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Rauch, Sam ~ Oral History Interview

Ruth Sando

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Voices from the Fisheries
166 Water Street
Woods Hole, MA 02543

Interview with Sam Rauch by Ruth Sando

Interviewee

Rauch, Sam

Interviewer

Sando, Ruth

Date

June 30, 2016 at 10:00 a.m.

Place

NOAA Headquarters
Silver Spring, Maryland

ID Number

VFF_SS_SR_001

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Biographical Note

Mr. Rauch is Deputy Assistant Administrator for regulatory programs of NOAA's National Marine Fisheries Service. After receiving a B.A. from the University of Virginia, he received a M.S. from the University of Georgia with the goal of becoming a forest ecologist scientist. He then earned a J.D. from Northwestern School of Law of Lewis and Clark College and worked for the U.S. Attorney's Office on the spotted owl litigation team. He was transferred to NMFS where he first worked on salmon cases before becoming Assistant Section Chief where he oversaw all NMFS litigations. He came to NOAA Headquarters as the Chief In-house Attorney for NMFS before starting his current position as Deputy Director in 2006.

Scope and Content Note

Interview contains discussions of: NMFS, NOAA, fishing regulations, protected resources, sustainable fisheries, commercial fishing, recreational fishing, salmon, endangered species, Vessel Monitoring System, GPS, Coast Guard, fishery management councils, red snapper, spotted owl, litigations, Magnuson-Stevenson Act, overfishing, Congress, right whales, aquaculture

Sam Rauch oversees regulations for sustainable fisheries, protected resources, the habitat program, and aquaculture. As Deputy Director, he helps to manage the regulations necessary to ensure marine resources are protected. In this interview, he discusses the changes in the focus of NOAA's NMFS over time. He describes the ways in which regulations are enforced through

technology like GPS, trip reports, dealer reports, human observers on boats, and the potential costs and benefits of using on-board camera systems in the future. He also touches upon the occasional conflicts between federal and state regulations and the difficulty of managing inconsistent regulations in federal and state waters. Rauch discusses the hiring practices within NMFS, particularly the use of contractors for specialized tasks instead of hiring a permanent specialist because it is hard to predict what big focus will come next. He also touches on the agency's relationship with Congress and his role educating and advising Congress on fisheries issues.

Rauch is most proud of his work with right whale conservation in the North Atlantic. He helped create regulations to prevent rope entanglement and injury by boats and faced a long and difficult fight in Congress to get the regulations passed, but eventually succeeded. Lastly, Rauch discusses the need for a greater supply of fish as the U.S. population grows and the trouble with current dependence on foreign fish. He believes we will see a rise in U.S. aquaculture in the near future.

Indexed Names

Bush, President George
Cheney, Vice President Dick
Hollings, Senator Ernest
Inouye, Senator Daniel
Lent, Rebecca
Magnuson, Senator Warren
Obama, President Barack
Schwaab, Eric
Stahan, Max
Stevens, Senator Ted
Young, Representative Don

Transcript

RS: Ok, so now it's going and this should record fine. This interview's being conducted as part of the Voices from the Science Centers project funded by the Northeast Fisheries Science Center. It's also part of the Voice from the Fisheries project that's supported by NMFS Office of Science and Technology. I'm Ruth Sando and today I'm speaking with Sam Rauch at NOAA headquarters in Silver Spring, Maryland. We're meeting on June 30th, 2016 at 10:00 a.m. in his office. Mr. Rauch is Deputy Assistant Administrator for Regulatory Programs of NOAA's National Marine Fisheries Service. He has a J.D. from Northwestern School of Law of Lewis and Clark College, and M.S. from the University of Georgia, and a B.A. from the University of Virginia. Thank you for meeting with me today. So, let's start with your current role at NOAA Fisheries. How would you describe it?

SR: So, I'm one of the three deputies here. I oversee the work of our regional offices and a few of the headquarters offices dealing with the regulatory programs. So, basically I oversee all the regulations for sustainable fisheries, all of our work on protected resources, biological opinions and things like that, our habitat program, and our aquaculture program.

RS: What is the history of your position?

SR: So, my understanding is that back in the early 2000s, there was one Deputy. There was always the Assistant Administrator in charge of the Fisheries Service and the Assistant Administrator had one Deputy. And before I started here, in about 2006, they split the job into three so that there was, instead of one, there was two named Deputies and then there was the Chief Scientist, which is a Deputy but doesn't have—has the same role and function as the two of us but has a different title. So, there's three Deputies. So, they did that and I don't know exactly when—sometime in the early 2000s, and the first person there was Rebecca Lent. When she went to pursue her international objectives and headed our brand new International Affairs program, they selected me. So, I think I'm the second official person to hold the role full time.

RS: And what was behind their multiplying this role into three?

SR: Well, it was too big. I mean, I can barely keep up with it now—I could not imagine doing my job, and doing all the budget and enforcement and science positions. I don't know how any single person could do that. Obviously they did, but I don't know how you could do it. But that was I think the—it was just too much of a workload to actually provide any sort of oversight, leadership, guidance on that function.

RS: So, the scope had really grown.

SR: As far as I—yeah, right.

RS: How does your work then fit into the larger organization?

SR: Which larger? NOAA or NMFS?

RS: NMFS.

SR: So, we are what I view as, we are part of the product here. We have to...the goal of NMFS, the two main goals are to ensure sustainable fisheries, commercial, recreational, those kinds of issues, and all that entails—food to the people, recreational opportunity, jobs, economy, for both today and in the future. That's half of our job. The other half is to ensure that protected living marine resources are protected and will be there forever and recover. So, those are our two main jobs. We have the science side which tells us what to do. We have the operational deputy which sort of gives us the tools to do it, my people are where it happens, where we do it. We issue the regulations that actually manage the fisheries, We issue the biological opinions, the recovery plans. We build barrier islands. So, I view what we do as the point at which all of this comes together in action. We couldn't do it without the other pieces of it, but this is where we actually achieve the results that meet those two objectives.

RS: Well, those objectives are very broad.

SR: They are.

RS: So what departments do you tend to work most closely with?

SR: So, I oversee all of our fisheries regulatory branches. I oversee all of our protected resources and habitats, so I work on all those kind of equally. But it's working with the councils, our regional offices to put out fisheries regulations—I signed all the regulations. We do—if you look at the codified register, the Fed Register, every year. I am told—I have never gone back and checked—but I am told that we are always within either the third or the fourth highest number of Federal Register actions, which means very active management of fisheries protected resources. So, I sign all of those. They all come through here. All of our region-issued biological opinions to federal agencies in terms of crafting, changing their actions to ensure that they're not jeopardizing the continued existence of species, recovery plans So, I work on all of those things. I oversee all of those—all those people that do that in this agency.

RS: So, that's all kind of bubbling up to you?

SR: Yes. Somebody has to—it bubbles up to a point somewhere...

RS: Yeah...yeah. So, there's three people in this role.

SR: Yes.

RS: Are their roles exactly the same? Is it the same work divided three ways?

SR: No. So, I oversee the regional offices, the Chief Scientist oversees the science centers, the Operational Deputy oversees basically facilities, enforcement, seafood inspection, international policy...those kind of things. We each have about the same number of people working for us and we fulfill the same role in the organization, but our areas of focus are different because I don't deal—I use the science, but I don't manage the science. That's all the Chief Scientist.

RS: So, what is the number of people that you have working for you?

SR: So it varies at any given year—we have about a 3,000 personnel organization. I have something a little less than a thousand, in any given year I'm not exactly sure how many.

RS: Has that changed much over time since you took on the role?

SR: The number of employees at Fisheries has gone down with the declining budget trends. We have—I don't know the exact number—but we have lost a significant number of jobs or positions that we have not filled. So, we are a smaller organization now than we were ten years ago, I believe.

RS: Now, is that reorganization or are people leaving, retiring, and not being... their slot not being filled?

SR: Mostly it's people retiring and we didn't backfill. I don't think that we have gone through any forced—we will normally turn over about ten percent of the organization in a year and we will backfill behind them. These are positions as the budget declined, we didn't backfill behind. The organization has shrunk as the budget has shrunk.

RS: You know, I always wonder—in that situation, you really don't have control of the skills that you're losing.

SR: We don't, but we can choose what we want to replace them with. There are some things that we were doing ten, twenty years ago that we are not doing today. We're doing new things today and so this is where we can look to within our overall mandates, which the broad mandates haven't changed but the things we're required to do are different today than they were back then.

RS: Give me an example of something that used to be very big, in terms of what people spent their time on, and is now gone or at risk.

SR: Well, I'll give you an example that's gone and it's coming back. My understanding—and this was a little bit before my time—but in the '80s and in the '90s, we had a whole division that was working with the seafood industry to promote the seafood industry, to work on trade relations and those kinds of issues so that we would promote U.S. product, we would invest in U.S. fishery resources. Because we were, at that time, transitioning from a largely foreign fleet to a U.S. domestic fleet. We did that in the '70s and in the '80s. And so we were investing a lot of that in industry support, promotion, marketing, those kinds of issues.

RS: [Whispered] Everything's okay.

SR: Alright. But we stopped that over time, so when I started here we invested almost none of that. There was still a little bit of those pieces around the agency—

RS: Did that go to Commerce, or go somewhere else?

SR: It didn't go anywhere else. The agency—the industry took it on on its own. As the U.S. industry became more mature—

RS: Oh, I see.

SR: —they didn't need as much of that support. Recently though, we have begun to invest more. So, when we created...when we merged international and seafood inspection, which is not within my chain, but we did that, part of the focus was to try to recreate some of the customer service aspect that we did then, but not with nearly the staff. That's perhaps the biggest shift over time that we've made. But we've done other things as we've gotten new species. We deal with protected species where we work on them and try to build on their needs and recover them. And so as species have recovered, we focus more on other things. Or, we've had to invest more things. In the early—in the '80s, we did not...our West Coast region, what is now West Coast

region, probably looked much different than it does now. Starting in the '90s we listed twenty—some odd species of salmon as endangered, and now, from my perspective, our West Coast region is probably our biggest office.

