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Bohnsack, James ~ Oral History Interview

Suzana Mic

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

Interview with James Bohnsack by Suzana Mic
Summary Sheet and Transcript

Interviewee
James Bohnsack

Interviewer
Suzana Mic

Date
July 22, 2016

Place
Southeast Fisheries Science Center
Miami, Florida

ID Number
VFF_MI_JB_001

Use Restrictions

Biographical Note
James Bohnsack was born on September 3, 1947 in Flint, Michigan. He began working at the Southeast Fisheries Science Center in 1984 as a research fishery biologist. At the time of this interview in 2016, he was the Division Chief at the Southeast Fisheries Science Center, a position he has held since 2004.

Scope and Content Note
Interview contains discussion of: Southeast Fishery Science Center, reef fish, artificial reefs, marine reserves, conducting census in the field, underwater observation, effects of Magnuson Stevens Act, aesthetic fisheries, ecosystem based fishery management, diving, technology changes, spawning aggregates, island biogeographic theory, Everglades, administrative responsibilities at Fisheries Science Centers, effect of technology on fisheries science, challenges facing Fisheries Science Centers, differences between Fisheries Science Centers, adapted management, coral reefs, bureaucratic challenges in scientific research

James Bohnsack's interview is a detailed description of the work he has done at the Southeast Fisheries Science center, particularly with regards to his work on coral reefs, reef fish, and other fisheries work in South Florida. He also describes the benefits and challenges as a scientist working with fishermen, and working for the federal government.

Indexed Names
Leopold, Aldo

Transcript –JB_001

James Bohnsack: This is my...

Suzana Mic: Another paper?

JB: Here's my new, this is my, one, that's truly, social science, how in the social, how the Florida Keys Sanctuary got established and some of the lessons learned, what worked and didn't work, you know. So you might --

SM: That's great.

JB: --find that interesting. That is my one sociological contribution.

SM: I'm looking forward to reading both of them.

JB: Yeah, so you might find them...

SM: It's always exciting--

JB: Yeah.

SM: --to see other perspectives from outside the discipline.

JB: Well having been through it, you know, having watched the process, what to do and not to do, and it's, as my colleague in New Zealand would say, it's too bad you're a republic. Because in New Zealand they want to do a reserve and they go in front of the Fishery Minister and one side says why they want it and the other side says why they don't want it and he makes a decision and it's done. So here, it takes at least a year, you've got to go through public comment. That's why, too bad you're a republic, he said, you know. You have to do all this stuff so it takes at least, over a year to do anything, you know. And it's just, you know, one of the burdens you bear; of course one of the things, you know, it's very expensive to do that all that, you know, and time consuming and so. It's not necessarily works fast. But anyway, I think you'd find that interesting.

SM: I will, I'm looking forward...

JB: Yeah, yeah...

SM: So let me...

JB: ... from a marine biologist's point of view. From a biologist's anyway.

SM: Let me, um, let me begin this interview, this um...

JB: Sure.

SM: The tape started rolling. So this interview is being conducted as part of the Voices from the Science Centers Project...

JB: Okay.

SM: ...funded by the Northeast Fisheries Science Center. It is also part of the Voices from the Fisheries Project that is supported by the National Marine Fisheries Science Office of Science and Technology. My name is Suzana Mic, I am speaking today with James Bohnsack, am I saying that correctly?

JB: Yes, I go by Jim, Jim Bohnsack, or James, is my...

SM: James.

JB: Well, that's my given name, yeah.

SM: Okay.

JB: Yeah.

SM: And the time is, time is 2:10.

JB: 2:10. Yeah.

SM: 2:10pm. And we're here at Jim's office at the Southeast Fisheries Science Center

JB: ... Fisheries Science Center, yes.

SM: I would like to let you know that, before we begin, that you can, you can stop me at any time, if you find that one of my questions is uncomfortable, you don't want to answer, feel free to tell me that --

JB: Okay.

SM: -- and we'll stop. Or if you want to take a break, the same, so, please do let me know.

JB: Okay.

SM: So I'll ask you also an optional question, what is your date of birth and place of birth?

JB: I was born in Flint, Michigan in 1947, September 3rd.

SM: Can you tell me what lab you worked for NOAA and in what positions throughout your career?

JB: Well, it's harder with, while I was a post-doc with NOAA I was the first SMAS [School of Marine & Atmospheric Science] post-doc at the University of Miami, that was around 1980, I believe, somewhere in there. I worked on research with, you know, as a NOAA, and I worked here as a contractor in 1983. They offered me a job but they couldn't do it, so I actually officially started a job in 1984 as a research fishery biologist. I had a Ph.D. at that point, and had, you know, about three or four years at the University of Miami on their faculty before I came over here. And so I started out as, to, since hired, to start a reef fish program they were trying to get going and I was kind of pre-adapted because that's what I did

for my dissertation research, so. And I worked there. About ten years ago, in 2004 I applied… so anyway I ran the reef fish program, we had seven, five people and for many years doing that. In 2004, I applied for the Division Chief, so it was a more administrative position and I took that for several reasons. I liked my research, but I just thought that instead of working for people under benign neglect I would call it, they were interested in other things. I decided that instead of someone else making all the stupid decisions, I get to make the stupid decisions. So anyway, so I took that on. I was a Navy officer; I was in Vietnam and so being in the military I ran divisions there so I understood the administrative, and the problems of being an administrator. And one of the problems we had is a lot of the scientists become administrators because it pays a little bit more and they're trying to get their kids through college or whatever their reasons are, but you can't do both, you know, very well. You know, you're going to be primarily an administrator and you've got to accept that. If you do a little science on the side that's great, but you know, you want a scientist to be able to make some of the decisions and influence science so my job is to make my employees able to do their work, you know, facilitate their activities. It's not all about me anymore. So, that's why I took the job. So I've been there for about ten years, well, twelve, it's 2016, so.

SM: I see.

JB: Yeah.

SM: So how many years in total have you worked for the Fisheries Science right now?

JB: I'm at 35 years.

SM: 35.

JB: Going on 36, and I had three years in the military before that.

SM: Nice. Can you tell me again, at the, at here, at the Southeast Fisheries Center you've been for how many years?

JB: Well, I was a research fisheries scientist and now I'm a supervisory research fisheries scientist.

SM: Okay, so this is your whole career--

JB: Yeah...

SM: --basically here.

JB:... Yeah it's been here except that I was at the University of Miami for four years as a post-doc and I was on their--

SM:...Okay.

JB:--on their faculty as a, you know, um, assistant professor.

SM: Can you tell me when and how you decided to begin a career in fisheries science?

JB: Well, that's a little trickier. I started out in the fifth grade wanting to be a scientist. In those days I was interested in dinosaurs. And over time, you know, I spent a lot of time in the summers here. I moved out here from Michigan when I was a kid, my father passed away so we moved down here when I was in the ninth grade. And I was exposed to a lot of the marine environment because my grandfather had a cottage and I'd go down fishing with him every weekend and so I started diving. I worked summers in the Florida Keys at, called Sea Camp, and actually I became the Science Director there but I was a biologist. I did all of the stuff there; I was a counselor. So I had so much experience in the marine environment, I just wanted to do something in ecology and realized there's very limited jobs in paleontology so I got more interested in the marine stuff. And so I started a dissertation looking at canal wall [unintelligible], and then for Ph.D. I realized that my knowledge of reef fishes and stuff was fairly extensive so I had an advantage over most students and I ended up testing some ecological theory called Island Biogeographic Theory using reef fishes and I knew enough about the environment that I had a good test that I could do. So that kind of got me in, my foot in the door as an ecologist working in fisheries and fishes.

SM: Thank you. Could you talk about some of the most defining times in fisheries science and management since you started working here at the Southeast Center?

JB: Defining for me, or for the...

SM: For the, for the fisheries science.

