in Puget Sound where there can be some really ripping currents, but I'll never forget it. Are you a diver?

ZM: I am. I am. I've never dove out that way. Mostly warm water for me.

SF: Cold water.

ZM: Lake Michigan. Yes, that was chilly.

SF: Yes. Dive on a shipwreck.

ZM: Yes. My background is in marine archaeology mostly, actually.

SF: Oh, fantastic. Fantastic.

ZM: Yes.

SF: I'm sorry. You're supposed to be the interviewer, not me.

ZM: No, that's okay. I'll edit this part out later. Okay. So, looking back in hindsight, might be twenty-twenty. It really feels like you had a plan, and you were very driven towards an end goal here, and I'm just I'm curious whether it felt that way while you were going through all of these steps or if you were just kind of making it up as you went.

SF: I would admit to the latter. Like I said, I went to college thinking I was going to be a psychologist. I was going to go into graduate school and get my PhD in psychology. I was taking psychology classes as a minor to prepare myself for that. It wasn't until my junior year, and I did this semester in the Virgin Islands that I realized, hard, right, we're going a different direction. And then it took me a few years to kind of figure out what that direction could look like. But then I kind of homed in on policy management, ultimately watching all these NOAA scientists that I was getting to interact with and, “oh, that looks cool. That's what I want to do.” So, it was a process. It kind of evolved as I tried a new thing, and that, “Oh, no, I don't want to do that. Oh, maybe this would be good.” And it was sort of a winding road, shall we say.

ZM: So, it was the presidential fellowship, is that what it was that you applied for and got? Can you tell me about what that was like, what your responsibilities were, where you were stationed, and what you're doing?

SF: Looking back at it, I realized why somebody who was working for NOAA said to me at the time, you have the golden ticket here with this fellowship. At the time it was called an internship, the Presidential Management Internship. It has subsequently been renamed to a fellowship, but that's neither here nor there. I was told I have a golden ticket. At the time, I was like, "whatever, I don't know. Doesn't everybody just waltz into NOAA with a two year program where you get to go do all these amazing things, and you have a guaranteed position at the end, and you have step increases throughout, and doesn't everyone get to do that, and everyone get to hand pick where they land?" So, the way this fellowship worked is, as I noted, it was two year plan. You come into the agency at a certain grade, and then you have guaranteed increases unless you really screw up, and a final position that basically you make an agreement with an office, a program, and say, "hey, I want to work for you." And they say, "here's what we want you to do." And then you tell leadership, "This is where this FTE [full-time employment] is going to land." It was very amazing. And then during that two year internship, I had the opportunity to do rotations, or details, at different parts of the organization that would ultimately help me gain the skills for that final landing spot. I was able to do rotations in different places, traveling, going up to the Washington, DC Silver Spring headquarters. I was based in Seattle, but I worked there, and then to California for an assignment. So, it really was a golden ticket. That again, looking back on it now, I appreciate at the time, I didn't have the sense to realize how lucky I was to have been selected for that program.

ZM: It sounds like it kind of let you do a few different things, kind of sample everything that NOAA had to offer before you kind of made your decision.

SF: It allowed me to create opportunities where I could go and embed with a program or an office. It had to have some nexus to an ultimate goal so, I had to articulate at the beginning of this, "this is what I'm hoping to achieve throughout this two year opportunity. And these experiences will broaden my skill set for where I ultimately will land." And obviously, the organizations that I was working with, the programs I was working with, needed to also find that to be useful and that that ultimate position was something that NOAA, writ large, would be benefited from. It wouldn't make sense for me to create a basket weaving program for myself and NOAA. But obviously, within the scope and responsibilities of what NOAA does, I could pick and choose and create this plan that then execute, and then at the end of which, I'm better able to serve NOAA as an employee going forward. Does that make sense?

ZM: Yes, definitely. What was, I guess, your overall goal during this fellowship? I guess you said everything kind of had to culminate in a purpose. What was your purpose that you pitched?

SF: Well, actually, that one also kind of wandered its way to a different ending point than I originally thought. But I started out with the intention of landing at the Northwest Fishery Science Center in Seattle, working for the Science Director's office, so in helping science leadership in whatever way they needed me to. And long story short, one of the assignments I did during my two year period brought me to the Channel Islands National Main Sanctuary for what was supposed to be a five month assignment that ended up being an eight year position. So, I

ended up finding what was a better fit and convincing those that needed to be convinced to allow me to take another right turn and change my intended path and land finally at the Channel Islands National Sanctuary as their research coordinator as opposed to ultimately landing back up in Seattle. So once again, I was very fortunate to be allowed to refine the original plan and land in Sanctuaries, because that's where I've been ever since.

ZM: Can you tell me a little bit about what you did at the Channel Islands Sanctuary?

SF: Oh, my goodness. Besides learning to love cold water diving, that was a magical opportunity because as the research coordinator, I was lucky enough to be involved in all kinds of different science missions. The Channel Islands National Sanctuary is an incredibly diverse, rich, beautiful place. I was able to do everything from participate in aerial surveys with a small aircraft, counting whales and boats, to everything from driving a single person submersible to 1000 feet. So, I was up in the air, I was down at the bottom, I was diving. I learned how to drive a hundred ton vessel, we were using remotely operated vehicles, just climbing around in sea caves, finding seabird nests. It was another magical time. Truly magical.

ZM: Can you, I guess, elaborate a little bit on how you felt when you got this position? Because not that you hadn't had other jobs before this, but this seems like a huge increase in responsibility. And just like you said, you're doing everything. I imagine that maybe this was a big moment for you in your career. Can you elaborate on that a little bit?

