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Burnett, Jay ~ Oral History Interview

Wrigley, Joshua

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

Interview with Jay Burnett by Joshua Wrigley

Summary Sheet and Transcript

Interviewee

Burnett, Jay

Interviewer

Wrigley, Joshua

Date

August 12, 2016

Place

Northeast Fisheries Science Center
Social Sciences Branch
Falmouth, MA

ID Number

VFF_WH_JB_001

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Biographical Note

Jay Burnett was born in 1948 in Springfield, Massachusetts. He earned his bachelor's degree in English from Boston University, and his bachelor's degree in Fisheries as well as his master's degree at the University of Massachusetts Amherst. He spent his career in the Age and Growth Unit, ten years as the head. He participated in many survey cruises throughout the years. Mr. Burnett retired from the Northeast Fisheries Science Center in 2010.

Scope and Content Note

Interview contains discussion of: aging fish, how fishermen reported catches, port agents, Fisheries Management Councils attitudes towards rules, fishery observer surveys, process of sampling fish, NOAA survey vessels, effect of technology on surveys, bottom trawl survey, Fisheries Ship Computing System, challenges during research survey cruises, process of aging a fish with otoliths, ensuring quality of age readings, Retrospective Pattern, image analysis in fish aging, the Cottage at Woods Hole.

In this interview, Jay Burnett provides a detailed description of his work the Age and Growth Unit at the Northeast Fisheries Science Center. He discusses the challenges facing scientists at the center and how he overcame these, as well as his hopes for the future of the Age and Growth Unit.

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Josh Wrigley (JW): This interview is being conducted as part of the Voices from the Science Centers project funded by the Northeast Fisheries Science Center. It's also a part of the Voices from the Fisheries project that is supported by the National Marine Fisheries Service Office of Science and Technology. I'm Josh Wrigley, Project Manager of Voices from the Fisheries, and today I'm speaking with Jay Burnett at 15 Carlson Lane, which is where the Social Sciences Branch is located. The date is August 12, 2016 and the time is about 1:00. And, uh, and we're sort of going to hop in here, as we were just talking about Jay's early career and then sort of move up from there. So, so you had just said that you were, you ran Age and Growth for ten years.

Jay Burnett (JB): Yes.

JW: Was that part of, um, Population Biology? Or how, how was that located--

JB: Yup.

JW: --under the organizational structure?

JB: Within the Population Biology Branch, there were three programs and the Fishery Biology Program was one of the three, and that was, that's its formal name. It's real name is the Age and Growth Unit.

JW: Okay.

JB: That's what we had been since the '60s when it was formed. So.

JW: So, um, now to go back, I guess, to the very beginning, when and where were you born?

JB: I was born in Springfield, Mass, out in the western part of the state, can't even smell the ocean from there.

JW: And what year?

JB: 1948.

JW: Where did you wind up going to school for your undergraduate and graduate education?

JB: Well, that's a long story. I initially went to Boston University and got a degree in English. But one of my summer jobs when I was going to college was working for a mason contractor. So, I think, two days after I got out of BU, I took a job as a bricklayer with that same mason contractor. And I laid bricks and blocks for the next ten years and I loved it. But my back didn't love it. And I had, I had a couple back surgeries and after the second one the doctor said, "you know, you might want to think about finding something else to do." So I did.

But during that ten year period, I was coming to the Cape on a regular basis to surf fish and during that ten years, striped bass abundance went from very high to very low. It was very dramatic. And I was interested in that, you know, what forces were at work that would cause, you know, such a huge biomass to essentially fall apart so quickly. So when I was confronted with the need to find something else to do with my life, I looked into the Fisheries program at the University of Massachusetts Amherst. And, I remember my first sit down with one of the professors there and he looked at my age and my background and he said, "well, you know, you're pretty old, there's not too many jobs in fisheries. I wouldn't bother." So, that was just like--

JW: How old were you at the time?

JB: I was 30. So that was like the red flag to me that, you know, I had to, I had to do this. So I went, went there. I had to get a second undergraduate degree, you know, because my initial degree didn't have the science courses. I was able to do that in two years and

then immediately, um, kind of lucked into a situation where a project that the Woods Hole Lab in, the NOAA lab in Woods Hole, a project they needed done very badly, they were looking for somebody to do it and somehow I was chosen. So I started both working for NOAA Fisheries and a graduate program at the same time, also at UMass Amherst. So, um, so it took me a protracted five years to get that master's degree. But it was on top of essentially working full time at the lab, a lot of sea duty, and so forth and so on. So.

JW: What was the focus of your research as you were working on your master's?

JB: There was some species of flat fish, the witch flounder, *Glyptocephalus cynoglossus*, that really nobody knew much about but it was becoming a pretty important component of the fisheries. It had the second highest ex-vessel price for flat fish to halibut, so it was getting important. And they had had some really good recruitment in the '70s so there were a lot of them around. But we didn't know how they, how old they lived, how they grew, when they reproduced, any of that stuff. So it was a basic population biology type program that they, they needed. I enjoyed it. I learned a lot and part of it was learning to age this animal.