JB: Okay. Well, one of them, one of them is for me and us…well, my career. I started working on artificial reefs and that was a very defining moment when I realized, again I'd done my dissertation work using artificial reefs, that defining the problem of artificial reef is are they just attracting fish, like easier to catch, or are they actually producing new fish? And their use as a tool depended on answering that question. And I kind of concluded, eventually, with data, that most artificial reefs were not producing new fish, they're just another fishing technique. And that's pretty defining. It turned out that paper I published, I've published two papers on artificial reefs, on the fifty year anniversary of the board of marine science, those were two of the top ten most cited papers, out of, um, over fifty or sixty year period, so that was, you know, so. That was a defining moment for me on fisheries. For the agency, it kind of changed the whole question and thinking and, that still goes on, they call it the Traction Production Question.

But a bigger one was about 1989 I was involved with the South Atlantic Fishery Council to look at reef fish problems, fishing and overfishing, and try to come up with some potential solutions and going through all the issues and reef fish tend to be very vulnerable to overfishing. And the only real solution that made any sense, because everything was going to fail because they could just, you know, they'd just catch them anyway, no matter what you did and even if you brought them up and let them go they died because you brought them up from a depth and they were dead. So the only thing was to have areas that had no fishing at all. And this was just totally, in fact I suggested this and everybody just laughed. You know, the scientists laughed, "right, we're really going to do that." And I said, "well that's the only thing that makes sense, to have areas with no fishing." Because then you'll have some that can spawn and get big and grow old and still maintain the fishery. But if you open it up to any kind of fishing, you're going to decimate them. So that was pretty defining and kind of started the whole idea of marine reserves for fishery purposes. It wasn't a new idea, they'd started earlier but it was mainly to protect special areas or habitats for diving or something.

But this was the idea that we could actually do this to help fisheries. So that was a pretty good, and I spent the next twenty years from about 1990, I did a review of the literature and provided the scientific rationale for doing this. And then spent the next twenty years going out and testing it in the field; does this work? Helping establish them, what kind of area, you know, what are the rules, how should you do this? And then obviously as a scientist, these are, predict what would happen and do they happen? And we actually showed that yes, they do, that the predictions that fish get bigger and older and more, fishing was a major problem. People kind of thought, well fishing is not a problem. But until you actually stop fishing you really can't tell. So that was a pretty important moment for me.

And the other thing, well, third thing, I'd say, that was really important is we actually developed techniques to be able to census how many fish were out there, reef fish, without killing them. Because more, up to that time, fisheries was always dependent on what people catch and areas, you couldn't fish anymore because they were protected, and but you needed to know what was happening. And we also weren't just concerned about, you know, the major fish that were being caught, we wanted to know about the whole ecosystem; how the fish interacted. And we realized that's an ecosystem, it's not just an individual fishery. So we actually developed techniques with colleagues at the University of Miami and many other places contributed to this, but we developed areas where we'd put divers and would actually come up with the whole population estimate from in water observation which is a breakthrough. We'd get their size, we'd do stock assessments from this, you know, so it, it was, that was probably the third leg of some of my major contributions is on censusing in the field. It's very difficult because reef fish, reefs are very complicated. About a third or, let's see, at least twenty percent of all fishes are coral reef fishes in the world, out of 25,000 species, probably four or five around the world. There's huge diversity; we routinely, you know, each year we get about 250 species of reef fish, and there's only about five or six that are important commercially. A lot more important recreationally and some are just incidental. But so, that was a very important part of my career. I think ...

SM: How was, how was stock assessment done before, before what you mentioned?

JB: Well, basically it depended on getting data from the fishery, what fishermen catch, what their sizes are. It's catch and effort, how much time they spend fishing, what do they catch, where do they catch it. It's always difficult because it's hard to confirm that; the fishermen don't always want to tell you everything, you know. There's a rule, that all fishermen, yeah, yeah, lie or something. Even as a kid, I learned never tell anybody what you catch or how you catch it. You know, or, if it's a good day you just say, ah, you know, you never told people how well the fishing.

SM: Why do you think that?.

JB: Well, everybody's trying to protect their, they don't want everybody to know, you know, it's very competitive. Fishing's always competitive. And so, that's just kind of, the attitude you have, and it's business, people's business. They find you're successful, people start following you around trying to go to your sites and stuff. So there's very good reasons for that. There's always worry that by fishermen, that you'll put restrictions on them. They may be necessary. Someone says the fishermen are like the accelerator on your car, you know, it makes it go, and the idea with fishery management, the management means you're the brake. You have to, yeah you need both to run a car, but who's driving the car is another question.

But still, you know, so we're kind of the brake. So getting information, they figure, this can't help me, it can only hurt me. And so they're very reluctant to share.

So, that's why the fishery independent was nice. We don't have to depend on them We can actually go in the water and see what's there and we see the same thing they're catching, so the big size is the biggest size they're catching too, and so we know what's happening. And we also can see fish they don't catch, like the juveniles, the babies, you know, they bring in the adults, they catch, and when they catch them, but we can actually see how many babies are there and we can see what's going to happen two or three years from now when they enter the fishery as fish species. Also, more areas are being closed seasonally, size limits were getting bigger, bag limits smaller so it's harder and harder to get data from the fisheries, so. And the trouble with reef fish, there are so many species that a lot of the fishermen can't tell them apart so when they report their landings they just say "grouper." In fact I was told when was first hired there was only three fish to worry about; there's snapper, there's grouper, and dicky fish, which is a bird term, dicky bird, means "fish we aren't interested in eating." So, everything else is, but that's important ecologically, that's fish food, you know. Those are the habitat that our fishery-dependent species, we depend on, that's what provides food for them and part of their habitat, so um, so, our view as ecologists, my background is in evolutionary ecology, is to look at the whole ecosystem, how these things work. So it's habitat, it's interrelationships and looking at the whole, all the species. So our view is, if we can see it, we'll count it. Not just what we catch, not just what we eat, not just what we can sell, just not what's pretty. And so that's kind of the view we went in as an ecologist, trying to understand how the system works and our role in that system. But the ultimate theory that we apply that to maximize or to our sustainability over the long-term, and also protect those systems. If we don't have those systems healthy then we don’t have fisheries, so. That's kind of the, the problems we're facing now, loss of coral reef habitat, for example, we're concerned about the future.

SM: Um, can you speak a little bit about the 1976 Magnuson Act?

JB: Sure.

SM: Um, what is your experience with, with, what impact it had on both the science and the management of fisheries?

JB: Well, that’s a good question. And it had a very big impact right off because essentially what it did, it transferred what our offshore fisheries, you know, it declared 200 miles under our jurisdiction. It eliminated foreign fleets from fishing in these waters so we actually transferred what used to be, say, countries coming into the waters from Spain or Portugal or Japan and making it, American fisheries took that over, so. That was one of the immediate effects. It also established regional management councils that tried to look at the regional characteristics and divide regulations tailored to those regional areas. One of the problems we've had with it is there's certain restrictions that are kind of troubling or hard for us to deal with. One of them is all fishery data from commercial fisheries are confidential; we can't release it. And we can only report it if we combine it with three different fishermen, you know, so confidentiality is an issue sometimes. It's done for very good reason, it’s to protect, that's their business so they don’t want people, you know, learning their secrets and how well they do because then they'll have more competition and open access. And so there's good there but sometimes having that information would be helpful to do a better job of managing.

So the other issues we have is the councils tend to be fishermen, on them, so it's kind of unbalanced. It's usually balanced between recreational angler and commercial fisheries. In the Southeast, you've got to realize, half of all recreational fishing trips in the U.S., about half come from the Southeast U.S., so it's huge here. It's bigger, than a lot of the fisheries, than commercial fisheries. Everybody thinks the other way around, but here it's not. So that's an issue.

So it's mainly they do allocation, that's not a science question, usually, who gets to catch them. Not, you know, so, you know, some of the ecological and habitat things get lost in there; it's just dividing up the catch. They tend to always look at the user demand, so they tend to take the maximum amount the fishermen want and the fishermen tend to make the advise process and make decisions. Now there's some legal protections in there, they can't, and each of the habitat of the Magnuson Act the revisions have added more protection. Now you can't overfish, we have, call it annual catch limits, for example. You can't allow the fishery to go extinct. Habitat became important, realized that yes, fish depend on habitat. As I say you take the fish out the habitat but you can't take the habitat out of the fish, so there's more interest in what is essential fish habitat. So we can do a better job of understanding and protecting that.