SF: Well, without question, I felt extremely fortunate. I will say, when I took the job, I didn't understand all the opportunities that lay in front of me. I didn't know that I was going to be taught to drive a single person submersible. I didn't know that I was going to be flying aerial surveys once a week and getting to look for whales. I didn't know that I was going to help design and oversee the construction of a research vessel. So, I can't say that I looked forward and was like, “wow, this is all going to be amazing.” But what I can say is I was absolutely enamored with the place I was working to try to understand and protect. I loved the people that I got to work with. I was not the chief scientist for all of these different things, but I got to work with and learn from amazing scientists and then work with really enthusiastic and curious volunteers. So, I had the best of both worlds. I had the world's experts to work with and learn from and then I had really curious, thirsty for information, and enthusiastic volunteers to help. I was sort of at the nexus of all that, which was pretty freaking awesome.

ZM: Yes, that sounds like a really exciting job to have.

SF: So, the logical next question is why in the world did you leave?

ZM: We'll get there. I want to know more about this job. So, the volunteers, that's really interesting to me. What were the volunteers doing? Were they recreational divers that kind of volunteered their services, or who were they?

SF: We did have volunteer divers that would come with us and do kelp forest monitoring surveys, which if you haven't dived in a kelp forest, you must put that on your list. It's magical. It's three dimensional. It's like diving through a forest because it is a kelp forest. To have that marine environment go all the way from the surface to the seafloor and to just be able to fly through it is magical. But yes, sometimes we had volunteers helping us, volunteers who had

spent a lot of time underwater, great divers and who knew their fish. They would come and they would help us do fish surveys, for example. But more often than not they were top side. We had a sixty-two foot research vessel. We would take it out for a week at a time and do any variety of research projects and believe it or not, we always could use an extra pair of hands. So, I would arrange for one or two slots to be available on a mission for volunteers. They were just basically citizen scientists who were eager to have a free week on a research vessel, a free cruise as we call them, and get to rub elbows with fascinating scientists. I don't necessarily include myself in that, but the people that I was working with were fascinating scientists that these folks just peppered with questions. And I will tell you, it was really a wonderful happenstance to need their help because it reminded all of us who did this as our jobs and kind of did this week after week or year after year. This is really amazing stuff we get to do. And sometimes you can forget that. You can forget that crawling around or staying up all night and counting birds who are flying back to their nest isn't work. It's really freaking cool. The volunteers always helped us keep that front and center. This is not something to take for granted, that we're really lucky to get to do this.

ZM: And I completely forgot to ask, do you remember about what year you started this position?

SF: I do. 1998.

ZM: Okay, so you said you got to work with some great scientists. Were there any in particular that were kind of good mentors for you? Anybody in particular?

SF: Absolutely, and many of which I'm still friends with. We've stayed in touch, and I left Channel Islands in 2005, so fifteen years ago, and I still keep in touch with many of the people that I worked with there. It was formative years for me. It was my first real career job. It was starting out and we were really growing something, I think. The experience left a really lasting impression for me. Yes, the other thing is I was a young woman, and in a position of some responsibility. I was also having to deal with a little bit of that and kind of trying to own my space as a young woman in a position of responsibility and in a role that is traditionally not one occupied by young women. Some of the folks that mentored me might have been the kind of learning experience that wasn't necessarily one I was looking for, but it taught me a lot. I would still consider some of the people that treated me perhaps like a silly young girl as mentors, in that I learned how to handle that. And then I had others who really helped foster my curiosity and my scientific thinking, and really respected what I brought to the table, and allowed me to contribute in whatever way I could.

ZM: Yes, you bring up a really interesting point, especially back in the early nineties, and I know it still is today and, I guess it's changing a little bit. I can't remember exactly where I read it, but I read that more than half of graduate students in marine sciences are now women. In the future, maybe this is something that is starting to change. But especially back then, I imagine it was a very male dominated field. What was it like coming into that first real supervisory position? With real supervisory responsibilities as a woman in a male dominated area?

SF: Fascinating. My eyes weren't open to expect it, but I certainly experienced it. And I can remember on numerous occasions where I was part of a mission, and I was serving as the chief scientist. Again, I was a young woman. I can remember having other scientists on the cruise with me, who were all men, who were not the chief scientists. But, when it came time for the captain

of the vessel to be instructed as to where or what we were going to do next, and I would go to the captain, and I would say, “here's where we're going, and here's what we're going to do next,” the captain would turn to the man and say, “where are we going and what are we going to do next?” Okay, “he can tell you.” But anyway, so I experienced that not infrequently unfortunately. I didn't have to put up with that for too long, because I think those individuals who treated me like that came to see my credibility and understand that I had some skills, and so they understood, “oh, okay, she's okay.” They probably would treat the next woman that walked on board in the same role the same way, unfortunately. But, I think I was able to get to a place where I could accomplish what needed to be accomplished, despite some of that kind of stuff.

ZM: Do you think there's more pressure on you being a woman to demonstrate that you had the necessary skills, or were you held to maybe a higher standard?

SF: That's a good question. I didn't spend a lot of time really analyzing at the time, quite honestly. I just was trying to get the job done. And quite honestly also, I think sometimes I was naive and didn't even recognize it. But as I mentioned before, because of circumstances, I ended up being in a position where I had to help oversee the design and construction of a research vessel and be the contracting officer. I marched up as a young woman to the boat yard every month and would talk to the boat builders and the guys that are welding the boat and engineers and so on and so forth. I can assure you; they didn't know what the heck to make of me. I wasn't a boat builder, but I was the one who was entrusted to do this, and I had to figure it out. And in retrospect, I'm quite sure that they were all kind of like, I don’t know, “who the hell is this woman? This kid? What is she doing here?” But I found my space, and I owned it. This is what I'm here to do. Let's talk about what I'm here to do. I don't care if you were expecting an old white guy. I'm what you got.

ZM: So, did you have any female role models that you either worked with or kind of saw in similar fields?

SF: Absolutely. I was very, very lucky all the way from those early days before I went to graduate school, interacting with women who were doing field work and working in ocean sciences, and then women in leadership roles in NOAA were kind enough to let me tag along and shadow them at different points in my career. So, I absolutely was able to see women in positions I aspired to and succeeding in roles that I admired.