RS: When you say it looked different twenty years ago or thirty years ago, do you mean in terms of the staff or their responsibilities?

SR: Yes, all of that.

RS: Oh, okay.

SR: Well, I mean, let me give you an example. So, our West Coast Region used to be split into a Southwest and a Northwest Region. For budget reasons, we combined them a few years ago. The Southwest Region, when it started, it was in Long Beach, California because that's where the tuna fleet, the U.S. tuna fleet left for. Their main focus, one of their big work focuses was regulating, servicing, providing support services to the U.S. tuna fleet leaving out of Long Beach. Well, for various reasons, that doesn't happen—there's not a significant tuna fleet or they don't need that anymore. Our entire California operation, which is our Southwest office, is focusing almost entirely on California salmon issues, dealing with the plight of these endangered salmon stocks. So, twenty, thirty years ago, I don't know that you had salmon biologists on staff in what was the Southwest Region. We have a lot of them on staff today and by far what they do most is dealing with endangered species issues in California where they used to work on international tuna fishing issues out of Long Beach. So, you see that change over time. So, we're hiring more salmon biologists, less tuna specialists.

RS: There's a natural flow of what is needed and then assessment of who's on board that can handle that.

SR: Right.

RS: So, the two California regions are now both located—or they were combined and they're in Long Beach?

SR: No. Well, they haven't physically moved. They've changed their name, they're different sides. So, we don't have two California regions, we have one West Coast Region. So, we had a Southwest Region, which was in California and at the time also covered Hawaii, but Hawaii has been created as a separate region all together—the Pacific Islands Region. Rather than keep only a region that focuses on one state in California, a few years ago, when the budget really declined, we merged the Southwest Region with the Northwest Region. They are still located in the offices—so there's still a Long Beach office, there's still a Seattle office which is where the West Coast Region was, we still have significant offices in Portland, Sacramento, Santa Rosa, California—but now they're all under one leadership as opposed to two.

RS: And is that leadership here in Washington?

SR: Well, no. The West Coast—there's a West Coast Regional Administrator.

RS: Oh, I see, okay.

SR: Which is out there, and then they report up here.

RS: And where does the Hawaii Regional Office report to?

SR: It reports to me. So, there's a regional administrator in Hawaii that also reports to me, and they cover not only Hawaii but all of our territories: Northern Marianas, Guam, American Samoa. So, they have a huge region, but sparsely populated.

RS: How has... You know, I know that there was a new marine protected area that was signed into law—I'm not saying it right, probably—by Obama within the last year or so. How has the work of the Hawaii regional office grown? Has that grown significantly?

SR: Well, it didn't exist—when I started here, I started General Counsel's office in about 2003 and it was just beginning at that point. So, it was transitioning out of the West Coast, I'm sorry, out of the Southwest office to its' own office. It didn't—there was no Pacific Islands Regional office. It just didn't exist then. Everything it does now is, in a sense, it's grown itself. When it started there, we did not have—it is having to focus more on some protected species issues than it did then. We just listed corals, we have—there are marine mammal issues around Hawaii. Those issues were not that significant back in 2003. They also were there and they—we have a fishing management council, they were dealing largely with fishing issues and with coordination with all the various far-flung communities out there. So, they've really had to build up a regulatory program for these various species that need assistance that we didn't have back then. You mentioned the monuments. What the President did—last year maybe, maybe two years ago—was expand the preexisting monuments. That monument had been out to fifty miles and they expanded it out to 200 miles. So, that didn't fundamentally change what they do out there, it just made it bigger. We have had to—President Bush did the first marine monument in that territory with the Northwest Hawaiian Islands Monument, Papahānaumokuākea. Starting with that one, which was at the end of his administration, whatever year that was, we've had to devote resources to monument management. We are not basically a land management agency. The sanctuaries often deal with protecting particular places, and so we co-manage that with Fish and Wildlife Service and the State of Hawaii. So, we've had to create a monument management branch. Obama created a number of... was it Obama?...one of them created a number of far western monuments out in the western ocean and then Obama just expanded this one and he may do something like that again. So, we've had to create that. I don't know that that's been as significant issue, because we only manage the ocean parts of them, we don't manage the land. And on the ocean parts of them, the management is not all that different than what we were doing before—issuing fishing regulations, dealing with interactions out there...it's a little bit—there's an overlay that now it's a “monument” plan, as opposed to a fishing plan, but I don't think it's created that much difficulty for us.

RS: I guess it's a matter of scope.

SR: It is. They're big, but there's not a lot of things that were going on out there to begin with. What was going on is the kind of stuff we were regulating before.

RS: I had the impression part of it was expanding the limit to prevent foreign fishing or some sort of commercial, from overfishing in that area.

SR: Well, it was the U.S. zone to begin with, so there's not supposed to be foreign fishing to begin with. So, that's not—

RS: Oh, so that wasn't the goal.

SR: --accurate. There are various people that attempted to do—because various people like the idea of big huge monuments and so they put out... But foreign fishing was illegal in this area to begin with because it is U.S. waters, and we do not generally allow foreign fishing in U.S. waters. The effect was to preclude U.S. fishing in those waters, and there was some out there. So, we did displace some fishing effort, and it has been difficult for U.S. fishermen to fish, but there is not before—there should not have been before and there should not be now, fishing there, and that's an enforcement question as to whether we can actually catch them. Maybe there is fishing there, we have every incentive—we have the same incentives to catch them now as we did before, right. It's still not legal to do that.

RS: So, talk a little bit about the enforcement side.

SR: I don't actually manage the enforcement side.

RS: Oh, you don't. Okay.

SR: Happy talk about it though.

RS: Well, I just wondered what are the major tools for enforcement, when you think about things like the large monument, the scale of that?

SR: Well, so let me talk about my part of—I have to manage the regulations. So, the enforcement can't... what are they enforcing? They're enforcing our laws and our regulations, right. So, that has to come through me. So when I design a regulation and I say—the people that work for me do that—they have to keep in mind, how are you going to enforce this? It doesn't matter, you can have the best regulation in the world, if it is impossible to enforce, we can't do that. So, the one thing the enforcement people told me since day one is they like straight lines. The fishermen often would like to tailor the regulations so they can get maximum economic benefit. If we have to close an area, the fishermen will often say, yeah, sure, close that area, but let's do it on contour lines and put all these little turns and twists in the map where it's closed so we can fish everywhere else. So, you can minimize that, protect what needs to be protected, less fish everywhere else, and that gets to the enforcement people and they say—I can't enforce a squiggly s-curve on a map, I need a straight line. That's a discussion that we have. How do you do that? We talk about—so that's one, so closed area enforcement. It's relatively easy to enforce a closed area if you have a straight line. You can have various surveillance technologies,

airplanes, ships. Most fishing vessels by regulation, or many of them, are required to have what's called a Vessel Monitoring Systems, VMS units. Little electronic satellite pingers that will tell us their GPS position that they have to ping us every so often when they're fishing so we know where they are. So, it's relatively easy to catch a fisherman who's fishing in a closed area if the lines are straight. The more difficult things are time-area closes, so you say the season's closed. If the season is closed for everybody, so there should be no fishing vessels out there, that's easy to enforce. But if you have fisheries like we do in many places, where you can fish for cod and you can fish for redfish and you can fish for flounder, and you close the cod season, then they're out there fishing and they're fishing for flounder and what happens when they catch a cod? It's hard to enforce a seasonal closure if there are some of the seasons that they're allowed to catch that are open, particularly difficult with recreational fishermen where seasonality is one of the only ways that you can regulate for recreational fishing. You set the red snapper season. Fisherman's out there and after the red snapper season's closed but the triggerfish season's open—or the amberjack season, that's a better example. The amberjack season's open and he catches a red snapper. Well, what are you going to do? So, he's supposed to throw it back overboard. So it gets difficult to enforce those kind of seasonality issues, but part of my job is to design things that are easy to enforce to achieve our objective.

RS: It strikes me something like, that a technology like GPS was probably transformational in terms of...

SR: It was for area closures. It really made those easy to monitor, because now if your a fishing vessel and you're out there without a GPS, that's a violation. If the GPS is not turned on, that's a violation. If it is on and you're in the wrong place, it's a violation. And you really have no excuse because the fishermen, they know where they are and now—maybe back before we had all the satellite data and technology you could say, I didn't really know where the line was—but now everybody knows where the line was. So, we see a lot—I don't know the statistics because I don't manage that—my suspicion is we see a lot fewer of these area intrusions in U.S. fisheries where we have these VMS kinda things.

RS: All due to GPS.

SR: All due to GPS. I mean, the Coast Guard is our partner out there. If we have a GPS unit but we don't have anybody out there seeing that their nets are in the water, it's not going to make any difference. So, we need the Coast Guard. But it really has...I think area closures are now much easier to enforce than they were, and you need less of a presence on the water than you may have historically had.

RS: Which is welcome, I'm sure.

SR: Yeah, I mean the Coast Guard has multiple obligations. It's expensive to put an enforcement presence on the water.

RS: What other technology has become an important tool?

SR: Well, so let's talk about monitoring fisheries. So, we monitor fisheries, not dispositional monitoring, but we have two kinds of fisheries in the United States. Either we require the fishermen to bring all the fisheries to dock, so it's a full retention fishery—

RS: So, you mean they bring their catch to dock?