So there's not a whole lot of speaking for the conservation except there are, there's a floor, they can't overfish, but, so the process there is kind of unbalanced in the sense that there's no real conservation seats protecting for the ecosystem or for other uses besides fish. One of the issues in the Southeast, for example, we have, right here in south Florida, our reef fish are worth about $6 billion. Half of that is fisheries, both recreational, commercial, the other half of the value is from tourist diving, recreational diving. That's an equal value, and actually a little bit more than the fishing, I think. Each take about the same number of trips, there's a little bit more fishing trips than recreational trips, but it's even, but there's no allocation for aesthetic fisheries, we call it. Aesthetic fisheries are people just want to see the fish. You know, you go to the Miami Sea Aquarium or something and see the fish, but people go diving, they spend a lot of money and they want to see a large fish, they want to see a Goliath grouper, for example, or a barracuda. They want to see big snapper. They want to see healthy reefs, coral reefs, and so there's kind of an imbalance there. We still divide up the fishery as, like, fish sandwich, who gets to catch and eat them, but it's, they're still have trouble dealing with what we call ecosystem approach where part of the ecosystems are people and they have perfectly valid uses of recreational angling, you know, besides angling, recreational diving and things. So these are some issues we're facing.

Now trying to provide the data and information, both the economic and the social data, but also the ecosystem data. So the definition of overfishing is always been single-species basis, and one of the problems is, we call it ecosystems approach, so it may not be, a fishery may not be overfished in a single-species sense, we can still fish it, for a long periods of time, sustainably, but it may be at a very low productivity, but also it may not be ecologically sustainable. So the, some fish have critical roles and if you take them out, you know, like all the top predators, the whole fishery may fall apart, the ecosystem may fall apart because you've overfished. So that's one of the things that's not concerned. One of the problems I have, I deal with marine mammals and turtles, for example. In the Gulf of Mexico, we have twenty-one species of marine mammals…about fifty-one stocks, if you will. All of them eat fish. Fifty, let's see, twenty of those species are toothed whales, they eat squid or fish, and the one that's a baleen whale, we have one resident red baleen whale in the Gulf of Mexico, but it also eats fish, it doesn't just eat plankton. It eats small fish in schools. And so you can

not overfish the fishery from a human point or stock, but it may be overfished for those mammals who can't find enough food. Because like fishermen, they want high concentrations of fish. You know, if we just bring it down to average, they can starve because they don't have enough concentrated for them to survive. We know very little about that. We don't, you know.

The ecosystem point of view is looking at long-term productivity changes, so if we see that productivity is increased here or decreasing we should adjust our catch accordingly. That's not always considered, you know, when we have a red tide, it kills a lot of fish, you know, how do we put that in our models? We can adjust, we may not be able to fish as much as we used to. Now with global warming, coral reef decline and things, and theory in fisheries, if you have overfishing, the solution is you cut back on your fishing mortality, your fishing effort. Or you, if you have any other impact that affects productivity do the same, the answer's the same, you still have to cut back fishery fishing mortality. And that's hard to do sometimes, because they don't consider all of these.

Other examples of the problem is that, you know, say a menhaden fishery or something that's 1.1 billion pounds a year, over a billion pounds a year are being landed as the fish food, base of the food web. So the question is how much of that would turn into king mackerel or red snapper, which have high value, for a seven cents a pound fish? And so that's not considered in the models. They say "oh, we're, we're not overfishing menhaden", but we may be overfishing it because we have much lower yields in other fisheries. So the interaction between fisheries is not always considered. And that's something that we're facing now, trying to do a better job of using ecosystem approach. So the key thing in fisheries is sustainability over long periods of time. We should be able to fish forever at whatever your mortality rate is, forever, in theory. The maximum state of fisheries is no longer considered. We have to fish less than maximum because eventually you'll fall off the cliff if you keep fishing maximum eventually you'll overfish and you'll go on the wrong side of the curve and things won't be good, so, sustainability.

So one of the issues here, essentially fishery management does four things. The idea, they get who gets to catch the fish, they allocate, so recreational, how much is commercial. That's not usually a scientific issue that's a social issue, social economic issue, decide that. It can be if you catch all the females or something, that'd be a problem, but normally not biological. They tell you what kind of gear you get to fish with; you can't use dynamite or [unintelligible] or certain hooks or things they try to balance that. They try to figure out how many fish can be safely removed from the population and be sustainable, so they figure out how much, the quota, or they try to set bag and size limits for fishermen. And in recreational they don't control effort; they usually want as many people as possible, partly because they pay license fees and things, so they don't want to control effort so they try to use a bag and size limits. So those are the things they do. T

hey don't look at the ecosystem say, in one case we have with corals is that some of the predators that we're removing also eat coral predators. So things like snail kill coral, damsel fish kill coral, hermi sea worms kill coral, and what eats those things? Things like hog fish, some of the larger grouper, and they're gone, and so in these areas are overfished. So those, those issues are coming to a head with us in terms of trying to balance our need to take fish with long-term sustainability. So that's our challenge now, and that's kind of the, we're right at the cusp of that. We know how to do single-species stock assessments and that we will always, they'll always do that, that's not going to change. We don't know how to make these

decisions or advise these decisions. And I should point out, as an agency, we provide the science. We don't make decisions, we just provide science to managers, they actually decide those things. But we try to give them the best information we can so we're trying to do that. And just, in simple terms fishery management does two things. It either changes the size of the fishery catch by minimum size limits, the idea is to allow enough to survive to breed, reproduce, or we change the total quantity caught and our mortality, and usually we measure that mortality, and often it's by how many people get to participate so we have quotas, we have license restrictions. You only have a certain number of commercial licenses for various fisheries. And the recreational is kind of a problem because we don't do that. We've never controlled the number and that's one of the problems we're facing now, is that the power is so intense, there's so many people out there, that it is a major problem and most recreational fishermen don't feel they're a problem, they're just taking one or two fish, but there's…they don't realize there's 10 million other people doing the same thing and that adds up. So, those are some of the, you know, challenges we have.

SM: What do you think would need to happen so that this ecosystem approach really is integrated within the councils to, or becomes more, more part of their decision-making processes?

JB: That's a good question. Part of it we need to improve our science and we need to do our models and we need to show, you know, make predictions and show they work. I envy the hurricane center; we're a science center for fisheries, fishery science center. We have the hurricane center across the street and we'd know in five days whether they're right or wrong. They say here's the projection, this is where it's going to go, and we know if they're right or wrong. In our case, we're talking thirty years to rebuild red snapper, for example, so in that thirty years a lot of things can happen so we don't get the instant feedback so the public doesn't necessarily have good confidence in our models. And sometime we don't have good confidence ourselves, we don't have enough data, you know, they are data intensive, we've got to spend the money and the effort and that's why the fishery independent sampling is so important. We now have methods we can do that and tell you how many yellow tail snapper that are of legal size in the Florida Keys reef system, for example. So those are one of the issues.

The other is we're kind of stuck with our heritage in the sense that they have single species plans, you know, so they have the menhaden plan, the red snapper plan, you know, king mackerel plan. There is no ecosystem plan. Habitat, we don't have a lot of control of or advisory to say, projects, recent stuff with dredging, for example. The Army Corps of Engineers has the ultimate authority and we advise them, but it's hard sometimes to get the habitat fully integrated into those decisions. So we need to improve our habitat information.