ZM: The Channel Islands. You're there for eight years, you said. That's a long time. I understand why you stayed there for so long. It sounds fascinating, but yes, it's time to ask, why did you end up leaving?

SF: For personal reasons. For love. I moved to Savannah [Georgia] for personal reasons and fortunately feel very lucky. I was able to stay in the National Marine Sanctuary system, which I really cherished, and started working out of the Grace Reef National Marine Sanctuary office in Savannah, but in a position that allowed me to work not only with Gray's Reef, but also the Florida Keys National Marine Sanctuary and the Flower Garden Banks National Sanctuary. So, the three sanctuaries that were in the Southeast region, while I was based at one of them, I was able to work with the others on a number of different policy and science related projects. I felt lucky once again.

ZM: About what year did you move down to Savannah?

SF: 2005 or 2006. Yes. So, mid 2000.

ZM: You said you got the opportunity to work at a few different sites. Could you list the sites that you worked at again? I'm sorry.

SF: Yes, the one I'm at now, Florida Keys National Sanctuary, and Flower Garden Banks National Sanctuary, which is in the Gulf of Mexico.

ZM: That's the one. I couldn't remember Flower Garden Banks. You said there were management and science tests that you're working on. Let's start with the science. What kind of science were you doing?

SF: Well, down here in the Florida Keys, I was able to do a couple of missions with Aquarius, the underwater habitat where you saturate and live underwater for ten days. That was tagging certain fish species and surgically implanting them with transmitters that would allow us to track them as they swim around the reef so we could learn something about their movement patterns. I also was able to come down here and support coral reef monitoring projects, coral disease research cruises. Yes, I was able to get to do some pretty cool stuff here too.

ZM: Yes, that sounds fascinating. So, you're an Aquanaut?

SF: Yes, twice.

ZM: Twice?

SF: Yes.

ZM: What is Aquarius? Like you said, it's an underwater research base.

SF: Yes. So, it kind of looks a little bit like a submarine with legs. It is inside about the size of a school bus, and lots of dials and gauges and radios and all kinds of really cool stuff that the habitat technicians manage, two of them, and then there are four scientists, and typically missions last for ten days. After an extensive training, the Aquanauts are brought down into the habitat with the technicians. And basically, there's four people doing research and then two people basically keeping us healthy and keeping us safe. we would go out and dive for about 8 hours a day coming in for lunch, but generally being out on an excursion for hours and hours. And for the divers who may be listening, you would understand that that's a lot of bottom time and that's the beauty of being saturated. If you don't go back to the surface and you just maintain your depth and whatnot, basically you're living underwater. So, that's what we got to do, and it was amazing.

ZM: Correct me if I'm wrong, but was that when Aquarius was still part of NOAA? Was it the NURC. I think I forget what? The National Undersea Research Center?

SF: Yes, it was a partnership with UNC [University of North Carolina] Wellington. Yes. Now, the Aquarius underwater habitat is operated by Florida International University, FIU. But it's still

in the same spot up in Key Largo, Florida, up at Conch Reef. And they continue to do missions, science missions and [other] missions. NASA astronauts use it regularly to basically train for space missions, which is pretty cool.

ZM: You're doing all these amazing projects at this time. But you had dove in the Florida Keys before, correct? This was years prior?

SF: Early in my NOAA career, I came here for three weeks at one point to get NOAA dive certified, even though I was a scuba diver already. I went through the extensive indoctrination to learn how to do it the NOAA way, which I will say was really great training, and then came back the next year and did another two weeks here in the Florida Keys to learn how to be a dive supervisor. So, I had spent over a month diving and training here in the Keys early in my career.

ZM: And do you remember about how long ago that was from when you came down to Savannah and did your Aquarius missions and stuff?

SF: My first diving in the Florida Keys was in 1998 when I started with the Channel Islands National Sanctuary. And then, I don't remember exactly what years the Aquarius missions were. Yes, I don't remember exactly what years those were, to be honest. I'd have to look back, but it was probably more than maybe close to ten years ago now, the second one I did. I can't remember, too long. I spend too much time in front of a computer now. Yes, all the fun was in my past.

ZM: Did you notice any kind of any changes on the reef from the first time you dove in Florida to where are we in the early 2000s in our chronology?

SF: Yes, unfortunately I have witnessed the declines that are somewhat well known now and for that matter, in the time that I've been here, sadly, which I moved to the Florida Keys in September of 2017 and there has been a decline in just that time, which just sickens me.

ZM: I imagine some of that. You mentioned doing disease monitoring around that time and so I imagine a lot of that decline is disease related? Can you describe what kind of diseases that you were seeing and what that does to corals?

SF: So, the disease monitoring that I came down while I was still living in Savannah to do was different from what we're experiencing now. The disease that we're experiencing now on the Florida reef tract is called Stony Coral Tissue Loss disease. It is a disease that first appeared off of Miami in 2014. Probably first came into the Florida Keys 2016, 2017. Right around just the year I was getting there. It was starting to flare up here in the Florida Keys. It's a very unusual disease because typically it may affect one or two species - A disease, a coral disease, typically affects one or two species only. Typically, it lasts maybe a year. Oftentimes it's very geographically constrained, and most often, it doesn't necessarily have a really high mortality rate. So, in other words, fewer numbers of corals, smaller area, lasts not as long, and most corals might be able to survive it. That's normal. What we're experiencing now is not normal in any way, shape, or form. It has lasted since 2014. It is affecting almost half of the species that we have here in Florida. It is, for many of them, a death sentence. There is no surviving for many of the species that are affected. It is not only here in Florida, but now it has spread to other reefs

around the Caribbean. It is unlike any disease event ever experienced anywhere in the world. Let that sink in.

ZM: I was about to say that I think we may have almost reached a logical stopping point for today, but I don't want to stop on that note.

SF: Thank you.

ZM: And we'll get more into that in our next session, but yes, that's pretty horrible.

SF: Sorry.