SR: Right, sorry. They bring all their catch to the dock. So, everything that they catch they have to land. Those are full retention fisheries, so we count their fish. It's relatively easy on land. But that's rare in the United States. In the United States, we often always have allowed the fishermen to sort their fish at sea, to bring home what is marketable and to return what is not marketable. And out of what you return, some of it's going to live, some of it's not going to live. We are adamant that all of that mortality—whether you land it or not—gets counted against the quota. So, we account for it, but that's expensive. So how do you monitor that? How do you monitor discards at sea? The historical way that we do that is two ways. One is the fishermen have to fill out trip reports, so they have to report what they do and those reports are accurate or not because they're all self-reported.

RS: And then that trip report's going to go right away into the regional administrator?

SR: Not right away. Historically, I mean, because the fishing vessel's out at sea and so the fishing vessel is out at sea, it won't come to us until after it lands and then it was mailed to us. So, often times, historically, it'd be several months before we had an understanding of what was landed from the voluntary reports.

RS: So, you might be seeing last season's information in this new season?

SR: Right. And that makes real time management almost impossible. So, you cannot sit there and say to a fisherman with any real accuracy that you as a fishing fleet can catch a thousand fish, send in your trip reports, and when we think the thousand fish are caught, we're going to close the season. If it's based on those long-delay mailed in trip reports, you're going to miss that. Either high or low, it's an estimation. You can try to put in uncertainty buffers to try to deal with it, but it's difficult. So, what we see now is we're moving towards electronic reports that come in in near-real time, using satellite technology, or at least—sometimes it's still hard to communicate with the vessels at sea—so at least by the time they land, we'll get them in near-real time. We also look at dealer reports, and in the last five years or so we have automated our dealer reports to corroborate. So, you've got the fishing vessel saying what they caught, you've got the dealer report saying here's what we think you landed—what we paid for—and those two better match up. Right, so that's all good for landed. I think we've had a really good handle on landed catch and the technology has really improved accuracy, so we're not sitting there with an accountant that's somehow preparing the numbers, which is very difficult...But in real time, we can look and try to calibrate the reports and so most errors are innocuous, miscoding something, but we can correct those or the system can identify those so the dealer or the fishermen can correct. Some are not. Some are more insidious, and this allows us to catch that kind of situation in much more real time and to do more real-time management so we can actually manage in season. But the other advantage is that now we have—but the other thing is we never...any sort

of self-reporting is, there is a certain degree of uncertainty with that, with people either making errors intentionally or not. And so we try to corroborate. The dealer reports are fine, because it's a market transaction, there's a product. In various places in the market you can check and say is that fish coming through. If you're talking about discards, things that are thrown out at sea which we never see, we put observers on the boats, human observers and we've been doing that since the '70s and that is a fairly sophisticated way so that we can try to assess are the kinds of reports you turn in when you have an observer on board the same as when you don't. We have very few fisheries that have an observer on every boat, but we sample enough of them so that we can get a good representation and have some certainty. The technology that we're seeing now, though, is cameras coming in place of observers. It's an expensive prospect, and sometimes dangerous, to put a human observer on a fishing boat that's not employed by the fishing boat. So, if we can do it with technology, which we're seeing more and more of, that may be a viable solution. We put a camera on the boat that has to be on when they're fishing, or maybe the whole time, and we look at the camera and the camera sees some of what the observer will see. An observer is almost in every instance a better data collector because you can collect samples from the fish, that kind of thing. But we are seeing a transition to more and more of the video monitoring systems to be put either to supplement what the observer does or to replace an observer at a lower cost. So, that's the trend that is starting now. We're on the beginning of it, we've rolled this out in a number of fisheries. There are going to be more and more fisheries in the next five to ten years that will be coming online with cameras, either to supplement the observers or to replace them.

RS: You know, it occurs to me, having worked with video a lot, that video is great but then you have to look at it.

SR: Yes, exactly. That's where the cost lies.

RS: Yeah, I mean that's hours and hours and hours of boring—watching a film.

SR: Right. So what we've seen is there's a—people believe that you can compare the physical cost of a camera to the cost that you have to pay in wages for an observer and cameras are always cheaper in that instance. But it's not true because there's still a human somewhere that eventually has to look at it. One of the things we're doing with the Pacific groundfish fishery which just implemented this method is using computer programs to look at all of the empty data because most of what the camera's going to see is nothing. You're at sea, there's nothing on the line, and then slice all those hours and highlight for the human person, here is, of the sixteen hours of data, here's the one hour in which fish was actually coming on board. And I think that will get better and better, and then you will say, you can get computer programs to say, of all the fish that came on board or was thrown overboard, here are the few fish that—the computer was able to catch everything except for these few things. So, over time the amount of video that a human will have to watch will go down. But the costs we see really in camera systems right now are the human auditing cost. How much, when are they going to do it, and the data storage and transmission costs because the video is taken on a boat and you have to get that video—not in real time, because translating that much video through a satellite link is difficult, you can't run a cable—

RS: Oh, it's a huge file.

SR: --right, so you've got to get that file off the boat in some manner to the auditing system and then you've got to store that data somehow. So, those are the real costs of the camera system. But those will go down over time, it's all technology problems. We either are going to fix or fixes are in the works for almost all those issues.

RS: What else do you see in the area of technology that might make a big difference?

SR: Well, I think that...I'm going to delve into my companion chief scientist role here because the big cost for us—once we get the monitoring cost which we just talked about—is trying to assess how many fish are out there. That's a hugely expensive prospect. Traditionally, we have done that by looking at how much fish are caught, but also trying to get an independent assessment. We have all these NOAA ships that are out there that try to do that. We spend a substantial part of the NMFS budget trying to assess, independently, how many fish are out there. What we're seeing is better ways to assess fish health without a big, huge ship because we haven't seen a lot of support in Congress, we've got an aging fleet...I don't know what the future of those ships are. The science side is looking at different underwater autonomous vehicles, all kinds of different metrics to try to figure out better how the fish are. I think over the next ten years we're going to get a lot better at counting the fish using these various much lower cost platforms.

RS: I had heard of underwater drones. Does that come under that category of autonomous vehicles?

SR: Sure, right. If you can pilot a radio-controlled thing down there and count the fish with that as opposed to putting a big net in the water and catching them off of a ship that's crewed by 30 people...

RS: Do you think that there would be more of a support for funding that than there would be for a ship?

SR: It would be cheaper, eventually. I don't know that it would be cheaper to start with, but eventually it would be cheaper. I think our challenge going forward as an agency is to figure out how to do the things we're doing now better, but more cost efficient because the demands on us are only going to increase. We're going to have to be able to monitor more and more things, to be more and more accurate. Our budget is not going to rise consistently with that. So, we have to do it cheaper and more efficiently. So investing in these technologies...I think we're going to have to do that. And we are already doing that—you see more of those coming online. There'll be better reflections of what's going in the water.

RS: It sounds like there's going to be more automation, but also more data.

SR: There will...there will. And one of the things that we're doing now, in terms of our relationship within NOAA, is we've done a much better job in the last five years than when I

started at trying to look at all the oceanographic data—other data that NOAA provides and we're really a customer for all of that. So, you know, we've got all of the satellite programs that take all the various atmospheric meteorological measurements. We've got the ocean atmospheric research people doing all these physical things, we've got all the mapping people in NOS calibrating—you know, so that's massive amounts of data. So, those things are—we control the fishing input, but the health of the fish stocks are, and when and where they are and how many of them, are determined by a combination of these few biological parameters but also oceanographic conditions. We know that many fish are temperature-dependent, they're acidity-dependent. With all this data, you can build much better models that are more accurate that depend less and less on actually going and hauling the fish out of the water to do that. So, I think that we are incorporating all of that. We are an end user of all the NOAA data—and other agencies' data—that they're doing. That's where we're really using big data in our workload. It doesn't necessarily come directly to me as the regulatory person, but I'm the customer for what the science gives me in terms of they'll tell me how much fish we can take. I have to design the systems that allocate that to who and where and how they can take it.

RS: So, you're getting the data in about the fish and their condition and then that might lead to some new regulations that your staff will then write up and...

SR: That will either tell you that you can increase fishing opportunity or that you have to restrict fishing opportunity. Either one of those is a change, right. Any bureaucracy hates change, but we're constantly changing and that's why we issue so many regulations is because the fish populations, they go up and down. Part of our mandate is to have a sustainable fishing industry, which is a huge industry in this country. To do that, you have to be very flexible. You have to not overfish them when they're down, but allow the fishermen to catch them when they're up because fish are cyclical—they go up and down.

RS: Has the role of the fishermen, in terms of the regulations and commenting on them and everything, changed over time? Or is it pretty much the same as it's always been?

SR: Well, so before 1970, there was not very strong federal regulations. The way that we were before 1970 is you had the states basically regulating the conduct of their fishermen within their zone of influence—out to three miles, maybe a little further. And beyond that, it was mostly foreign fishermen coming in and we were regulating it through treaties with foreign governments. Since 1970, the U.S. declared sovereignty over its' Exclusive Economic Zone, its' EEZ, out to 200 miles. And we basically restricted foreign fishing in our waters and created a U.S. domestic industry. There was not a large role for our fishermen before then because we didn't have any fishermen before then that was truly in depth of federal waters. There has been a long, rich fishing history in many areas of the country, but not the same as what we see today. But starting in 1970, we have what's called Fishery Management Councils. These Councils—there's eight of them around the country—they are dominated by the fishermen themselves, so we appoint every year fishermen to the Council, there's also states and some environmentalists, some academics. But in large measure, it's fishermen, and what we tell the fishermen is there are certain legal parameters, including the ones that are generated from science, that you cannot cross. But within that, you're supposed to advise us on who should get to fish, what the season

should be, these kinds of allocations. So, it is basically a mini legislative body that will negotiate within the legal bounds and the science bounds who, when, and where people get to fish. And so they really drive the system. We vote on them, we have one vote. We basically are the auditors of that system. We ultimately issue the regulations, and we'll do that because it resolves what they do as legal. But they have a huge voice in that. What we've seen over time is that the commercial people still—they started with a huge voice, that voice has largely continued...the commercial folks are fairly sophisticated, they make business decisions, they can understand cost-balances and that kind of thing, so they've been there. What we've really seen over time is that the increase in the importance of the recreational community in that process. Recreational fishing, at least in federal waters, is—I mean, everywhere it's important but it's not just a pastime, it's a business. There's lot of jobs. The amount of money added to the economy in any given year from the recreational fisheries can rival what is coming from the commercial fisheries because the jobs, the travel, the boats. We deal with --

RS: I didn't understand the end of that sentence. Because the jobs travel?