We need to make our models more predictive and we also need to have an ability to look beyond a single species plan. We need to look at the implications for other fisheries, climate change, things that are happening to the fishery and interactions between fisheries and species. You know, catching all the lobster, lobster being more valuable than something else, and by catching too many of one thing, we may hurt something else. And that's where we're, we need to do that, so there's a big challenge. We, you know, um, and we're slowly making steps in that direction, but it's a cultural, it's hard to change. Like we have, um, I use the example, we have a twelve month calendar. And you know, some months have twenty-eight days, some have thirty-one, some have thirty. There was a solution that we should have thirteen months, all, all, you know, twelve of the months would be thirty days each, so you

know every Tuesday would be this date, you know, every Thursday, the third week, would be the twenty seventh would be on a Thursday. There would be one extra day, 365, right, so. You'd have one day you called "Sunday" or something, they were going to have another month, at the end of the month between June and July called, um, "Sol," for "sun," you know, middle of the summer. And you'd have one day for a holiday, a national holiday, international holiday, something, and that would make a lot more sense for a lot of people but we're stuck with this. It's kind of hard to change those sorts of things, like your calendars, you know, so that's the calendar. There's other calendars, you know, the Hebrews have a calendar, and the Aztecs had a calendar, and the, and so.

So it makes sense if you can do it, but it's hard to change because you're stuck with the system unless it makes a major overhaul, a Magnuson revision which could happen, they've added in endangered species, actually I use Aldo Leopold as my model. He kind of went in, it starts out as a commercial fishery, then it turns into recreational fishery then it turns into an aesthetic fishery, in his case catch and release like trout. There's fisheries that are totally catch and release now. But then he also said we've got to worry about endangered species. We have not only the Magnuson Act, we have the Marine Mammal Protection Act, sea turtle, you know, sea turtle protection, Endangered Species, ESA, Act, so we also, because it's rare we need to protect those, that's kind of added in. So we have ability to do that. Habitat's important. If we don't have the habitat, we don't have the fish so they've added that in there, so we're slowly looking at the other things and the other fish are important too, just, if only because they're fish food. If you don't have the fish to support your fishery then you have a problem, so.

Those are kinds of the steps we're going, we slowly, at least my view, I see us making those steps, moving in that direction. And one of the key ones, is from a scientist's point of view, generally we have no controls. You know, the most important tool in science is having a control and that's a treatment where you don't manipulate so when you do fisheries they just say, well we're going to make the bag limit bigger or catch limits smaller, you know, I mean, you can take home, or the size limit bigger, catch number smaller, and declare victory. But we don't have, did that really work? How do you know? So a control, one of the controls in the ecosystem perspective is a marine reserve, an area we don't fish. And the, we kind of reverse the burden of proof. It's not proving that we're sustainable, it's proving that, or not sustainable, you have to prove that the fishery is sustainable. I blew that one. I didn't explain that well. So, the question is not whether marine reserves work, do fish increase, does it support fisheries, that's, you know, that's one question. It is how many fish can we remove from everything else and still maintain healthy ecosystems? That's the key question. And a reserve is our measure to tell us how well we're doing and we know in the Keys, for example, where you close small areas, some of the populations increased twenty seven folds, like black, black grouper. Twenty seven times what they were before. Grey snapper went up tenfold. One of the most important fisheries down there is yellow tail snapper, it went up fourfold, so 400 times the population in protected areas. So that tells us that we were probably overfishing, and it also tells us that it's not water quality. Fishermen always say something else is a problem, not us. It's pollution, it's water quality, it's something else. That tells us we didn't do anything except change how many fish catch. That total is a big change. So that's like our control. That's one, you know, we use tells us how well we're doing elsewhere. And that's the real value of it, is one of the values. So. Does that help?

SM: Yes, thank you.

JB: Yeah...

SM: That does clarify it a lot.

JB: I'll give you one other explanation. So fisheries tends to focus on yield now. They tend to over do it. The idea of an ecosystem point of view is that we're focusing on the persistence and the productivity of the ecosystem, okay? If we do that, then we have fishing, we have recreation, we have diving, we have tourism, we have all the other things that go with it, that's maintained by that. So it's a different focus. Often in traditional fishery, I call, it's like we fix it when it's broken. And you may be sued if you don't prove it's broken, you know, I mean that's kind of silly, but like, my daughter with her car, I mean, we design cars to have two headlights in case one breaks, two taillights in case one breaks, an emergency brake, right? So we have a little built in, you know, protection, but if the battery fails, you've got to pull over, usually it's not life threatening, but I get a call, well, the windshield wipers not working, or the battery's not working, and then we have to fix it. Ecosystem point of view is more like airplane maintenance. You know, you don't fly unless everything's working. And my, my father was a pilot so I got this, they've got three computers that tell them where they're at, you know. Hopefully, two of them will be right. One time two were wrong, he had to figure that out, he had to use the sexton. You have a port and starboard hydraulics system so if one fails you can use the other one, you have duals, backups, if the air conditioning doesn't work, you know, for, you know, the passengers, you don't fly. So, any of the electrical, mechanical, physical, you know, how many bolts can you take out of the wing and still fly with that? If a bolt pops out, you know, how many do you want of those?

SM: Zero. [laughter]

JB: So we, yeah, so those were very carefully doing that, figuring this all out. So that's kind of what the ecosystem view is. We don't want wings to fall off airplanes when we're flying, especially. It's also embarrassing if the engine quits, right? We don't want that to happen. So that's, that's why, you know, that's the different thinking. We make sure all the systems are functioning and that what we're doing is to the capability of the system. You know, how much weight we carry, you know. We won't go exceed the design of the system. Unfortunately we don't have blueprints of our ecosystem. We know very little about it and that's where we're trying to do is develop those blueprints and understanding what we can and can't do and what the consequences are of our actions. So.

SM: Can you tell me a little bit about the emergence of new technologies and how that impacted your work, like modeling and, I don't know what other--

JB: Well certainly computers--

SM: --research technologies.

JB: .--yeah computers, for sure, I mean, we can do now things we couldn't, would take us weeks, even graphing, it would take, you know, hours to do a graph by hand, figuring out the size, now you just stick it in the computer and it automatically adjusts things, so we got more tools. And they can be distracting too so people do things because they can do it but not really understand what they're doing, so yeah, I think the fifteen different graphs but never really had a hypothesis to begin with, so. So they're wasting time. You still have to do the thinking, so it's a tool, like any tool, it can be misused. Our fisheries are a good example. It's

a tool, it can do good things it can do bad things. A hammer can do good things, it can do bad things. So, um, you have to understand that. So it's good in a way but there's a lot of people that use the tool and don't really understand what it means, because they produce a, you know, stick it in a program and get a result. So, generally, you know, certainly it's increased our capability but it's still human limited. It's not just, the computer's not going to do everything for us. So those are one.

Certainly the technology under water is fantastic for us, the better maps. Why we do things we could not do without maps, we use lidar, we use various satellite things to do, that map the habitat better. Our resolution now is hugely better which is great. They used to be quite a cumbersome to take pictures underwater. Now we have GoPros, we can just leave them out and take video and pictures. Ah, one of the big ones for me is stereoscopic photography because our, there's another one where you can actually focus in and out so we can measure the size of the fish. We can count fish in photos. We see more than we ever catch, but we need to know their size to do a stock assessment, so by having stereo, so divers wear like a stereo camera, our eyes are, you know, seventy-two millimeters apart, so we can judge size because we have two things to compare. And that's what the camera does. So being able to do that is a big, big accomplishment.

Acoustics, we use multi-beam surveys to measure habitat, for example, is one thing, we can tell the relief of the habitat but also we can actually measure biomass of fish. Our acoustic listening devices, understanding spawning aggregations, we can actually listen for spawning. Each fish has its own sounds. We can actually bounce sound off fish by the size in their bladder, we can actually figure out what they are. And even with some of the acoustic things, we can actually see the image of the fish, not necessarily, we know it's a shark and not, you know, salmon. They actually count salmon going through areas where you can't see at all, but the acoustic signature goes through the water and can picture the, the shape of a fish coming in, so they can actually count things, so.