ZM: No, that's okay. That's okay. It's really important that people know that this is even happening. I think a lot of people hear coral disease, and they're almost tuning it out by now because they've heard it so many times.

SF: Oh, yes, "the corals are dying. The corals are dying. The corals are dying." People have been hearing this for decades, really? And they have been. But this is unlike any other coral decline.

ZM: So, this is much different than what you were tracking, which I guess is like Black Band disease?

SF: Yes, much more prevalent. And white band disease and white pox. And this is why our restoration efforts are so critical and so important to me. Because if we are to achieve what I noted earlier, which is my inspiration, and that is to have young girls today, when they're my age, telling the story of recovery, we have got to get really serious about restoration and actively getting out there and helping these reefs survive.

ZM: I've heard one argument against coral restoration. I didn't think that you could argue against it, but the one argument that I have heard is that scientists should, instead of restoring coral that are just going to die anyway because of the effects of climate change, all scientists should be focusing all of their energy on fixing climate change first and then figure out what's left. What do you think about that argument?

SF: We don't have the luxury of doing this. This first, and that second. We have to do both. That's just all there is to it. We don't have the time to wait. If we wait until we fix that problem, there might be nothing left. So, I get it, I get it. We cannot create the perception that we can restore our way out of climate change, but we can't wait for climate change to be addressed to help our reefs. Might be too late.

ZM: Restoration is fascinating. When you had first gotten to Savannah and you started working in the Keys a little bit, as well as Flower Garden Banks, were you involved in any restoration projects?

SF: No. There were people pioneering it and there were people saying, "we need to do more of this." I just didn't understand. I was one of many who appreciated and thought, "yes, that's nice," but I think back then we should have been aggressively, ambitiously working on restoration. But

as you noted earlier, hindsight is twenty-twenty, and so here we are, and it is abundantly clear we don't have the luxury of waiting, and we may still be too late. What we're proposing in terms of restoration here is bold, ambitious and we'll see if we can pull it off. But I'm not ready to just throw out my hands and say, too bad going to be what it's going to be. We've got to try.

ZM: On an attempt to end on a slightly more upward note for today, I have heard that there are actually some patch reefs and isolated spots in Florida that are doing pretty well.

SF: Absolutely, yes, there are. There are places where it is remarkably resilient and we have corals out there that have survived Hurricane Irma, have not been susceptible to the disease and the temperature stress that we're experiencing. What is it that they got that we got to get everywhere else? And there's really exciting hope in the realm of science and restoration. There are breakthroughs being made with regard to out-planting corals that can very quickly, within five years, be able to spawn. And that's remarkable. There are corals being spawned in captivity. There's a lot of exciting work happening with identifying resilient strains, so there's a tremendous amount of hope and creativity, and passion, and commitment to addressing these issues. So, yes, it's daunting, yes, it's challenging, and there's incredible hope.

ZM: Excellent. Before we get into everything else that you're doing and your work with the Key Sanctuary and all of this great restoration work, I think now is probably a good time to hit pause just because it's already a couple of minutes over. I know you've been on the phone for like 8 hours today. That's a lot of meetings for you. So, I think we'll probably hit pause there. But I really appreciate you taking the time.

SF: No problem. You're kind.

ZM: After the long day.

SF: Well, no problem.

ZM: This Zach Mason. It is August 14, 2020, and this is part two of my remote interview with Sarah Fangman. I am again calling in from my home office in Baltimore. Sarah, thanks for coming back for part two. I appreciate it, especially on Friday afternoon.

SF: No problem.

ZM: Let's see. So, you started your role as Florida Keys National Marine Sanctuary Superintendent in 2017. Can you tell me just very briefly what that role entails?

SF: Yes, the sanctuary superintendent's job is to essentially manage the natural resources of the sanctuary, which are many, and do that while also supporting compatible use. So, activities that can take place in a sanctuary that can be done sustainably and without affecting that fundamental goal of resource protection. A very fine balance and sometimes difficult line to walk, for sure.

ZM: Can you elaborate a little bit on how you draw that line and keep that balance, keep yourself kind of centered between those two sometimes competing goals?

SF: It's very challenging because there's new issues to resolve that come at me all day long every day. It takes a lot of discipline to keep your eyes on the prize and to really make sure that you're not just managing like a squirrel, running from one thing to the next and not actually getting anything done. So, I work very hard with my leadership team and the team leads to try to really keep focused on the big picture and those things that are really going to make us successful, as opposed to the bright, shiny object that may appear and then soon disappear. That is tempting to chase, but maybe not ultimately going to get us where we need to go.

ZM: There's a lot that goes on with this job, I imagine. I don't think we'll even have time to cover all of it. For example, since we're already talking briefly about hurricanes, you started this position right before Irma came through. Can you describe what your job would be after something like a major hurricane? What do you even do after that happens?

SF: Well, the first sort of business is to make sure our people are safe and then attend to any facility issues. We have lots of boats, vehicles, buildings, make sure that we are attending to any impacts to that. Those are the immediate issues. And then position ourselves to help respond to the natural resources impacts that we're responsible for. So, for example, after Hurricane Irma, there were tremendous impacts to our reef. The wave energy that a category four storm can bring to bear on these reefs is almost unimaginable. We had significant impacts to those living reefs. We mobilized teams, along with partners, to go out and where possible, try to restore and repair where the hurricane had done damage to those reefs. So that, of course, takes a long time. The other thing that happens in a storm is there's a lot of debris that gets thrown around and washed offshore. We did a lot of work to address marine debris issues. And in fact, the honest truth is we continue to work to clean up after Hurricane Irma three years after that storm. And then another thing that happens is a lot of vessels were thrown around. We worked with partners to remove thousands, literally thousands of boats that had ended up awash in the mangroves, on the beaches, etc. And then three years later, we're still honestly issuing permits for people who are repairing their docks and their sea walls, because to do that, they need a permit. We continue three years later to deal with the after-effects of Hurricane Irma.