SR: The jobs, the travel, the boats—you get a recreational fisherman that could be a tourist—

RS: Oh, so they could do both?

SR: No, you're either a recreational fisherman or a commercial fisherman unless you're in one of the territories where those lines get very blurred. If you're a recreational fisherman and you own a charter business where you're taking tourists out, right. Or, somebody's got to buy all those fishing poles, those gears, those nets, those boats, those hotel rooms...all those kinds of things. It gets to be a very large source of money and jobs in the economy. If you go down in Florida, you see all the big tackle shops. Right, that's all for recreational fishing.

RS: So, it's kind of a ripple effect, economically.

SR: Exactly. So, even though you cannot actually sell the fish, or else it would be a commercial fish, it still is a huge business. And it's important to the United States and jobs—

RS: [Touching mic] Just checking. Okay, we're good.

SR: --so, we've recognized that more frequently but we also understand that—so it's not only significant in terms of the positive economic impact and all the other good things recreational fishing brings, but it is a significant—it can be a significant conservation concern on the back end. With so many recreational fishermen, they can, in some areas, take out as many fish as the commercial fishermen, creating a sustainability concerns. So, what we've seen, I think, over time, is the rise of recreational fishermen in importance and having a bigger voice. It's difficult for them to have, because of the nature of that, a unitary voice.

RS: That's what I was thinking of.

SR: But you're seeing, you can see large national organizations that sort of act for them. You

still have—it is still an industry that is dominated by individual people doing private individual things which makes it difficult for them to engage in a policy debate. But you see more and more of that, and over time that's going to become—and we would encourage their participation because they are important, and they have traditionally been underserved and that's a real change that you're seeing, is the voice of the recreational fishermen.

RS: And does it make it difficult to reach them, to sort of educate them about regulations so they know what is permitted?

SR: Well, not necessarily about regulations. They will know because you—they will know whether it's legal or not, when the season's open or not. We can reach out to them. But to get their input ahead of time and have them—because it takes time, the way that we generate the regulations is through these Councils. They meet three, four times a year, sometimes for a week at a time. It takes a lot of effort to come to a council meeting and be prepared to be constructive. Many of these recreational fishermen, they don't have the time or they're not going to travel. There's only eight of these around the country, so if you're in Florida, you may not travel to Texas where the meeting's going to be held to do that. So, it is difficult to get their participation in the process. I don't think it's difficult for them to understand the regulations in the back end, I mean the season's the season. They're used to fishing seasons, they're used to you can only catch two fish a day. That's what they do. And so I don't think we've had a problem there, we have had a problem understanding what their needs and wants are because it's difficult to get this sort of group of independent actors to come together and to say, this is what our needs and wants are.

RS: So, their voice is probably the weakest in the process.

SR: It has been historically. I think it's getting better. They are rising in importance to reflect the importance that they really have. They're getting better advocates for them, you see some national organizations stepping in more strongly than they have in the past. That really is a trend that when I started in the mid-2000s, ten years ago, here, we didn't give as much credit or voice and there really wasn't much opportunity and you really are seeing much more of that now. That's by design—we're encouraging all that.

RS: Can you talk a little bit about the combination of the federal regulations and the state regulations in terms of developing it?

SR: So, we regulate in federal waters which is usually three miles to two hundred miles. The states regulate in-shore. The fish don't care.

RS: [In unison] Don't care [laughter].

SR: They often don't notice. It's very important for us to work with the states. Much of the data-collection system—the states been regulating fish and game well before we started here in the Fisheries Service. They have huge infrastructure to deal with their own fishermen on their docks. It's revenue for them, they tax it. Much of that revenue gets funneled back into the ecosystems. They collect a lot of the data. So, when we talk about, we get dealer reports, we get vessel trip

tickets, vessel reports... a lot of that is actually we get them from the state. They turn it into the state or to some joint federal-state partnership and then we get them.

RS: So, it's moving up eventually to you.

SR: Right. Because that's the point of landing—when they land, they're landing in the state. It is more likely you're going to see the state agent there than us just because of the vast coastline. So, we have to have a partnership. We have to have a partnership on enforcement, we have a partnership on data collection. The regulations need to be coherent. In an ideal world, we have the same fishing season in state waters as in federal waters because otherwise it's an enforcement nightmare—particularly for the recreational anglers. It creates...the fishermen don't understand why there's a difference. It creates well-deserved charges of this is a bureaucratic problem. So, we try very hard to have consistent regulations in state waters and federal waters and that means we work very closely with the states. The states are on all our Fishery Management Councils. So, they have a say in that we try to be not necessarily deferential, but very cooperative with them on what they want to do, what we want to do, and we try to collaborate. It works very well most of the time. There are some times when it doesn't work well. There's some times when the states and the federal government have different views on how these things happen and when that happens—hopefully that won't happen for long, but it creates a lot of animosity, confusion, position-setting...It's not a good situation where we are not in alignment with the states.

RS: What would be an example of that situation developing?

SR: Well, the best example right now.. best.—the most apropos example right now is with red snapper in the Gulf of Mexico. So, red snapper is a fish that is caught predominantly in federal waters. It has historically been an important commercial fish. It was one of the two fish that were black and red fish, that and actual red fish. In federal waters, juvenile red snapper were taken, killed in unsustainable numbers in the shrimp fishery. The shrimp fishery's very important in the Gulf. It has historically not been that significant of a recreational fishery because it was in federal waters—you had to have a boat, you had to go out three to nine miles. When people started getting more boats, the economy improving in the '50s and '60s, and started recreationally fishing out in the federal waters, all the federal recreational fish became important. Red snapper is very tasty. It's a good fish to catch. So, the recreational catch on that has increased. So, a lot of people take red snapper all around the Gulf. We manage it in federal waters because we can—so, it's a single stock what happens in Texas matters to people in Florida and vice versa. We are one of the few forums that you can actually develop those trade-offs. We have within the federal system, we can put limits on the shrimp fishery in order to leave more adults for the recreational fishery and vice versa. But what you saw in the recreational fishery is—historically, for all these various reasons, red snapper was very overfished.

RS: Overfished?

SR: It was overfished, and it was declining and as the federal management became more and more mature—occasionally with help from some litigation from the environmental community—we had to put in more strictures and actually have a recovery plan to rebuild the red snapper

stock. And that recovery plan had been phenomenally successful. So, red snapper now, there are more out there and the quota's higher than at any time in the last, say, thirty years. Right, so it's going really well. It is going actually far *too* well. So, the commercial people are fine. Their quota's going up, they know how to deal with it. The shrimp people are fine, we've put in measures for them, they're okay. It's the recreational people that are suffering because when a stock recovers, it becomes easier to fish. And so you're a recreational fishermen, you go out there, you are more likely to encounter a red snapper than you were before and the red snapper are bigger. They're moving—they're not necessarily moving, the range is expanding so they're coming down the coast of Florida where they're meeting with more recreational fishermen. All good things, but their quota—they're catching their quota a lot faster than they've ever done it before because of all these good things.

RS: So, by 10:00 a.m., they're done [laughter].

SR: So their season has gone for a recovering stock, their season has gone from a year-round season to a nine day season because they can catch it so fast. They're catching more fish in those nine days than they did in the year-round season, but that has not gone over very well. Right, that system...that system...the fishermen don't understand it, it's hard to explain, it's counterintuitive. You're catching more fish, but you're catching them in nine days. Would you rather have a longer season and less fish? Nobody will agree to that. So [unintelligible] in federal waters because we are trying to achieve these Gulf-wide standards. So, Gulf-wide, we cannot allow more than X number of fish to die. That is coming into conflict, and has come into conflict with the states, who are looking off their own coasts and say, well, I see a lot more on our coast than I've seen in thirty years, I'm going to let my season go longer. And so really what happens is if everybody was managed in the same season, you'd have maybe a twenty day season. But you have the State of Florida, Louisiana, Alabama, Texas saying no, we're not doing it, we're just going to open our fishery all summer long. There's not as many fish in state waters, but there's not none. There are fish in state waters, and so what that means is for every day they open their fishery, that federal season gets shorter and shorter. And so you've got like seventy day season in Florida, which means that instead of having a twenty day season in federal waters, you're getting down to a nine day season. This is a situation where we're not in alignment. It is benefiting some people. It is benefiting mainly the people who can—like Florida, where they actually have some fish. It is hurting the people who would fish in federal waters. So, that's what's going on. At this point, the stock is still healthy, is still recovering, but because the states and the federal government have not agreed, you've basically reallocated fishing effort to the near shore folks and taken away from the people who fish further offshore. That has not been a strategic decision, there's no council that said that, it's just each state individually has done that. So, that is going on right now, is an example of where the federal and states have not agreed. The states are well-meaning and we agree on a lot of other things, but there's a lot of politics involved in red snapper, and that's where we are. And so we don't want that to continue, but it's not clear when that's going to stop.

RS: Unintended outcomes.

SR: Yes.

RS: Yeah. You mentioned the environmental community and environmental issues. How does that play into your role here? I'm sure there's a lot of groups, there's a lot of active interest. How does their voice get incorporated?