Technology has been very important. The gliders now, there's just been one they ran thousands of miles looking for illegal fishing. It just goes under the water and they have a program and it's up in Hawaii, you know, after, you know, months of, um, operating on its' own. And so there's, technology has been really important in that sense. And it's also been a problem. Email, I think, is probably one of our bigger problems. Because before, we have a lot more administrative issues, mainly because they can make us do things now they couldn't us do, yeah, you know, every once in awhile you had to do something because you got a letter in the mail that said you had to do it, yeah. Now we can, you know, now anybody can contact you at any time and ask you to do something. And that's probably one of our more, we haven't dealt with the human dimension, so. It seems like every week we have a new change of a policy here, a policy there, and the question you have to, is it really necessary? Did that really need to be done? But somebody can do it, it's important to somebody, so a lot of our time seems to be diverted from science and doing our science to doing administrative stuff, I think, is more of our big challenges.

SM: Can you, um, give me an example of one of these cumbersome requests, or?

JB: Well,

SM: Changes or policies?

JB: Yeah, well, right now we're trying to do travel and all that. They want to know how many people. If you go to a meeting you have to have approval for more than ten people, they changed it to more than eight people, and then who do you report to? I mean, it's just constantly changing, and you spend a lot of time trying to figure out who, what, because they're just changing things, and there's no parent there saying, you know, this is good or, there's nobody there. Someone decides to do it, and there's nobody really in a position to say well, this is not necessary, let's not do this. It's not a good example but it's an example. And there's so many of them, most of them are not long but they're time consuming.

Another issue that's related is legality. We used to be able to take people out really easily. I used to go out, two people would go out on a boat on a good day. We would be careful. We never had anybody hurt but, so we have two divers, they go diving, they collect their data. So that's two scientists. Now you have to have somebody be a rescue diver on board so there's a third person, now you have to have a boat operator also, and they have to be trained on that boat. In my view, if you're in the boat, every person in the boat needs to know how to operate the boat, at least, you know, getting it going and bringing it to the dock or something. But they can't do it unless they're certified and they have to go through a class. I have divers now that have been diving for many years with other agencies and they have to do two weeks of our training. It's expensive, you've got to send them to Seattle and they go through two weeks of things they've done forever and they have to learn, obviously, the NOAA approach, but those things just drain on our resources. So, now instead of having two people out doing science out there, I have two people doing science and two people going on a boat ride. And that costs me money. And we used to take students and, it's just harder to have volunteers now, for example, it's all liability issues, getting a volunteer because what happens if they stumble or get hurt, or get eaten by a shark or something. So those are burdens that we're having that makes it more expensive and harder for us to do our work.

SM: What, when was the time when you noticed this changed in, change in becoming, you know, legalities, all these legalities questions becoming much more important and much more pertinent to your daily work?

JB: Last decade.

SM: Last decade.

JB: It's really grown, yeah.

SM: What, why, what do you think generated that?

JB: It's hard for me to, it's happened partly with technology we can do it now. And it's partly there's more emphasis on accountability. We're using government resources, taxpayer dollars, there's more looking for, you know, things that don't need to be done. The liability things, lawyers run our agency and they tend to have the last word. You know, if I get called to go to court, to provide stuff, everything stops. I have to go do that, you know, so. There, those are issues. It's just, you know, this is my personal opinion, these things have become more cumbersome. I know people who retired because of it. You know, it's just, it's just, when you first started this was fun and exciting, and now it's less fun. Doing this, excitement is still there, but it's just harder to sometimes, to get through some of the hurdles being put up. And often people make decisions, the hardest part here is the tyranny of 10,000 cuts, I guess, that get, you know. Someone does something because it makes their life easier so they

want you to report this so they can do their report. Yeah, but you know, my time is ten minutes, but there's thousands of people out there doing ten minutes. Now, is that really worth, you know, somebody's time to do this? And unfortunately there's so many of them; they're all a little here and a little there but then trying to figure it out. Each time they do it I can't remember the policy, the policies used to stay in place for decades, you know, the same thing. And every ten years you'd get a revision to the policy, you were going to change this or that, and that was fine. But now it's like, it seems like weekly something changes. And again, you just wonder, who thought this through? And they didn't really think of the consequences of, it makes, if everything works right and you're totally versed in the, say the program, it's fine but you've got to train a lot of people to do that and people are people, they'll make mistakes, you know, so those are... I think our technology, we have not controlled that well. It can be a tool, but in some cases it can be a handicap, that's what I was saying. It can be counterproductive and may not be worth doing, and no one's really evaluating, okay if we do this what are the pros and cons, you know. Get a new software update, if someone didn't realize, our programs don't fit that so we can't do our programs anymore, that sort of thing, so. Those are some of the issues we face because we're coming more and more dependent on that technology and so that if we can't do our job, it's difficult.

SM: Can you talk to me, tell me a little bit about more of the office working atmosphere here at the Southeast Center?

JB: Sure.

SM: Maybe, what did you notice an evolution, a certain evolution or certain pattern since you worked here, since you've been here for more than three decades?

JB: Sure, yeah that's yeah. It's scary to think that, yeah. Well, certainly the best thing that's remained pretty consistent, we have really very dedicated people that are here to do a mission. It's not just a job, this is a mission for most of the people. They really want to do something. They have a feeling that we're increasing our understanding, making life better for people. That's a good thing. So the dedication is still there. We certainly have, like I say, more things we have to do. We've had an erosion, say, of support; we used to have people who took care of a lot of the paperwork for us and they've kind of gone away. We haven't replaced them when they retired. That has to do with, we've had flat budgets for a long time so we figure out what can we cut, and administrative people get cut. I lost a secretary three years ago so I get to do the secretarial work, you know, a lot of it, and some of it other people take, it's not just me. But so lack of that support and being, at least in my job as an administrator, I'm supposed to know all this stuff and it's too complicated now. I need people who specialize. I spent two years trying to hire somebody in my own job before I replaced him very quickly, it's very simple. Now it's taken me two years. It's just, you know, kind of, beyond any human to keep up with all the details; it's gotten very complex. We used to have specialists that would do that for us and the first time they didn't give me any candidates that were appropriate for the job. And it's just a miscommunication, so that's a very detailed....

Again, it's more administrative, more things to do. But some of the support stuff I never worried about making sure the paper was right, somebody would specialize in that, they knew how to do that, they knew how to hire, these are the forms you need, this is what you've got to do, and there's no one to guide me in that. You're kind of all on your own. So that's one of the problems, I think, over time.

Our facility is fifty years old now and it's showing signs of wear and tear. I mean, we've had long periods of time where the elevator didn't work or trying to fix things when some point, you know, we haven't kept up one of our things. We do a lot of telework now and our offices are set up for the old style, you are here eight hours a day, five days a week, right? So we have people using up time and they're not here a lot, they can do their work from home which is a good thing because we can actually do our work anywhere, we don't have to be tied here thanks to the internet. And so those are good things, we can actually work all over the place but have access to journals and things where before it had to be paper. Certainly not having everything hand typed, you know, we can do that on a computer, it checks your spelling, so those are good things. But also they expect you to do more paperwork because they want you to do it. You can do more, but they just, so they fill up your time doing more, which again, sometimes you question yourself, is this really worth doing? So that's one of the issues.

But maintaining the equipment and the facilities is a problem, yeah. We used to have people all the time who would go out and fix buildings and now we have to have a contractor do it because we don't have people that can do this or that, or everything is bring in somebody to do it and doesn't know the facility, so. Those are some of the handicaps we have.

When I first got here, I'll tell you one of the good stories, when I got here there were actually no research vessels in this Southeast Science Center. In this building, this facility, we now have seven boats. So we have all kinds of projects going on now but I remember I used to embarrass the division and the directors saying, "oh, well, we do research but we have no boats". So that problem has been solved over time, but it's hard, still it's hard to replace them or when they break or fix because usually the budget. You get a one year budget and sometimes that's not enough to pay for a boat so we have to be very creative on how we do things and how we do that. And the administrative burden is an issue, the planning is an issue, you got one year, you don't have two year money or you know, we can't plan for two years or long term programs. You just kind of go by year by year and that's not a long-term goal for doing programs. And sometimes your funding got cut for nothing that you did, you do good science, has nothing to do with that, so we have people spending a lot of their time trying to make sure that they get their, keep their research going in the right direction. Obviously someone has to make sure it's appropriate and it's good research. That's my job is to kind of lead that effort, make sure people are doing things they should be doing. But it is demanding.