ZM: One thing that really strikes me is the amount of interagency cooperation that must be necessary for something like that. I imagine that's really challenging, and especially when you apply it to something like restoration, I feel like that's something that has come across as something that you're passionate about, at least in this interview. Can you describe how, because I imagine there are a bunch of different groups in Florida and in the Keys that are all working on separate restoration projects, do you play any role in kind of coordinating that or managing any of that?

SF: We do. And you're correct in pointing out how complex the Florida Keys is jurisdictionally. There are numerous federal players. There are, of course, state players, there are county players and there are cities, and then there are academic institutions that are doing research. There are nonprofit organizations that are doing restoration, as you noted. So, yes, it is a complex playing field, and a lot of what we do is making sure we're coordinating with those different entities. In the restoration realm there are a number of organizations, again, federal, state, nonprofit, academic, that are involved in supporting restoration here in the Keys. And yes, we have taken more and more of a coordination role, recognizing that the work that's been done to date is really, truly heroic, but it's not keeping up with the scale of the decline. So, we're trying to really help

synergize the people that are working on these issues to try to see if and how we can scale up, as well as make sure that we together can have a bigger impact than the sum of each of the small independent projects. We've been working very hard, along with the practitioners that have been breaking ground here and pioneering restoration, to support what they're doing, magnify it and expand it.

ZM: Yes, I think that centralized role is something that could really make or break a lot of these projects. Is that something that the Sanctuary has tried to serve as since its inception or is this kind of a new role that you may be taking on?

SF: I would say that the Sanctuary has attempted to coordinate and bring people together around different issues since its inception. So, the Sanctuary was established after a number of large vessel groundings impacted the reef. And so of course, that was the galvanizing issue that brought the Sanctuary into play and brought people together. Over time, what is the common issue that the Sanctuary is trying to promote and bring people together around has changed. At different times it has been marine reserves and establishing a network of marine reserves here. I would say that our work in trying to coordinate restoration is not new in and of itself as a coordination role and as a synergizing role, but the focus being on restoration is new. And quite honestly, I would argue that national marine sanctuaries have largely tried to focus their energy and attention on affecting human behavior, not necessarily putting Humpty Dumpty back together again like we did after Irma. We'd never done that before after a hurricane. We had not attempted significant restoration because hurricanes are natural events on coral reefs. But, recognizing that this reef at this time is so degraded that we needed to give it a little boost, we took a much more active role. Likewise, restoration, we've permitted it and we have supported it, but we haven't necessarily pushed it because National Marine sanctuaries have said, "no, we're going to focus our attention on altering human behavior, not trying to rebuild something or meddle with, play God, if you will, in terms of the ecological condition and presence of who's in the habitat and how many are there and so on." So, we're really pushing forward in ways that we haven't done that in the past. Does that answer your question?

ZM: Yes, and it kind of leads me to this next question. I think that there's been a market change in some of the techniques used and the aggressiveness of techniques used by scientists in restoration. And you kind of really touched on the theme there where scientists didn't want to play God right and restore after hurricanes and things like that because it's a natural event. But I get the impression that things are changing now and possibly because of changes on the reefs. Is this correct? Are scientists now forced to take more drastic measures because of fairly recent changes?

SF: Well, that's a really interesting question and I wouldn't want to imply that there is consensus on the role of restoration. There are still a lot of people that debate and argue should you be doing this for different reasons? Many times, the question is, "should we be doing this?" Because you haven't addressed the issues that got us here, temperature stress, for example, overfishing water quality. And so, it's a waste of time to do restoration in the absence of solving those problems. That continues to be a conversation that goes on. That said, I think more and more people are recognizing we don't have time to wait. And some of these species are in such decline that they will not naturally recover. They will not because they're too far apart and they can't

sexually reproduce. I do think more and more people are understanding that these types of active actions are necessary, and people debate whether they can be ultimately successful.

ZM: And you brought up a good point here, and I don't want to go too far on this tangent, but I think it's important to bring up the sexual reproduction of corals is different than just taking snippets of corals and then putting them back on the reef. Right? Can you explain a little bit about what the difference is?

SF: Right. Well, it's basically about evolution, if you want to boil it right down, because the sexual reproduction - I'm sorry, my cell phone is… I apologize. I'm going to turn this up. I should have done that before. - Sexual reproduction allows for potential changes in genetics that might allow for corals to be stronger and more resilient to the stressors they're experiencing. Whereas, propagating corals from, say, a contained genetic strain, if you outplant a lot of the same genetic material, some new disease comes out and can wipe it all out. So, we absolutely need there to be that continual genetic mixing and potential for new, stronger, more resilient genotypes to be the result of sexual reproduction. Hopefully that made sense. We definitely need to continue to propagate, to just get volume and propagating done carefully can also result in some mixing. But, what we ultimately want to do is work ourselves out of business in this regard, where we outplant enough that these corals can reproduce naturally and they get back to doing what they do so successfully and have done for thousands of years.

ZM: Going back to you taking this position, what drew you to this position specifically?

SF: Oh man, challenge. I like a challenge. I was a superintendent at another sanctuary before this job, and I recognized that doing the same job, the same title, was a completely different experience in the Florida Keys and would stretch me enormously, which appealed to me selfishly. But also, I felt like this was a place where there was an opportunity to really make a difference. This was a place where there were enormous natural resource challenges and new ground that needed to be explored in terms of how we managed this place; as I alluded to a minute ago, in terms of putting Humpty Dumpty back together again and being much more hands on in how we manage the resource, that appealed to me. Getting the chance to try to figure out some of those new territories and new ways of doing things was very exciting to me, and the possibility of trying to help make a difference was irresistible.

ZM: It sounds like you have plenty that keeps you busy with managing so many different things at once, and all of the interagency management too. Sounds like a logistical, almost a nightmare for some people.

SF: I run into places, kind of slide in sideways with my hair on fire, because, yes, it's challenging. I feel like I'm constantly [Sarah makes a sarcastic screaming sound] but that's okay. It's fun.