SR: So, the environmental community has helped push us towards the sustainability position we're in. I'm not sure that the United States would be the leader in global sustainability it is now without the environmental community either pushing legislation or litigation or those kind of things. They tend to file litigation if they don't think we're complying with the law or they think we've cut the corner too much. They've been very vocal advocates with the overall U.S. citizenry, sort of raising the sensitivity to sustainability products, and with Congress. We've got the regulatory structure that we do now because the environmentalists are pushing us. Now, it's not exactly what they wanted, but it is a lot closer to what they wanted than if they hadn't been doing that. So, that's the broad scope of that. And we talk with them all the time on various issues just like we talk the fishing, we talk to all the constituents who come in here. On an issue-specific basis, at least when we're talking about fishing, we haven't talked about protected resources much at all, but if we talk about fishing, they should work through the council process initially. That's where we make these policy-level decisions and that is one of the things I have also seen changing through time. When I started, I started at the Justice Department in '94 and I was doing a lot of litigation and the environmentalists would sit back and not participate in the council process and then they would sue at the back end. And they would win on occasion. They would lose on occasion, but they created a lot of animosity because they didn't participate at all. I'm thinking like the Natural Resources Defense Council in the '90s with the Pacific groundfish fleet, they sued on every action. They didn't go to the council meeting—they sued on every action and they won some, they lost some... a lot of animosity. What started happening, though, is they started going to the council meetings. They started going to the council meetings and started being part of the process as opposed to the litigates at the back end. The number of lawsuits dropped, the number of council actions that actually did what they wanted to do increased. It takes time and effort to do, but once they come into the process, the fishermen, both recreational and commercial fishermen—they're outdoors people, they're out there. They could probably make money doing other things. It's not an easy thing to do. My experience is that they do have an environmental ethic—most of them, not all of them. Most of them do, and they are concerned about having a fishery for their kids' future. So, they are often willing to listen to the same kind of arguments that motivates the environmental community if you don't demonize them and work with the system. And so you've seen that a lot—when I think the Pacific Council has vastly transformed since the '90s because of the participation in the process. And you've got people in Nature Conservancy and Environmental Defense Fund which are out there buying fishing permits. There are fishing permits that environmental organizations now own and fish. They didn't own them and set them aside, they own them and fish them. They're working with the fishermen to fish in what they perceive to be “the right way.” They're using that as an example to say, “look, you can still make money and not kill the environment, we want everybody to do that.” And that's a very persuasive argument. And so that has really changed out there and in other places around the country, too, where you see the environmental community—they still use litigation, but they are also making an enormous investment in the council process, and that has moved the council in their direction. I think it's a good thing.

RS: What made them decide to move to the front end?

SR: Well, I think that if you sit back and we make a decision and then you sue us and you win, we're going to do what the court said to do and that's all. If you go through the process—and then the next time we'll go through this all again. If you go through the process, though, and you get certain principles established by the council and all that, then you don't have to waste time...I mean, I was a litigator. Litigation is a roll of the dice. You can have the best case and lose, you can have the worst case and win. You can't ever predict what you're going to do, and if you're really interested in the solution, the court should be the last resort because you just don't know what's going to happen. It's much better, you have much more control, if you invest in the front end of the process. And I think they realized that the fishermen are not all evel, that working through the system is not—you've not somehow tarnished yourself by trying to work within the system. And I think that they've started to see results, right. I don't think that...What I'm talking about now is the people that were going through this in the '90s and the 2000s, because I think now the environmentalists are all very sophisticated, they're working through that. The results will look a lot more like what you want to do if you've invested that time up front, and that has been more worthwhile to them than the few victories that they could check off in litigation, which have not been—I don't think that they've been all that enduring. Some of them have, but...So, I think you see that and I think that's a very good thing. The councils are open to those kind of proposals. And then maybe it's because the government has encouraged them just like we do with recreational people to participate. Maybe it's because they were sophisticated on their own. But either way, it's a good development that you seen over time.

RS: Well, you mentioned that we hadn't really talked about protected species.

SR: No, we didn't.

RS: So, say a little bit about that in terms of—well, environmental groups, but also in terms of regulation.

SR: So, the fishing industry is interesting and it is a relatively easy thing to do. From that side of the house, we are monitoring to try to maximize jobs and benefits and minimize environmental harm. But if we fail, it's just less money for fishermen. The consequences of failure are not as significant. The other side is a very much more difficult problem. We're dealing with endangered species that if you fail, they're going to go extinct. There is not recovering from failure, so we have to be a lot more careful. The solutions, though, are also not very apparent. A lot of these species became endangered for over a century of degradation. The habitat has been wrecked. The climate is changing, we overfished them to the near-extinction. If they could have recovered on their own with the easy solutions, they would have done so. So, there are not a lot of easy solutions to these. A lot of the solutions that we've left with by the time we list them, are solutions that are going to cause massive disruption in the community, the economy, something like that. Now, we're facing a lawsuit on the Columbia River. Out there, the communities of Seattle, Portland—they all started, they became big cities in part because there's cheap electricity, funded the aluminum industry, which built the planes and Boeing. That cheap

electricity all came from the hydroelectric dams that we put in there. Those hydroelectric dams, the environmentalists argue, are killing all the salmon. We lost a litigate—a court case earlier this year and the environmentalists were saying the only option they want is all those dams to come out which means that all the electricity that we've been supplying will not come from those dams if that happens. So, where does that come from? When you start talking about that massive a change to protect the salmon, and we've been talking about that for, since the '90s, is a lot of people coming out and it matters a great deal. You can't...you can't lose that debate. You can't allow them to be extinct. So, it's very difficult what we're dealing with—we're dealing with vastly different constituents and it's not just a business proposition with cost and benefits. The Endangered Species Act is a very strict statute at times because we can't allow for extinction. So, that is a different skill set that our folks need. And the environmentalists who are out there, they're arguing for many of the same things we're arguing for. The question is: how disruptive are you going to be? There are some good people that normally would embrace environmental concerns, but because it's going to hit them at home—maybe cause them to move their home—they all of a sudden become antagonistic. So, that's been very difficult. We've made some great progress. Even so, on many of our species—there are still some that we aren't making progress on and that we're concerned about. There are some good success stories, but it takes time. You have to be very patient. You have to do—you didn't get there overnight, you're not going to recover them overnight and that's part of the difficulties of that side of the job. That side of the job is also very difficult. Much more difficult, I think, than the fishing side.

RS: What are some of the skills on board at NOAA that are crucial for dealing with those communities and coming up with the regulatory solutions? Not solutions, perhaps, but...

SR: The difficulty is, we've got to become an expert in so many things. We can't just be an expert in salmon biology, say. Because you may know that for salmon the best thing is an open-running river in a certain temperature range with certain flow rates. That's easy. But we have to have hydrologists to figure out is there a cost-effective way to reconfigure this dam so this animal can get around it? We need to have communication people to talk to local land owners. The kind of coalition builders that we have—that's an important skill, the negotiation skill. Because although we know that the ESA is a hammer, if we bang on too many nails with it, the hammer will get taken away. Congress, which is sitting down there, sometimes has threatened a lot that they will take away the hammer. And so we need to be mindful because often times the first thing that is the best for the salmon will cause such community disruption that maybe the second-best thing for the salmon is still good enough, but you can have much less disruption. Negotiation skills, not just a biologist, is what I need most. That can sort of figure that out, that can work on compromise but still maintain our scientific integrity. Those are the skills that we sort of look for.

RS: And then you have to have them out there in the regions.

SR: You have to have them out there, right. That's why most of my folks are out in the regions, because they've got all these issues they've got to talk to.

RS: Well, let me ask you then about when you hire people that are working for you, what kinds

of skill sets are you looking for?

SR: Well, I don't do much to much direct hire. I supervise the Regional Administrators and the Office Directors, and they do all the hiring.

RS: Well, let me ask you—do you find that working for NOAA and working for the government seems to be a desirable goal for younger people starting out?

SR: It's hard to say what they do. I have a daughter in college, and what I understand about younger people, though, is they have less job loyalty.

RS: Loyalty?

SR: Loyalty, and maybe that's a bad word. Their view is that they will work on a job and they will be happy to pick up and leave the job. I don't think when I started...when I started I thought my first major job, when I took it, that that's what I was going to do forever. I actually left that job and came here, but everything I read—take that for what it's worth—is that the new generation of college graduates believe that they will find a different position. They're more inclined to look for a job—their first job may not be, they're not necessarily thinking, I'm going to sign on with NOAA and that's what I'm going to do for the rest of my life. I'm going to sign on with NOAA and I'm going to try to find the best fit, and if I don't find that fit I'm going somewhere else and they're not that concerned about it. I think I would have been a little bit more concerned than what I understand or view the next generation to be. But that's not a bad thing. So, I think what we have to look for in terms of...I look less, I would encourage less at, are you going to hire someone who's going to be here forever, or are you going to hire somebody that's going to serve the needs that you have today and for the next five years. Beyond that, we'll see.

RS: Is NOAA good at training people, or do they expect them to come in job-ready, as it were?

SR: I think we expect—I think the federal government...it's hard to get a federal position unless you've got certain skills. There are very few sort of entry-level skills that you can have. Very few people—we don't hire people that we expect to train up into the position unless we're talking about training them for management. Right, but if I get a biological opinion writer, I'm going to look for somebody that has those kind of skills because it's so competitive to get those kind of positions. We're not going to hire just a generic good person that we'll train out. I think that's probably true with much of the federal government. We do hire—so, one of the things that it does is that we do get to look at contractors a lot. Because our needs are flexible, we often times will hire contractors instead of a federal employee. Sometimes those contractors will be here for a long time, and so we get to see and actually train up a position. We never hire a contractor thinking they'll become an FT, but often by working with us as a contractor for several years, they actually do become trained and so they're much more competitive for that FT position when that full-time equivalent position becomes open.

RS: Do you find the use of contractors has increased greatly over time?