SM: Can you give me an example or, it doesn't have to be necessarily something that is ongoing, but for example you want to initiate a project, a research project that has many components and I want to understand what's the decision-making process and the scales at which you have to go to in order to obtain approvals to move a project ahead. Like, yeah.

JB: Well, well, first off, we have certain base funding for our employees. The problem over time - that's stayed flat. And so salaries have increased, people get promotions, you know, through their career. We haven't replaced people and that doesn't go as far as it used to. So I used to have in my division, I had five people, I'm down to three. My group does the reef fish research division. We had a whole program there and all of a sudden the money kind of dried up, habitat money and it used to be, eight people supported, and now I don't even have enough for two. So, those are problems because the budgets are fixed, you know, so that's the bad side. So, so we have to look for what we call soft money or outside money. There are various programs that provide money competitively. There's MARFIN [Marine Fisheries Initiative], both internal and external, so either work with partners that can apply for external

money, we do a lot of that which is fine because we can't do everything. We work closely with other agencies and partners. But sometimes you're kind of stuck with the theme of the, money comes down but you can't use it because you don't have anything relevant to do, I mean. An example, there's a lot of money that's saved for marine debris. Well, marine debris is probably not one of our big issues here, we have other things more important than that, but. So I have a couple of people that work on marine debris, but it's not fundamental to the problems. So sometimes, and it's also, it's kind of like the grants. You get like one or two years. In a long-term program, you know, like we did, we spent thirty years developing our fishery independent assessments and there's a lot of steps along the way where we improved and things. The idea is it's an incremental iterative process to get better and better, but all of a sudden, if your money dries up, you're dead. You know, we have people who are specialized on, say, doing coral research, working on disease, are all trained and all that, and if one leaves because he got a better job, or you can't afford it, the money grant, you can't replace them. I mean, it costs too much to train that kind of, you lose that expertise. And one of the problems is the demographic issues that, um, we're top-heavy with scientists. I've been around and I'm one of the older ones now. I won't be around forever. That, there's nobody been trained so the institutional knowledge goes with them sometimes. And things change, I understand that, we need, you know, the things, I started in a career we don't do anymore maybe because we have other things to do and we have better ways of doing it. But, but sometimes there's not a good system. So like right now, in one of the programs I have, I have two new, brand new employees and they're both highly qualified and I'm sure they'll take over, but they were, they have a lot to learn very quickly. Yeah, that's an issue. So that's, the long term perspective is sometimes lost. And our problems aren't going away. That's one of the, remember we're, we're a management agency. We will always have a fishery agency because the problems are there and they're going to be there. And so, you know, you need to think ahead, not just what we're doing now. And we need to do things better. And so when we make a breakthrough it really helps, you know, so. A lot of it's been technological but some of it's just hard work you have to do.

SM: Um, I want to go back a little bit to the question of ecosystem management...

JB: Sure.

SM: ... and ask you…how much, or how, actually, how is the human dimension a part of this --

JB: Sure.

SM: --ecosystem management?

JB: Well, fortunately our definition says people are part of the ecosystem, so, it's right there, the human dimension is critically important. I usually have a cartoon I present, it's not just about fish. Fisheries has two ends to a fishing rod. Most of us got in because we're interested in the fish, but on the other end of the rod there's a human there, so that's, that's a critical part so we understand that. And the idea is how do we, you know, work with our ecosystem to maintain it. And some of it, it is critical; some of the issues we have is lack of understanding of the ecosystem limitations, capabilities. There's a lot of thought like our fisheries, well, we can just increase the pie, how many fish we get, by adding more habitat. Well, it turns out in most cases adding more habitat is not the problem, there's not enough females producing eggs to maintain your fish population. So, and, but the public doesn't always understand that.

They just assume the ocean is infinite. I mean that used to be the, we cannot overfish, we cannot hurt the ocean, dump all of our stuff in the ocean and it's okay. We now know better than that, that there are problems and that's human.
Part of the idea of ecosystem management is that people are part of it but we have to adjust our demands within the capabilities of the ecosystem. We can't exceed that otherwise it's short term and won't last. And one of the, of course the issues here is a lot of times the problems are kind of masked because we have international trade so if we overfish one fishery, we just buy it on the market from somewhere else. Well, maybe they're overfishing there, so how long does that work, you know? So, it's kind of, you know, think globally and act locally type of a solution. We have to understand the limitations. I work with MPAs, for example, marine protected areas, and particularly marine reserves where there's no fishing at all, which is a very hard concept for people to understand, but it's, the idea is that the system worked without people and so at least some portion should be set aside to operate so we better understand the system. This goes back to Aldo Leopold, considered the father of, I think, of modern conservation. Ethics, ethics is a critical part, not just economics and that's what he contributed. You know, you'll always overfish if you just use economics especially if there's a change of technology or change in value; you have to have an ethical basis of self-interest. That's, I think, his contribution to that, so.

Those are part of it but in terms of technology, we could not close areas of the ocean because we have no way of doing it. We can't paint paints, paint lines on the ocean. We do on land, we put fences up, you know. We've done this on land very well. And thanks to the Magnuson Act, back when that was done, we actually said, we claim 200 miles, we can control that. So we now have the ability to do that technologically, we have satellite navigation systems; we used to have LORAN now we have GPS, so you know where you're at, you know whether you're in or outside of the zone. So we have the capability to paint lines on the ocean. So that's a good thing. We also have the legal authority that, if it's in our 200 mile limit, or 300, international agreements that are internationally, we could actually do it internationally. And there's a lot of effort now to go after these, these fleets that are illegal, you know, killing fish all around the world. So those are good things, you know, that we have the capability and the technology to do that.

We're still fighting the, I call it the social process. So, and that is one of the things about fishing and fishermen, they feel like they're conquering nature. There's a lot, there's about nine different social values to fishing, I mean, it's solitude, individualism, manhood, you know, catch the big tarpon. I've been though all these stages. You know, man, the tarpon, yourself, your abilities, there's all these. But one of them is the freedom; you're on the frontier. And we're now civilizing the frontier. And if you remember out west in this country when we, we took the range so everybody got to put their cattle out in the range and people were overgrazing and so there's a decline in productivity so people start fencing areas to keep from overgrazing. And there were shooting wars. There was tissue damage by people. So we're kind of doing the same thing in the ocean; we're civilizing their last frontier. And now there's rules and regulations. And they do, fishermen historically do not like rules and regulations so this is one of our challenges that's sociological. I call it professionalizing the fishery, both recreational and commercial, that this are the things you've got to do. In the past, I remember when we first size limits and bag limits, people didn't like it, they wanted, they want to have twenty, you know, spotted sea trout, it wasn't worth going out, they wanted to fill their freezer, you know, they get freezer burn and they aren't any good. Now they have two but they're much bigger, you know, and most of them are happy, you know, two big ones versus twenty little ones, you know, so.

Those are the challenges we have, is in the human dimension, is the understanding. International, still, whoever catches, by definition, usually who owns the fish, whoever catches them. So it's, why should I conserve, it's the, what do you call it, the tragedy of the commons. We still have a common fishery and our limits and having open access is probably not working well. So that means restrictions and people do not like restrictions. And we're facing that right now, that issue.

SM: Um, I don't know if you can speak a little bit about the, maybe the difference between, and I know not necessarily you can do the comparison, but, between the Southeast Region and working with the communities here versus other regions in the U.S.?

JB: Yeah, well, of course I've only worked here. I know a little bit. I mean one of the biggest things is the recreational component here is much larger than elsewhere. Plus the tourism component is much larger than most other places. So, um, you know, certainly for reef fish, but you know, also I mean, we deal with the high seas also, and you know, bill fish, and so recreational fishing is a big deal. So that's one of the big differences here than elsewhere.