ZM: Do you get a chance to get out on the reef? Do you still dive?

SF: More often the diving that I do is on my personal time because that's just the way the demands of my workday are. Occasionally I get to go out as a part of my work, but more often than not, I do it on the weekend. That's okay.

ZM: It's not too much. It hasn't become work for you when you go diving and you look at the reef and look at the fish, it's still enjoyable. It's not work?

SF: Yes, it's still work, and it's enjoyable. I can never take off my sanctuary superintendent hat, nor would I want to. If I go out on a commercial dive boat, I'm watching how they're doing things. I'm watching what the tourists are doing. I'm listening to the tourists to hear what they're experiencing and how they're seeing things and what they're thinking about all this. When I'm in the water, I'm picking up debris. I'm noting there's more disease here. "Whoops. There's a lionfish, invasive species. Oh, darn it. There's part of a trap." So, yes, but that's because what I do is what I love, so I wouldn't want it any other way.

ZM: Do you find that there are some groups in the keys that I guess are more apt to follow the rules and regulations than others?

SF: Of course. Isn't that true in any community? Right. I think there's a lot of diversity here in this community in terms of how people approach marine conservation and sustainability, and how people feel about the sanctuary. There are some that love us and some that hate us and pretty much everything in between, and that's just kind of par for the course, I think.

ZM: Speaking of groups that aren't too fond of the sanctuary, I read an article the other day about a group when the sanctuary was first started that burned an effigy of your predecessor, sanctuary director, Bill Causey. Were you aware of this kind of tension before you started this position?

SF: Oh, certainly. That story is legendary in the sanctuaries. And in fact, some folks who've been around sanctuaries for a long time still have their "say no to NOAA" shirts that were quite popular here. People were passing around dollar bills that had "say no to NOAA" on them that people in the community were using and circulating. There was a lot of animosity for the sanctuary at certain times, and I'm, yes, very aware of it. And, what's really interesting is some of that is decades old, and yet feels very current to some people. And I find that as the current superintendent, I have to manage and navigate distrust from decades previous. It's disappointing and it's challenging. I think about that a lot in my job, the legacy that I will leave. And I don't mean to sound too grand, but I know that I'm still dealing with issues that came up twenty years ago. People remember how they were treated, what people in leadership said, versus what they saw happen. I'm very mindful that what I'm doing now is going to be the legacy or the inheritance of the superintendents that follow me, they will have to carry my legacy. They will inherit my mistakes and the consequences of them. I try to be very mindful of I'm not just responsible for now, but what I'm doing can set the tone for tomorrow and next year and even ten years from now. Because people here remember it, they will remember it.

ZM: Oh, yes. So that's interesting that you said it still feels very recent, especially in some groups, but I do imagine that there were likely some groups that initially maybe opposed the sanctuary, but now are probably some of your best supporters. I'm thinking maybe like the recreational diving community. Is that something that you found that people have kind of generally been won over by the sanctuary?

SF: Yes, well, I try not to generalize too much, but without question, there are individuals, for sure, who were really strong opponents, very vocal opponents, who have come to understand and appreciate what the sanctuary brings. And in fact, I would say that they represent a range of constituencies. So fishing, shore diving? Yes. Just locals who didn't want federal government in here meddling and now use the sanctuary's presence in their advertising as a source of pride. The transformation occurred with lots of different constituencies, but not with everyone within those constituencies. There are still some people that we haven't convinced, but we'll keep trying.

ZM: Well, that reminds me, there was a proposal somewhat recently in the southeast Florida area, I think, I can't remember the exact specifics of it, but some kind of sanctuary or restricted access area. Okay, do you know anything about that and why I don't think it went through?

SF: I'm not sure I know what explicitly you're referring to, because there have been a number of different proposals that have met with resistance. I'm not aware of a sanctuary per se. I'm not exactly sure specifically what you might be referring to.

ZM: Yes, I don't think it was a sanctuary. It came up in a previous interview, but the interviewee didn't know many specifics either and I couldn't find much about it in my own research. I was just wondering if you had heard anything.

SF: Well, could it have been in Biscayne Bay National Park? There was an effort to establish some reserves and fishing limitations that caused a great deal of discontent and controversy and ultimately had to be backed down and reconsidered and very controversial. No, maybe that wasn't it.

ZM: That's a possibility. Well, that's okay. I did see that the Florida Keys National Marine Sanctuary is looking at possible expansion right now. Can you talk a little bit about that? I saw that there's multiple different proposals and it looks like it's a very complicated process.

SF: It most certainly is. And the process that we are still working through started in 2012 and was the result of the Sanctuary publishing a document that spoke to the status and trends of the resources we're protecting. And because the status and trends story that was told in that report was one of significant concern and decline, the Sanctuary decided we need to try to address these issues, try to reduce the threats that are causing these declines, and try to find ways to improve things. Thereby kicking off what is now an eight year process, and still going, to find ways to do that. And it was extraordinarily comprehensive. The Sanctuary is very large and impacts a whole lot of different constituencies and user groups. And so, needless to say, it has been very controversial. But on the table are everything from, as you noted, potential boundary changes, to potential changes to Sanctuary wide regulations. So, we have regulations that apply to anywhere you're in the Florida Keys National Sanctuary, thou shalt not. There are other regulations that just apply within specific zones. So, if you are in this box off of this island, thou shalt not. But you can do that thing in other places. So, we are looking at Sanctuary wide regulation changes as well as potentially new zones, changes to regulations inside of those zones, be they existing zones or new zones. So, needless to say, it has been a lot to try to wrangle all of that, to try to be very inclusive of all of the different interests and try to strike that balance as we started this conversation, what does a Sanctuary manager do? A Sanctuary manager tries to manage the

resources sustainably, but also support compatible use and sounds simple, nice and sweet and simple. And let me tell you, try to do it and it gets really hard really fast.

ZM: When is this all going to be finished?