SR: I don't know that it's increased greatly over time or not. I really don't know. I know that we use them a lot because our needs change, because we are not like a normal business. Normal business, you've got a CEO that manages the budget that can make hiring, firing decisions all within themselves, so you can be much more aligned of a purpose. So, you can hire the people that match your need. We have a split view. Our company is run by somebody who is not part of our company necessarily, by Congress. Congress will say, "this is your new mission." Even within Congress, you can have the authorizer say, "this is your new mission" and the appropriator say, "I don't care—I'm not going to give you any money for that new mission, I want you to do this other thing entirely." We do what the money does, right. So, you have all these disconnects between—even within Congress, between Congress and the administration. More so in the federal government than any other business, you will have an inability for us to actually budget proactively for our needs. We can make a budget proposal that gets wiped out, sequester or something like that. I can probably tell you exactly what it would need to do, all statutory mandates that Congress has given me, but Congress has not given me enough money to do all that. So, because we don't do that, we need more flexibility within our workforce. I cannot sit there and hire a, say, coral biologist right now knowing that I will always need a coral biologist for the next forty years. I might need it now, but maybe I'll do a contractor because next year I might need a monk seal biologist instead. So, I think contracting gives us the ability to be flexible given that we really have all these problems managing strategically for our budget needs. So, we don't know. If I were in a business, I could make a commitment and say, "I'm going to need a coral biologist for forty years, I'm going to hire this person and they will always do that." And I could actually follow through with that. But I may not be able to follow through with that.

RS: I never saw that connection with budget unpredictability.

SR: Oh, that's huge. And we have changing needs, right...Corals is a good example. Ten years ago, we didn't have any corals listed under the ESA, so all of my ESA folks, none of them were coral folks. Two years ago, we listed twenty species of coral. Now we need coral folks and we need them not in five years, but we need them today because once they're listed, immediately you have to do things about them. So, I can shift people around, but that's slow. I can hire contractors, that's a lot faster. So not only do we have the vagaries of Congress, but because the environment is changing, new species are listed, our mandates change over time—particularly with the protected resources. So, it's hard to plan for where the next big need is going to be.

RS: Well, thinking about careers, I wanted to ask you about what inspired you to get into science, and then into the regulatory side?

SR: I was a bad scientist. The second question first, why did I get into regulatory science? Because I was a bad scientist.

RS: Well, I don't have a list of what your BA and MS were—subjects.

SR: Well, okay...I went to University of Georgia to be a forest ecologist scientist and I was

burning down forests and I loved burning down forests. And I was measuring greenhouse gas emissions from forest fires and that was a fantastic job. Running around, setting forest fires on purpose, playing in the blaze...

RS: Dream job for a young person [laughter].

SR: Yeah, you'd set out this sort of research plot, and you'd have to—we would know where our pet copperheads were and had to avoid them, and you'd let them burn. So, that was a great job, but I was a poor field—I was a poor lab technician and I really disliked the fact that in the science field, nothing seemed to me ever to be done. I did my thesis, I would write my thesis and you can always write it better and better and better, and even then it was only a very small piece of a larger puzzle. So, after I got my Masters, I decided that my skill set was better suited to arguing about things than actually doing things, and so I went to law school. I went to law school out in Oregon in the midst of the spotted owl crisis, and I was always kind of an environmental person, but I was never an environmentalist—I was always more of a conservationist to the extent that I thought that you...I was not a preservationist but a conservationist. So, I thought you should be able to use the environment, but use it in a sustainable manner, not preserve it.

RS: Well, that spotted owl issue was huge.

SR: It was huge.

RS: The publicity was enormous.

SR: Right, the publicity was enormous, it was all about timber sales and all that. So, I was in Oregon in law school in Portland at the time and I was working with the U.S. Attorney's Office there while I was in law school and so I got hired by the Justice Department—the wildlife section here—to be on their spotted owl litigation team because I specialized in environmental law, so I was as qualified as I could be to be a forest owl litigator, and I was there for about two weeks on that litigation team and we lost—NMFS lost—a big case on the dams in the Columbia River back in the early '90s. And so I got shifted from the spotted owl team to the NMFS team to do salmon.

RS: So, that was Justice working with NOAA?

SR: Yeah, Justice represents us. So, if we ever get litigated, if we get sued, Justice will be the ones because they have the attorneys.

RS: Oh, okay.

SR: We have some attorneys, but they have the litigators, right. So, they do all the litigations. I get shifted to that, so I started to deal with NMFS cases then mainly because I was on sort of the NMFS docket doing fishing cases. I had all this background in forest law and birds and all that stuff and greenhouse gases and none in fish. That's how I became a fish person, right. So, then I went after I became the Assistant Section Chief and I was basically in charge of the entire NMFS

litigation portfolio. A promotion to be In-House Counsel for NMFS came up, so I took that job, left Justice, came here as the attorney, the Chief Attorney for NMFS—in-house counsel, we didn't litigate, but I was doing that. And then they hired me to be the Deputy when that position came over, and that was about ten years ago.

RS: Deputy...?

SR: The job I'm in now.

RS: Oh, okay. So you moved from—was it like a General Counsel level?

SR: Yes.

RS: To this Deputy Director?

SR: So, I was basically...Right, I was what you could consider is the General Counsel for the Fishery Service, and now I moved up to be the Deputy Director. I think because they couldn't find anybody else to do it, is what I believe. But in any event, they selected me. They wanted me to do it, so I did it.

RS: So you feel like a legal-slash-litigation background is important in this role?

SR: Well, it's not necessarily critical. There are people who have done the job—I had to act inside the agency for about two years, the guy I had acting for me did a fine job, he's an economist. I think Rebecca, before me, was an economist. I don't think you have to have a legal background. Being able to critically think about things logically is very important. Being able to negotiate is important. I think it has helped me because that's been my biggest asset, is to be able to do that, but other people have other skills and you can do what you want. What I rely on is my ability to look at that kind of things logically, and to deal with that, but other people do perfectly fine doing it with other kinds of skill sets.

RS: Well, I'm sure that background is helpful, though.

SR: It is helpful to me.

RS: Yeah...yeah. So, I wanted to ask you about when you came into this position, what was the regulatory focus and has that changed?

SR: So, when I came into the position it was in 2006. At the time, we were about ready to issue the last iteration of the statutory amendment so under the Magnuson Act. Let me talk about the fisheries part of it first. In 2006, we were struggling with ending overfishing.

RS: With what?

SR: With ending overfishing in U.S. fisheries.

RS: Overfishing.

SR: We did a good job about Americanizing the fisheries, but we'd overcapitalized them so there was too much fishing effort. So, we did two things for the first five or six years I was here. We changed the Magnuson Act— we --Congress did it, but we worked with Congress to do it, to put in much more strict requirements about ending overfishing. It was no longer a theoretical target, it was a mandate. And then—so that passed in 2007—then from 2007 to 2011 we actually did it. We imposed regulatory control effort, regulatory control that actually ended overfishing that we knew about. Sometimes it still crops up and happens, but it ended immediately because the fish stock is cyclical so you never can tell. But we ended all planned overfishing. That was a huge change. Now, on the fisheries side, we are—it's much more about tweaking the regulations within that construct and looking for opportunities. On the protected resources side, we had some success stories—we're all about just maintaining survival. So, we were ending what I think to be the sort of the great rush to list all of the marine species that needed to be listed. We were starting to rebuild. So, there was a lot of biological opinions which are the regulatory documents, listings. I think we're transitioning out of that now. We're focusing on recovery, right. I think we've got the base of what we need to do. We've in many areas solidified the species, but now we need to focus on recovery. I spend a lot more of my time now looking at ways to recover species and less time on putting them on the list and just trying to make sure they don't go extinct. The other big part, which we haven't talked about at all again, is habitat. That's my big third area. When I started here, we have a huge program in which we try to preserve habitat either for our fisheries or for our species that depend on it. At the time, the program was very disjointed. We were doing a lot of small-scale things because people wanted—because we had willing partners. In my view, we weren't really achieving what a federal agency could do. You were making living shorelines that may be as big as this room, as opposed to fixing the watershed problem. No one can fix the watershed problem if we can't fix it. We are the only ones that are of a size and scope enough, the federal agencies, to actually work on these big picture things. So, I really think the habitat program has transformed since I've been here from that kind of piecemeal habitat project to actually doing much bigger projects for a much bigger benefit.

RS: So, give me an example of a big project.

SR: Well, there are a couple of big projects. One is to look at the Russian River watershed in California. There are endangered species in it. What we have done there is worked with landowners up and down the river as opposed to these isolated things. To have a coordinated watershed plan to restore the *entire* river system from the delta—from the mouth of it where it goes into the ocean, way up until the biggest impassable barrier. So, that has taken us...we've had to work with NOS, with OAR, with other elements of NOAA. One of the biggest things that we've done there is—because we're not focusing on trying to restore this little piece or this little creek anymore. We're looking big picture. We're able to work with OAR and the Weather Service to predict what's called "atmospheric rivers" coming in. These big troughs of precipitation that come in. If we can predict those, we can talk to the Corps of Engineers about how much water to leave in the reservoir or to release for salmon. They were just being very

conservative and reflexive and the reservoir didn't have much water in it because they had to be able to catch this atmospheric river whenever it occurred. By connecting those two, the Corps can now tailor their flood control to the atmospheric river and we can have extra water for salmon. That one has a lot of on the ground pieces, but there are—but they're all connected in ways which we weren't even thinking of. On the other hand, compare that to what's going on in the Penobscot River in Maine. There, we've got Atlantic salmon, which is one of our critical endangered species—could not get past, I think, four huge dams in the river. We were a significant leader of the coalition that tore all those dams out. So, we took out three—we took out two big dams and put fish passages in two other ones so that now salmon are going to come back to that, and so rather than looking at these little small-scale weirs, which they were looking at, we're looking at the whole river and bringing everything to bear. What that means is that there are other positions in Maine, say, or California which we basically can't get to yet. But we weren't really moving the ball in terms of restoration by looking at these small things. It was only when we looked big, when we brought our abilities as a federal agency to coordinate on the watershed scale that we actually have seen some change.