The other thing is the biology. Most areas they have just a few fisheries they go after. You know, you can count them on your hand and you have big, industrial, millions of tons or something. As you go to the tropics they're smaller fisheries but there are more of them; there's more species. We have 110, I think, reef fish on the poster for commercially caught fish in the southeastern United States, for example. And that's not even a portion, I mean, there's over 500 described from one reef of fish, so, and some of those may be by-catch; by-catch is one of the issues we're facing. It's a big one because now it's the fish you didn't intend on killing therefore, it's treated as not quite as dead, but that's kind of, um, you know, way to look at it. But just because you throw a fish back, doesn't mean it survives. And it turns out a lot of our recreational fisheries, for every fish caught, that they can land legally, there's ten thrown back that are undersize and a lot of those die. Even ten percent, say, die, which is normal. Around eleven to eighteen percent, depending on median or mode, is the death. So, if you get caught once a year, in ten years you're probably dead. And these fish live as long as we do, thirty, forty, fifty years. Or sixty years. Actually, we have a red snapper, fifty-seven years old when they caught him. And they do that for a reason. They live that long because they have to make sure they replace themselves sometime in that generation because mortality is so high. And they produce six billion eggs, so the average person says, what's the problem? That can resupply the whole Gulf of Mexico. Well, what they don't understand is that maybe only one of those eggs survives. They produce six billion eggs because almost all of them are going to die; the current went the wrong way, the jellyfish ate them, it got too hot, too cold, it's landed in the wrong habitat. So, people don't understand the biology there. And the, and that's, uh, some of the issues we're dealing with on that.

So we don't have the large, industrial fisheries. A lot of our data have not been collected for a long time. The best example I have is our reef fish fishery, we didn't start collecting data at the species level. We collected landings data since probably the 1800s on red snapper or something, but not the species level. So, is it grouper or snapper? But now we realize we have to know which species it is, it makes a difference. And I have an example of a shifting baseline where, you know, each generation sets its' own expectations based on its' direct experience. Between Cuba and the U.S,. well in Cuba we showed, you know, a big decline over years. But if you started in the '80s, you know, you have one expectation, you know, say 2 million pounds a year. But if you started ten years earlier, you'd get 40 million and ten

years earlier you had 60 million. And each generation doesn't remember the past because they don't have that experience. So we didn't have data. And so and we show the data where we do, we have the same pattern that say Nassau grouper was a major fishery in Cuba, probably in the Florida Keys, we have some anecdotal evidence saying that. But they're now, just got declared threatened on the endangered species list. They've disappeared because they're so vulnerable.

That's the trouble with a multi-species fishery, that they get caught anyway. You can't, if you, say don't take this grouper, or whatever takes the hook and these tend to be the aggressive fish. They're more bold or have less fear of humans or less wariness, and they're the ones that tend to disappear. So that's hard in our tropical situation. The complexity also, complexity of the fleets are not big boats, some of these, menhaden fishery or something, it's just a few boats. Take a temperate fishery, something like, um, you know, haddock, or, what's the other one, oh I can't remember the name of the fisheries. But anyway they have a few big fisheries, commercial, so you have to monitor the fishery, how much they're taking. We go down to the Caribbean. We have hundreds of little boats, they're kind of, um, they're not, commercial, recreational, with the Magnuson Act that's all you are, but they're subsistence fisheries, people are part-time fishing. We have the, uh, what do you call it, the artisanal fisheries, you know, some, it's very hard to monitor because there's no sale. Some people sell off the back of their boat. They take the truck up to the market or whatever, so it's very hard to get data on what's happening. That's one of our issues with that. But that, plus all the part time fisheries, some of the fisheries we have in the southeast are called fishery of last resort. In Louisiana, the oil market's not doing good, everybody let's go fishing. Like, there's no view that there's limits to how many fish you can put out there, so. So those are some of the issues. Yeah. It's complex. We'll always have a job.[laughter]

SM: Well, that's good. Can you, you already talked, told me a little bit about some of the theories that guided your research throughout your career. Can you expand a little bit on that, on how they changed, if they did, what are some of the major scientific theories that you use in your research?

JB: Well, as ecologists we're, you know, and again I'm an ecologist it's not just how much we catch and, you know, it's kind of the, you catch and, you know, effort. Certainly the ecology of how these things interact is much more important behavior. Just an example, I mean , some areas, I mean as an example, New Zealand, I was just telling someone earlier, that no one ever knew these fish formed harems when they reproduced because they never saw any because they were caught. Everybody caught this one fish species, they called it spotty or something in New Zealand. But then they had a reserve where they protected them, and all of a sudden they realized they have a male and they had a whole harem of females. They were producing these big spawning areas, you know. So that's, so that's, you know, a science thing, behavior, understanding that. So most people are willing to protect spawning aggregations, most people don't understand that very few fish form spawning aggregations. Most of them are pair spawn or wherever they are they're going to spawn. I mean, that's fundamental biology. So by having that knowledge we can apply it. In my case, I worked on island biogeographic theory, which just says, every area is not unique; there are rules and ecological principles, how many species that are in an area is based on the size of the habitat, its distance from other habitats and the rate of mortality. I mean, so the other view is that every island has to be studied by itself; each area is different. And that's, doesn't get you very far. You're looking for principles that you can apply to elsewhere. And that's, that's kind of the thing that we bring to it nowadays; the idea of having controlled experiments, we don't just,

can't just observe. We need to do manipulative experiments, that's still been an issue with some agencies. They don't like manipulation. They want nature just to be looked at; we aren't going to interfere with nature. But then sometimes you just need to do that. I can give examples of that, but...

SM: You can give me examples.

JB: Well, an example is our Everglades system here in South Florida. That's a good one because right now it's all under human control. And if we don't manipulate it, it'll go extinct. The waterfalls...

SM: Are you talking about the restoration project?

JB: Well, restoration, but all the waterfalls, everything depends on water flow; the timing, the quality, you know, the distribution, and one other factor…um, quality, quantity, spatial distribution, and, um, timing. So there's time. That's when the birds breed. And they, if, if, you know, a dry down occurs, the fish get concentrated, that's the only time the fish can, or birds can successfully reproduce because the fish are concentrated and they get enough food to feed. So if you change that, they'll have unsuccessful reproduction. And so it's balancing the human needs, they use water for agriculture, for, you know, for everything for humans, drinking, but you need to make sure you maintain that system. So if you want to maintain the aggregate, uh, the Everglades, you need to understand that. And sometimes you have to do an experiment, called adaptive management, to... This is our prediction right now in Florida Bay. They probably need more fresh water, which is what, in high demand, we've kind of wasted it. We've shut it off, caused problems. So that's a good example there of where you want to, need to manipulation.

I'll give you another example, locally. Years ago, back about 1982, a colleague of mine wanted to do an experiment in the local park, you know, Biscayne Park, where he wanted to take four patch reefs - they have thousands of patch reefs - four patch reefs and take all the sea urchins off to ID them, and put them on another four, so you double the density to ID them, and to ID them you scrape the surface, and prepare the, uh, substrate for coral sediment. So, they're very important grazers, on the reef. And then three reefs, or four reefs as control. So it'd be twelve reefs, three would be manipulated, moved to ID them, four you'd have twice the density to ID them. And he was not allowed to do that because they didn't want anybody doing experiments. Now if you wanted to spear fish, as a recreational angler, you could kill them all. You could do anything you wanted. There's no laws against it. But he could not get a scientific permit to do that. That's one of our big issues, by the way, permits. We spend a lot of time on permits and they're getting worse. I mean, they're just more time, I mean we typically spend like four years getting a permit for doing some of our work, you know, for endangered species, for whatever, it's...

SM: So, I'm sorry to interrupt, so it's --

JB: Yeah.

SM: --it's more difficult to get a scientific permit--

JB: Yeah...

SM: --than a commercial fishing--

JB: Well yeah...