SF: Great question. So last fall, about this time last year, we released proposed alternatives. It included four alternatives: status quo (leave it alone, don't change a thing). And then three additional alternatives that ranged from less protective to most protective. We picked a preferred alternative in the middle because that's what you got to do. Put it out for public comment and [Sarah makes a "pew" shooting sound] everything sort of blew up. Everybody had their different opinions, "we hate this, we love this. You're not doing enough; you're doing too much." Five months of public process input from all of the different constituencies as well as our other jurisdictional partners. As we mentioned earlier, there's a lot of different players in the mix here. So that public comment ended in the end of January of this year. And now we have spent the last five months going through comment by comment, line by line, all of the different input relative to these different proposals and have drafted a set of proposals, a single set of proposals, that we think reflect the input that we heard. Which is not to say that we're doing everything that everybody wants, but we took into account all the considerations and we think the following set of alternatives makes sense. So, this boundary, these sanctuary wide regulations, these zones, these regulations within the zones. We are now socializing that, as they say, going back to our agency partners and saying, okay, this is what we think we heard, this is what we think we should do. Hopefully getting the nod from all of the different players. At that point we put it back out for public comment, take public comment again before we finalize this. So yes, it is a very long, very complicated process, but our intention is to be inclusive and transparent and allow people to have a voice in this process because ultimately these are the resources of our nation and people need to be able to be heard.

ZM: And I know that it's likely a long way off, and I know it's also very complicated, but if you could briefly summarize some of the major changes in that middle plan, the preferred plan. So, if that went through as is, what are some of the biggest changes to the Sanctuary?

SF: Boundary change. So, expanding the boundary. There are some sanctuary wide regulations that we would propose changing, but probably the biggest is in the zoning, because zoning is one of the most important tools that we use. Again, the sanctuary is very large, 3800 square miles. It basically reaches from Miami, just offshore of Miami, all the way, the entire way through the Keys and out to the Tortugas. So anywhere you step in the water in the Florida Keys, you're in the sanctuary. There's no cookie cutter approach to managing that entire expanse. And so, what we do, is we take different little pieces of it and apply different rules because certain areas are particularly susceptible to certain activities. So, we want to apply certain rules inside of that box. The zoning piece of what we are moving forward with is probably the most complex because we are trying to be as strategic about additional regulations, versus using a really broad brush and saying, "you know what, this activity is a problem over here. But to simplify it, we're just going to apply a rule relative to that for the entire sanctuary." Well, people would go nuts. While it complicates things because we do not have singularly consistent rules everywhere, it makes it better, because, again, managing that compatible use, we're going to protect where we really have a problem, restrict activities where it's really necessary, but allow it elsewhere, which

means a lot of zones. So that's probably the hardest part about what's coming out. I hope that made sense and was as brief as I could be.

ZM: No, that's good. Thank you. Definitely. Transitioning to a more retrospective look - actually before we get there. Do you have any projects that you're working on currently that you're really passionate about that we haven't discussed yet?

SF: I find it's very exciting what we're trying to do with regard to restoration. The restoration blueprint, which is what I was just describing, this large management reexamination that's really exciting. Trying to find that sweet spot between use and protection is really exciting and challenging. We're also looking at the issue of use and how do we make sure that we are maximizing the user experience while also managing the impact. Some sanctuaries are very remote, and so there's very little activity, whereas here there's a tremendous amount of activity. Is there a point beyond which there's too much use? How do you measure that, and then how do you address that? I'm excited about trying to crack that nut. It's a really hard one, but it's very relevant here. Water quality issues. We've gotten a lot of people care a lot about water quality. I'm sorry. I'm going on and on and listing basically everything in my job because I love my job, and I find it all fascinating. Sorry. [Sarah laughs]

ZM: No, that's okay. Don't apologize. It is fascinating. Do people on the dive boats and dive charters that you go on, do they recognize you? Are you a celebrity in the dive community?

SF: What I will say in answer to that question is that I am frequently greeted and recognized as the sanctuary superintendent. It's a small community, and I try to spend a lot of time out in it, meeting with people, giving presentations. During this restoration blueprint process, this very controversial review of how we regulate these resources, I was out literally meeting with thousands of people, telling them about what we're proposing, listening to them. I do try to be very present, and people do stop me. Hey, you're the sanctuary superintendent, aren't you? And that's a privilege. I have the privilege of having a job that is significant in this community, in that what we do affects most people.

ZM: Yes. You've had a lot of very… what's the right word? You you've had a lot of positions of authority and managerial positions so far. And I know we had talked about in our previous interview that it was a little bit tough coming up sometimes as a woman in science and then especially in these authoritative positions. That's the word I was looking for. And so, after having worked in a few of these kinds of positions, have you found any opportunities to kind of mentor some up and coming young women in maybe a way that that you were not mentored? In a positive way?

SF: Absolutely. I don't want to imply that I was not given opportunities and am grateful for what women in front of me helped me with. That said, yes, without a doubt. I've really made a concerted effort to be available to folks coming after me. Mostly young women, through working with interns or students, doing research to young employees. And now, at this point in my career, I've had the opportunity to be a part of mentoring programs both within my line office, but now also the broader NOAA. I don't have the time for it, quite honestly, but I absolutely make time for it because people did that for me. And I have sort of learned some things along the way that I like to talk about with other people. And it's as much a conversation as it is as Sarah's telling you

how to do things, or whatever. It's exploring some of these topics with young professionals. And frankly, I find I get as much out of it, which is probably why I make the time, I always learn something when I'm interacting with folks who are at a different stage in their career and we're kicking around these ideas. It's always helpful to me, too, and I enjoy it. So, yes, I most definitely make the time to try to pay it forward, if that makes sense.

ZM: Definitely. Let's see, I heard a term the other day, shifting baselines. And so that's kind of been an undercurrent a little bit about what we talked about. I remember you saying that one of your goals was that people that look at the reef today for the first time in thirty or fifty years from now, they'll see something that's much better. And so hopefully the baseline will shift positively. But so far, I get the impression that reefs have mostly trended in the negative direction. Do you think? How can we make sure that people don't look at the roof now and see that as the baseline?