RS: What would you attribute the change to, moving toward that big vision?

SR: Well, okay. So, I think it's two things which kind of coincided. One was the... it was sort of a negative reaction. Because we were doing all these small-scale things, people were wondering why we were doing habitat at all because we couldn't articulate that. We'd lost the connection between our progress and our mission. We were doing things like building bird sanctuaries—which is all well and good, but it's not the Fisheries Service's job. And so in budget cuts, people threatened to cut it out. But the other thing on the other side is we—one of our past administrators was Eric Schwaab from Maryland.

RS: What was his first name?

SR: Eric Schwaab.

RS: Eric Schwaab.

SR: And his view, before he came here, was that ending overfishing was really the big task of the 1900s, early 2000s, but that the task moving forward is creating habitats for fish production. We've done basically all we can do to the fishermen and still let them fish. If we want more fish in the ocean, we have to improve the habitat. And so he really wanted us to focus on big, broader things for habitat, and this is the kind of program mindset he brought to it. So, those two things happened at about the same time. One is our habitat program came under fire for all these external purposes because we kind of lost our way, and we had a brand-new administrator who thought habitat was one of the most important things we could do. And so, I think that was very transformative.

RS: Have you seen that during your career, where a lot depends on the individual vision of somebody high up?

SR: Oh, absolutely. Yeah. I think it does. It doesn't mean it had to be high up. What I've seen is you're not going to get anything done unless one or more people really believes and wants it to happen. If you can't get somebody who actually can effectuate that change, want it to happen—it won't happen. But I have seen massive change no matter whether you or the Assistant Administrator or the head of NMFS or some biologists who just takes it on their own initiative to try to build a coalition, to design it—you can have change in either direction, but it does take that. Clearly the Assistant Administrator by emphasizing certain things and deemphasizing others can set us on a path, but they're not the only ones. I think I've done that, I think Richard has done that, our Chief Scientist...everybody can do that at every level. If your sphere of influence is smaller...

RS: Well, I wanted to go back to the issue of Congress. So, how do you—do you testify before Congress? --

SR: Oh yes

RS: -- How do you move these regulatory issues to their attention?

SR: I don't testify—well, so Congress does not approve our regulations. Congress sets the scope within which I can work ahead of time. They will be as specific or not, but if they're vague or if they leave the details to us as they almost always do, then we'll do the regulations, we won't have to go to Congress. If Congress doesn't like the direction we're going, they will call and ask us to explain—and they may change the law, but they rarely will not weigh in officially on a regulation. Congress is an important partner. We effectuate Congress's laws. I can advise them ultimately on what the legal policy through the President, but if Congress says go this other direction, that's the direction we're going to go. So, it's important to work with Congress—I spend a lot of my time talking to congress people or their staffs and educating them on various issues. A lot of times what you'll get is somebody who will be concerned and will call their congressman and not call us, so it's important that we talk to them and so that they know. So we spend a lot of time educating them. I've been down to the Hill—I've got like three Hill calls this week so far, and I've got another one tomorrow talking about various things, explaining what we've done, explaining an issue that we may agree is an issue and Congress wants to know about it. Occasionally I will go to testify in front of one of our committees on various things. They will be interested in potential legislation, they will advise to testify...it often is not—when I go to testify, it often has very little to do about whatever they said it was going to be about. So, they'll call us to testify because we're the agency, and they want the agency's opinion, so we'll give the opinion and then they want to go through the litany of whatever problems that they've had with us on any other issue.

RS: That must be hard to prepare for [laughter].

SR: It is a little hard to prepare because it's so open-ended as to what they can ask. They have the right to ask all of that, they're the congress people. What the challenge is we would like to be responsible, so we try very hard to be responsible at the moment, but if you can't, you can't. And sometimes I just have to take—you know, they've got a bigger issue within administration and

I'm just there to take the heat. And that happens a lot.

RS: I see that on C-SPAN all the time [laughter].

SR: Yeah, you see that. Yeah, right.

RS: You've had a lengthy career now, thinking back, talking about Congress—how would you characterize the relationship between Congress and NOAA over time, particularly in terms of interest in marine science, in habitat, environment, endangered species?

SR: Well, I... When I started, it was right at the end of Hollings from South Carolina. He was a huge marine supporter. We still had Inouye, we still had Ted Stevens. We didn't have Magnuson anymore, but so there was... it was really, in my view, the end of an era in terms of some of these big historical people who have really focused a lot on fishing issues or marine or ocean issues. At least for in terms of the fishing issues, there are still—there are a number of Congressional people that pay attention and care about that. It remains to be seen whether they're going to have that same kind of legacy that those folks did. And it comes and goes. Sometimes you see somebody up and coming who will have a legacy, and they won't get reelected. But what you often see is that many of the congressmen, they care about so many different things that you're never going to get—I don't know that you ever did—get one person who said “I am the champion for this.” They are a champion for a lot of things, and their positions are always nuanced. They are for or against different things, and they may not... So, what I see is I don't see today the same kind of singular focus that I saw when I first started. That's not necessarily a bad thing. Maybe that's a sign that we've actually got it kind of right, and they can focus on other things, and that we don't need so much oversight. So, I don't necessarily view it as a bad thing, but we don't see that. Other parts of NOAA I can't really talk about, but I do see that through lessening of that sort of direct, more laser focus on us that we've had in the past. Which hopefully means they think we're doing okay.

RS: I just wondered because of you're having to go to Congress, and you know...

SR: Oh, they're still interested. They're still interested, but they seem to be interested. Right now, so we have—a good example is we usually, or Congress usually, I shouldn't say we usually, Congress usually had reauthorized the fishing statute once every ten years. So, the last one was in 2007, so the next one would be 2017 so they're coming close. There are some bills in there, but in 2007, Senator Stevens and Senator Inouye said—and Representative Young from Alaska—said this is going to happen, and it happened. Now, I'm not sure that Congress is going to do anything. It's not the same sort of emphasis on that. One interpretation—my interpretation is Congress is not nearly as concerned as they have been in the past. They don't feel motivated because there's not that big of a problem that they think they need to step in. There are minor things that they need to do here and there, but the fundamental structure is similar. I think that that's why you haven't seen as much oversight of us. At least, I'm going to keep telling myself that.

RS: [Laughter] Well, I like it.

SR: Yeah, it's good for me.

RS: Let me ask you to talk about, also thinking back on your career, a project or an issue you were involved in that you find particularly memorable or that you're proud of.

SR: So, one of the things that I am most proud of is my work with the North Atlantic right whales. So, this started when I was in the Justice Department. The right whales, they live in the Atlantic and they're called the right whales because they were the "right" whales to kill.

RS: Oh.

SR: They hung out near boats, they weren't scared of boats, and they floated. And so when the whaling industry wanted to kill the whales, they decimated the right whale population.

RS: What period did that occur?

SR: That occurred in the late 1800s, early 1900s. The whaling industry in the United States has largely been banned since the '50s—even before then it was questionable whether it was viable or not. So, there hasn't been any commercial whaling of right whales for a long time, but they still have had a lot of trouble. When I started dealing with right whales in the Justice Department, the best estimate was that there were only 297 of them left...in the world. And they all went up through Massachusetts into Boston. We didn't know where they went after that. But NMFS—and I was at Justice at the time—was saying that the loss of even one was going to jeopardize the population. And so I got involved because we were at that point being sued by a very interesting character named Max Strahan who was, for all I could tell, homeless. He would walk around but he really, absolutely cared about the whales. What he would do is, he would go get people to help him until he wore out his welcome by being verbally abusive and all that kind of stuff—he had some other issues. But he sued a lot, and he won—pro se—a lot. When I got started, he had just got through with an initial victory against the Coast Guard because the Coast Guard had run over some whales in the federal water by operating the boats too fast, and we couldn't afford to lose them. And so he was asking for all this relief from the Coast Guard. That's when I got on the case. So, we basically already lost and we were just trying to design the injunctive relief. We worked with the Coast Guard and the Coast Guard put in a number of very good measures that were designed to minimize their impact on whales so that they had to go slow when they were around the whales, they had to have a monitor and all that. It became an issue for the Coast Guard, and it was a court martial able offense, then, to hit a whale which --

RS: You mean it became an issue for the Coast Guard because it was too onerous for them?

SR: --No, it became a good issue because it became something that they were concerned about, right. So, now the captains—working with the military, once it becomes sort of the military doctrine, they will follow it. They are really good about that because they don't want to be court martialled and all that stuff. So, the Coast Guard really became a really good actor through that, and Strahan never got tired—he kept suing. But basically the Coast Guard had done everything

that it could do. NMFS did a lot of things that it could do to sort of protect the whales. So, I come over here and I still am working with the whales, and the two things that are at issue in the Bush administration, the two things that are hurting the whales are entanglement in fishing gear and getting hit by ships. Not the Coast Guard ships anymore, but other ships. We worked first on a rule with the lobster fishermen about breakaway lines so that they wouldn't entangle the whales, and it was hugely expensive in the State of Maine and I had to go deal with the economists at the White House and with all the Congressional folks about getting this rule in place and it was really traumatic. But we did it, and the number of whale entanglements has declined. And the other aspect was the ship speed rule, and this is a long way of getting to what I'm really proud about the most, which is the ship speed rule where we mandated that in certain areas at certain times, these big huge tankers had to go 10 knots or less because, at that point, if they struck a whale, the whale might live and the whale has a better chance to get out of the way. And it cost hundreds of millions of dollars in terms of delayed arrival dates for the ships. We had to go to the White House and Dick Cheney was adamantly opposed to this rule. We negotiated, we pulled out all the stops—we tried to find every friend we could have in the government to try to convince the White House to let us put this rule in, and in the end of the day we won. So, we beat Dick Cheney and put this rule in place. As of the last census, the whale numbers were—well, maybe the immediately preceding one—the whale numbers were up past 600. So, the whales have largely increased because of these two measures and other things that we've done. There's a lot of things a lot of people take credit for, but I believe—this is one of the things where I've actually said that I worked really hard, I fought the evil empire in terms of Dick Cheney, and we won and we put this thing in place and it was costly—it was not anywhere near as costly as we thought it was going to be, but it really has achieved some benefit in terms of whale recovery. Those whales were going to become extinct and that would have been a huge loss. So, that was difficult and it took years and years and years to get those two things. And we still continue to do whale recovery efforts, but that's what I'm most proud of here.