SM: --permit, a fishing permit?

JB: Well no, I'm mixing stories here. So let me, the sea urchin thing first. He wanted a permit because he's trying to be legitimate, I'm doing research; I want to do this manipulation. They said no, we don't manipulate, we just observe, you know, I mean that was the policy. They changed that somewhat, but it's still, they're still late in, depending on the generation. So what happened here, then six months later, it turns out a disease infected all the Caribbean and pretty much 98% of all sea urchins died, you know, in some areas almost totally. So, we would've loved to have that data, what would happen, you know, with, you know, increased, no urchins, what could we predict happened, we had no way of knowing. It was a disaster. Coral has been declining since and there's other things involved with that too. You know, you know, climate change, global warming, you know, temperature, disease maybe spread coming in through the Pacific from other sources too, ships coming in through the Panama Canal, we just have bigger ships now. So there's a lot of issues there.

But that's an example of, you know, not understanding that we need to do these sorts of things as scientists to do science so that we can better manage our resource. The Everglades is a good example. You know, everything there depends on human management. Fire, we've drawn down the water tables, so if we want to maintain those systems we need to actively manage, we can't just let nature take its course. So.

The other part, about permits, because you asked me about some of the issues, we spend more and more time, I have people, one person their whole job is pretty much making sure our permits are up to date as scientists, you know, for an agency. Now I understand, there's need to make sure we aren't abusing things, and there's laws that you have to do it, but it's just, you know, very, very detailed, burdensome. And the problem is a lot of academic scientist, you know, you work with social scientists, in the government you've got to go through OBM [Office of Budget and Management], and it's very difficult. You know, the hurdles there, and it can take years to get your permit to do it, and most academic scientists they have two or three years, they've got to get tenure and get publications out, they can't wait for that. I have some post-docs who wait over a year to get a permit to do some turtle work. It's very minor; it's not a big deal. But they can't touch a turtle until they get that permit and it's tied up in some morass of bureaucracy. And that's, and the permits more so. And I go to the Keys, Biscayne Park has permits, Santa Flora has a permit, NOAA has a permit, everyone has permits. And so, all of them are a little bit different and you got to do it, but you spend a lot of time doing that.

That's probably one of the changes, when I, I did my original artificial reef research I made artificial reefs, I didn't have a permit at all; nowadays I would never be able to do that research, because I'd never be able to get the permit. It's just too long. I actually used rotenone, I spent a, to kill everything on my reefs. I was testing theory how fast it would colonize because predictions, how fast it would happen, and so I'm going to test that. So I'd take a guy out a year, you know, look at all the sites, so I spent several days doing that with him, then they finally got a permit but he had to go out with me when I did it. I had to take him out a day later, I had to take him out a month later, and a year later. So I spent a lot of time taking this guy. He loved it, he got to get a sunrise, you know, suntan and stuff on the

boat. It's a lot of time. And I understand, again, it's the first time, I was the first permit using rotenone in the Keys, so they were concerned about what might happen. We showed, got the fish, put it in, killed the coral, didn't hurt the sea urchins. Things a fast physiology and we did our experiment. It was very difficult and you know, it's gotten more so. So permitting is probably one of our, I think, I've told people it may be our limiting factor because, especially if you're dealing with dangerous species, it's, you know, and there's good reasons why you need permits, but you wonder is the process, you know, driving the train or not, it's maybe not a good thing. And trying to do social science, I would, at one time I would entertain, if I wasn't a biologist, I would've been a social scientist. But the hard part of social scientist, because I, I find it fascinating, you know, people, stuff, but you can't do experiments. [laughter] You know, you have ethical things, you know? So you can't do a blind experiment or have a blind control easily. You'd have to be very clever how you do things and, but, trying to, you know, you know, just when my colleagues have to get social permits to do surveys of people's attitudes and stuff. It's just a lot of hurdles there, and I'd be afraid it would be very discouraging I think. But that's across the board, all of us are having that problem with permits. And also you get surprised. Oh, you don't have a permit for this. Well, I didn't know I had to have a permit for that, you know? So, whatever. But. I'm sorry, we tangented off on...

SM: No, no, it's a great tangent.

JB:... that permit thing. Yeah.

SM: We love tangents in social science, so that's okay.

JB: Well, but that's clearly one I've recognized recently is going to kill us, I think, because the time, it's very time consuming, and. Heaven help you if you don't get your permit on time or something, you know. It takes them forever to process. So, anyway.

SM: Can you tell me if there are any, and if so what, are the more of the sort of positive side of working for the federal government in this context of --

JB: Oh, well, it's great.

SM: --scientific concept?

JB: The exciting thing for me is we're where the action is. This is where the rubber meets the road. So, what we do affects people's lives, our resources, our long-term, so we actually are applied. So we do good, we research but we also work with our academic partners, they do things we can't do. They can do certain kinds of experiments, they have a different perspective and skills we don't have. So, that's the good part. We work through SMAS and other agencies that allow us to work with academic partners, so we do that. We also work with other agencies, we work with the public, so we're actually, make meaningful. So by being regulatory, we're actually the ones who influence the laws and determine how well our fisheries are doing, if we're overfishing or not, you know, so we're there.

Our science is used to make a difference, make decisions, so that's really exciting. It's not esoteric, no one cares about how the mouth part works on a damsel fish, for example. It may be very important, but it may not, but what we do affects people's lives and so we're there making a difference, I think. And that's exciting to me. And the work we've done on marine

protected areas, for example, shows they work, they're very important for, certainly coral reefs and reef fish reefs, you know, they actually benefit those fisheries, not everybody accepts that, but the science is pretty strong and there's a lot of studies showing that. But sometimes trying to get that into policy is an issue, but.

Sometimes our, the analogy I make to people, what we do is like, if you were to like, like, a doctor. So a doctor tells you, well, you need to, you know, quit eating fat, get some exercise, cut down on the sugar, you know, quit smoking, right? You know, so we're like that. So. Protect reefs, pick size limits, size and bag limits, have some marine reserves, you know, kind of give the advice. And sometimes they do it, sometimes they don't. But we also have the obligation like a doctor, sometimes the doctor calls you in and says, "well, I hate to tell you, but you have a spot on your lung". That's hard news. And we are hard news is tell them, "well, I hate to tell you this, but you're overfishing, or overfished". It's the same thing. There's denial, there's anger, everyone else is the problem not me, you've got to be wrong, and then our responsibility is, well, here are your choices. You can go home and die; the Magnuson Act says no you don't get to go home and die in the fishery. You cannot just let everything go extinct. It's a good thing.

But then the social process, you know, we, obviously, we recommend this, you know. You have a reserve or change the size limit or reduce fishing mortality, and sometimes the patient does it, sometimes they don't. Sometimes they don't quit smoking. We have no control. And so it's hard sometimes when you give this advice, you did all this work to give this advice and to see it ignored is, I think, sometimes frustrating. You learn to be patient because, the comment I have, science will prevail. You just need to be persistent with, with the data and the information and hopefully at some point people kind of wake up and say "yeah, that's what we need to do". But that's, that's one of the challenges we have. But it's, it's again, we make a difference in people's lives and our future generations, to make sure there's something here for the future.

SM: Is there anything you would like to add to this, um, to our interview, or anything we didn't?

JB: No, I think we've, we've mashed most of the potatoes, I think. [laughter]

SM: Yes. Well, I'm glad to hear it.

JB: Yeah, so anyway, well anyway, I hope that's helpful, but anyway...

SM: Absolutely.

JB: You do get perspective over time and so hopefully it's useful to somebody.

SM: Thank you very much.

JB: Yeah. Well very good. Well thank you, for coming and reminding me. I saw your thing and it's like, well, let's see, I only have sixty emails today, and oh I'll get that tomorrow and about two days later you forget, so.

SM: I'm sorry.

JB: No, it's not you, you're doing what you need to do. And that’s for you, and that's important. Can I get a copy of that, just for jollies?

SM: Absolutely. And I also have something to give you, like my own, I'm sorry.