SF: Such a great question, because I have not been in the reef restoration universe for very long, but, as I noted, there are pioneers that work here that I talk to. When the reef scientists try to shout from the rooftops, "the reefs are dying, the reefs are dying, the reefs are dying." People who don't know anything about reefs say, "okay, why does that matter?" "Well, they serve all these purposes and there's this and this and the tourism." Well, I'll tell you what, every day there are people leaving from the dock in Key West and going out and looking at nearly dead reefs (from a coral perspective). There are very few living corals there, hard corals. And, they're just mesmerized. No disrespect to people from Iowa. They come and they don't know what a healthy reef is supposed to look like, and they're mesmerized. And what they're looking at is algae, is bryozoans. It's not what's supposed to be living. There's still fish swimming around. There are sea fans that are colorful and moving, and it looks very mesmerizing, but it doesn't look anything like it's supposed to. That shifting baseline is real, but people, as you kind of alluded to, don't know any different. So, when people who have pioneered the restoration conversation are trying to say, "we've got to do something to address these chronic issues that are forcing these reefs to die or causing them to die." But they look fine, they're still pretty. Look at the fish. There are still things living there. They're not a moonscape. They just don't look like a reef is supposed to look. And so, yes, that's been a huge problem, because we can't point to it, say, no, tourists are coming to Key West. They don't want to come here because the reefs are all dead. That's not true. They still come. Even though the reefs don't look anything like they're supposed to, they still come because they don't know any different. It's absolutely been a major hurdle for people who are trying to say, "we've got to do something about these reefs," because the people who can really make a difference and give the money and address those chronic issues say "show me what the problem is. There's still fish. The tourists still come here. What's the problem?" So, yes, shifting baselines, very real problem.

ZM: How do we combat that problem?

SF: We continue to struggle with answering that question, to be honest. We continue to struggle with how do we convince people in Iowa that this matters and that we need to spend $100 million restoring seven iconic reefs in the Florida Keys? And it's a hard question to answer. It's intrinsically very valuable. They do provide really important ecosystem services, meaning a healthy, vibrant reef supports tremendous economic activity from tourism, from fishing, and then coastal protection. And the economic benefits of those are real. The problem is really being able to calculate and demonstrate the lost cost or the cost of that system degrading. And because the

tourists keep coming, we can't use tourist dollars to say, see, you lose this many corals and you're going to have this much less in tourism dollars, because it hasn't happened. Hadn't happened. And the shifts that have occurred, haven't happened in a time frame that we can really draw that clear line and say, “because Looe Key Reef is a fraction of what it used to be, this many homes were destroyed inland.” We don't have those direct lines of cause and effect. And so, we've really struggled to convince people of those connections and really inspire them to make those changes and to invest in turning things around.

ZM: Yes. Do you have a high point or a favorite moment of your career so far, or favorite project or something that you did that you thought, “I'm really making a difference right now.” What's the one thing that you've worked on that's your favorite?

SF: It's hard to pick a favorite for sure. If I answer that question by what I think is most important and urgent, it's what I'm doing right now, hands down, no question. What I'm doing right now is the most important, is the most urgent. And, if we fail, I'm not sure that we have time to try again. I haven't felt that way with any other resource issue I've dealt with in my career. I haven't felt like “if we don't get this right now, we may not have another chance.” That's how I feel about the Florida Reef Tract.

ZM: If you could give some advice to a future generation of potential marine scientists, what would you tell them?

SF: I would say act early. Yes. You think you have time, but you might not, so don't wait.

ZM: I think I have two more questions if you have time. I know you've talked a little bit about legacy. What do you think will be your legacy when you retire eventually?

SF: I don't know what it will be, but what I hope it will be is that I was a part of making change for the better and that I was a part of regaining trust and inspiring action. That's what I would like it to be.

ZM: And then, yes, finally, what's next for you? What's on the horizon?

SF: Trying to keep my hair from being on fire all the time, quite honestly. But, getting the restoration blueprint out to the public is very high priority. Continuing to push hard for our mission, iconic reefs restoration effort here, really getting the investments that we need and the on-the-ground-work to really ramp up so that that restoration work can be ecologically significant and really start to show how we can make a difference. And that gets to the inspiring part that I was talking about a minute ago, because this is important not just for the Florida Keys, but if we can figure out how to do this meaningfully here, I believe it can also help inspire and inform how the same kind of problems can be solved elsewhere. And if we can't do it here, where we have enormous resources, enormous capacity, and tremendous will, I fear for everywhere else. Because if we can't figure out how to do it here in Florida, in the United States of America, who can? I don't mean to sound egotistical in saying that, but we have all the resources, we have tremendous capacity and resources. We are blessed with incredible capacity, and if we can't find a way to harness all of that here in this country, shame on us.

ZM: Do you think we'll figure it out?

SF: Absolutely. I'm enormously optimistic. I know that there are some people that have thrown up their hands on coral reefs and said “they're just doomed. They're going to be gone by date ‘whatever.’” And I'm not one of those people.

ZM: Well, that's good to hear.

SF: I'm not going to give up.

ZM: Excellent. Well, thank you, Sarah, so much for sitting down. I know we've already gone over.

SF: Have we? Well, we kind of started late.

ZM: Yes, I wasn't watching the time. My fault. I'm just trying not to take up too much of your time. I really appreciate you donating so much of your time already.

SF: No problem.

ZM: That's huge. I know you're super busy, especially after speaking with you about everything that you have going on.

SF: All good. Good luck with this. Let me know if I could be of any other assistance. And have fun making music with your dad tonight.

ZM: Thank you. I will.

SF: That sounds really great.

ZM: Have a great weekend.

SF: Thank you. All right, take it easy.

ZM: Bye.

SF: Good luck.