RS: Well, I would say congratulations. That's...

SR: They're not out of the woods yet.

RS: No, but—

SR: You're not going to reverse decades of whale harvest in a few years.

RS: Oh yeah, yeah I mean going back to what, the 1820s and 30s? I wanted to ask you something else, and that was the new President's task force on illegal, unregulated, or unreported fishing. Where did that come from and how do you see that going?

SR: Where'd it come from is a lot of things. It's a little unclear where it came from. We have been opposed to illegal, unregulated, unreported fishing for a long time internationally. We struggle to try to put in regulations to make practices illegal. We're concerned about that—we're concerned that our fishermen who have to make so many sacrifices to have legal sustainable fishing, they sell their same product on the store shelf against compared to some other one that was illegally caught but now, because it was illegally caught, it's cheaper. So, we've been very

concerned about it and we've done a number of things to try to put it in place. What we saw is a number of factors... the environmental community coming together, seek interest from the State Department and others wanted to really elevate that beyond a NMFS issue to a Presidential issue. And they convinced the President to do it. So, you had the White House and they wanted to do it so they had this task force. The task force was doing the kind of things that we wanted to do all along. For us, much of that—we work really hard to provide all the data and to actually sort of align some of the statements, the positions with reality, that's what we do a lot. People think, isn't this a great idea? We're like well, maybe you should think about this part of it. What came out was something that we thought was doable and really will put in—at least from our part—a unique new system of seafood traceability which will be a great tool for IUU fishing. I think a number of the environmental communities want to attack fraud, as well. Fraud, which is—every year they go to a number of restaurants and say this fish is not what it says it was because they do genetic testing. That's fraud, it's consumer fraud. If 7/11 sells you a Slurpee and it's not a Slurpee, that's fraud. The way that you deal with it—that's not a federal crime, though, likely. It is a state and local crime and the environmentalists would like it to be a federal crime. We have task forces to do these kind of things. I mean, there's other kinds of things, state and local things, the federal government is concerned about at a time. But the difficulty has been separating out the fraud aspects which we really as the Fisheries Service only have a peripheral relationship to, compared to the unsustainable fishing practices which is right within our wheelhouse. So, we're doing these traceability things, we are trying to work with state and local governments about fraud, but that's where the expectation setting comes in. Fraud is—at some point, the federal government can be concerned, but it is a state and local issue. Unless they're doing fraud in Customs, but much of it happens in a restaurant. Right, the restaurant will buy a box of Asian catfish and they'll sell it to you as salmon—probably not salmon, but something like that.

RS: Well, the traceability effort—is that, now that that's started here, is that something that's already been going on in other countries? Didn't you mention the EU?

SR: Europe has had its' traceability requirement for imports for a while...less than a decade, I'm not exactly sure when it came in. The United States gets, in some manner, a free pass in Europe because our system is so good that Europe relies on the United States statement that it is sustainable as opposed to having to trace it. I don't think any other country has that same kind of entryway into Europe. But most of our major fish producers want to go through Europe, and so they already have a traceability system. Almost every major producer—when I was talking with our fishing industry, many of them back when we were thinking about this—they would show me their inventory control system. They keep track of their product, they know where it came from and where it goes. And for U.S. domestic fish—by regulation because some of the other monitoring things we talked about—we know, the government knows. So, traceability for U.S. product is not that big of a deal. We have it, our companies have it, most of these big international players have it. Some of our imports, particularly where they are, at some point, relying on artisanal fishermen, that are going out in canoes and doing things, it gets difficult. Sometimes it's difficult to trace product where it gets intermixed in, like tuna salad, as opposed to a tuna. But it is not nearly as difficult as you might think and it is much more prevalent than you might think. There's actually a bioterrorism act that the Food and Drug Administration administers which says for any food product that is imported in the United States, imported into

the United States or sold in the United States, you have to in some ability be able to trace from the consumer to the farm that the thing was grown in—it applies to fish, it applies to lettuce, apples... So that they can, if there's a health outbreak, they can go back to the farm and look at that. That's a traceability system. It's not as easy as some of the things we're talking about, but they have to be able to trace in some pattern. And so that's been in place for several years. So, it is not nearly as new as people think. It's not as sophisticated as what we're about to impose, it is directed at sustainability, is what we're about to do. But it is achievable, I think. For some of the reasons we just talked about.

RS: Particularly it sounds like it's another piece in the sustainability effort.

SR: Oh, I think it very much will be. There are always talks about how many billions of dollars in illegal trade are coming through, and it is—even within the U.S., it is sometimes difficult to get the fishermen to comply if they know that they're going to get out-competed. They don't mind regulations nearly as much if they're perceived to be fair. If everybody's doing the same thing, that's fine. Fishing's no different than anything else, I think. But if they perceive they are having to pay the price and other people can get away with it, that really undermines the credibility of the system, and so this really helps us with that. It will help us with—we are concerned about global sustainability of fish products. There is so many interconnections that we don't understand. We can't just say, if they overfish the Mediterranean, we're fine, we're not going to worry about it. I think we know now that things are a lot more complicated than that.

RS: Well, I've asked you a lot of questions and we're almost out of time. Is there anything that we haven't touched on that you would like to have included? Or any other...

SR: The one thing we haven't touched on that is another big important piece of mine—I'll try to do it in the few minutes remaining—is aquaculture. So, that is the fourth big office area that I deal with, although it is small because we don't regulate a lot of aquaculture. The dynamic in the United States is that we know from the Food and Drug Administration, Health and Human Services, that we need to eat a certain number of seafood meals a week for our own health. They recently increased that up to two from one. And if you are a pregnant mother or something, it can provide enormous health benefits and all that. So, part of my job is to make sure that there are enough fish for the U.S. populous to eat. The U.S. populous is growing, so the number of fish that we need to eat over the next thirty years is going to increase rapidly. Right now, we import 90% of the seafood that we eat—a lot of that is U.S. product that has gone elsewhere for processing and comes back, so it's not quite as bad as it seems. But we do import a lot, and half of that is aquaculture—more than half is some aquaculture product. That is something that 20 years ago wasn't the case, right. A lot more of it was wild fish. Now, aquaculture can be perfectly healthy and some environmental parameters can be controlled and it can be more sustainable even than wild ocean fishing. It also cannot. It depends on how you do it—it could be very destructive, it can be very unhealthy depending on what you do with it. So, we're very concerned about that, but right now, almost all that aquaculture is foreign. There's very little in the United States. That's an enormous missed opportunity and it's a security concern for us because we need to be able to domestically supply our own people with our own fish that is caught under conditions that we understand. So, we need to both—I think what we're going to

see in the next decade or two, and we're already seeing it, basically, in other countries, is an increase in aquaculture production to be able to feed our own people with marine aquaculture, not necessarily catfish. There's some of that can be done on land, some of that's going to be done in oceans. That is the real growth area that I see us moving into. We've got a few plans, it's really in its' infancy in the United States. We doubled the aquaculture production on the East Coast last year, but we're talking about really small numbers—that's easy to do.

RS: Geographically, where do you see it growing?

SR: Well, it's growing in Chesapeake Bay right now. It's going to go to the Gulf of Mexico because it's shallow, so you have not as many issues. I think Hawaii's very supportive of aquaculture, so you'll see it there. I think you might see it in California. You will never see it in Alaska because they are opposed—it's a state by state kind of regional issue. And it'll depend on different species. We're seeing a lot of shellfish culture everywhere. When you're actually talking about fish, it's a little bit different, that's lagging behind. So, I think that's the big challenge: how do we feed our people? We're not going to be able to increase wild production, people going out on boats in the ocean fishing—that's not going to supply the fish that we or the globe needs. I mean Asia...they eat more fish than we do and their population is growing even bigger than ours, so they're going to take more of the production and go there. So, how are we going to feed our people? We need to invest in aquaculture. What is our role?

RS: That's what I was going to say. What does NOAA do to stimulate that?

SR: Right, so what is our role? We have a couple roles. One is we've gotten away from that industry stimulation. I talked at the very beginning about how we used to have a program that was trying to create an American fishing industry. We don't have that program anymore. Do we need a program to create an American aquaculture industry? We don't have that right now, but we're talking about those kinds of things. What can we do? We probably will not create the same kind of program, but we're trying to invest, we're trying to work on the regulatory structure so that you can actually build these facilities in federal waters. If it's the state waters, we have less of a role there. We're trying to work with other agencies to support aquaculture production with the Corps, particularly you need a Corps permit for almost anything.

RS: Corps of Engineers?

SR: Corps of Engineers. So, we're working with them to try to create a more welcoming environment for aquaculture facilities because we do see it as a need that's going to have to be filled. We're not exactly advocates, because that's not our role to be an advocate. We are a government agency and we have concerns, right. We believe that well-done aquaculture is necessary, but there's plenty of examples historically, less now, but historically of unwell-done aquaculture which has been bad. So, we're an advocate for sustainable aquaculture—not just any aquaculture. We have some science and technology support roles, some tech transfer role that we're doing, we're working on regulatory...but were not marketing U.S. aquaculture. I don't see us doing that.

RS: Okay. Alright, so I need to take a couple pictures. Let me turn this off.