Some of the, um, I think both the St. John's lab in Newfoundland and the, um, the Halifax/Dartmouth lab of DFO had done some work with that species but they were aging it with the whole otolith, um, the otolith is a little ear bone in the fish's head. And I found out fairly quickly that they were grossly under aging as a result; that the growth rings, the otolith, this, kind of curled around as the fish got older, to fit the shape of the cavity that it was in. And they weren't able to see many of the later growth rings. So we sectioned these otoliths and got ages that were two to three times higher than what the Canadians had been getting. So that was, that was an important discovery. And that carried on to a lot of other species as well. Quite a few species that we were aging with scales, like yellow tail and winter flounder, we found the same, same issue that that we were under aging the large winter flounder, so we're sectioning the otoliths now.

JW: Was the scale generally adequate...

JB: For the younger ages and quite a bit of our sampling is a combination of scales for younger fish and otoliths for older fish. The otoliths are much more labor-intensive. It takes technicians and a lot of time to section them.

JW: Why do scales become less important as the fish ages--

JB: Well--

JW: --for that analysis?

JB: ...a fish doesn't grow linearly. It grows fast at first and then asymptotically after that, so growth slows a lot. And on both the scales and the otoliths the spacing between the growth rings gets smaller and smaller and smaller. On the scales, we found that there's a kind of a natural erosion of the scale edge just because that's the exposed part of the scale, and that a lot of the later growth information was just missing, totally missing. So,

I did that, and it led to a, an FTE [full time employment] with the Age and Growth Unit in Woods Hole.

JW: In what year did you begin your work here as you were working on your degree?

JB: Um, the summer of '83 is when I had, I had, I don't know if you've ever heard of the old 1040 appointments?

JW: No. What was that?

JB: Well, I guess there's 2,080 work hours in a year. So a 1040 is half of that and that was like a half-year appointment that they offered. So I would do that for the summer months and then back to Amherst to take classes and later teach, teach a couple in the winter months. Then the position opened in survey, a woman who was working on survey went out to the University of Washington to get her master's degree, and they needed a pretty quick backfill for that, so.

JW: This was the bottom trawl survey?

JB: Bottom trawl survey. And Tom Azarovitz, who we talked about earlier, was the, was the supervisor then. So went over there, I loved going to sea, I went as often as ninety days a year in some years.

JW: And this was on the *Albatross IV*, right?

JB: It was, or the *Delaware II*, in some years we, one of the other were constantly breaking down or needing repairs so they were somewhat interchangeable. They had done a lot of vessel comparison work over the years so that if we had to plug in to the other vessel we had conversion factors and, to apply to the catches.

JW: What role did you play aboard ship?

JB: Initially just, you know, Watch Stander. But I quickly became a Watch Chief and then I probably did twenty-five cruises as a Chief Scientist in the '90s and early 2000s. But I went on a lot of commercial vessels too. Our observer program didn't really start until 1989 and before that it was like the new kid on the block went sea sampling. And that was me for, for a few years. So back then, we sent people sea sampling, usually to address a specific issue. Usually a by-catch or discarding issue, so I went on quite a few trips in the Gulf of Maine, mostly on red fish trips, to document what they were doing the rest of the day. The issue with red fish is that they're on the bottom, tight to the bottom during the daytime. They come off the bottom at night. So what do these guys really do at night? They're not catching red fish. And they would, um, fish for flounders or other, other species at night.

JW: Oh, so they were still using bottom-tending gear--

JB: Yes.

JW: --at night.

JB: Yeah, yup. So, and then red fish by day and, and other species at night. But we didn't really have a handle on that. Before, let's see, I think log books were initiated in 1994. Before then, we relied heavily on what we called an interview system. We had a cadre of grizzled old port agents. Some were ex-fishermen, some would go out and drink with the fishermen, but there was, we had key people in key ports that really had their finger on the pulse of what these guys were doing and so we would get highly accurate information on where they were fishing, trip durations, number of tows, what they were catching, more importantly, what they were discarding. When we went to the log book, you know, a voluntary - well, not really voluntary but self reporting - it kind of all, we lost all that.

JW: Was that a mandatory part of the system?

JB: Yes. Yup. It was a, um, headquarters, probably a regional office decision. I forget what you call it now, GARFO [Greater Atlantic Regional Fisheries Office] or something like that. That was a blow. I know some of the assessment scientists in Woods Hole were adamant that we at least have one year of continuing the interview system to sort of calibrate the log books, you know.

JW: Why was that eventually phased out?

JB: I, I couldn't answer that. I know, over the years, there's been renewed efforts to develop partnerships with industry. You know, it's, you look at the Council system and in all the other regions, and it's fairly successful. There's good fisheries management for the most part in most of these other systems. Not in the Northeast. It's never been that way in the Northeast; from day one it's been adversarial. And, I don't think it's any better today, in fact, it might be...

JW: What are your thoughts on why the relationship has historically been adversarial?

JB: I think there's, initially it think it was the composition of the, the fishing industry. There were a lot of middle-aged or older fishermen. Part of, and this all happened after the extended jurisdiction, the Magnuson Act.

JW: In 1976?

JB: Yup. Yup. But I think, you know, hindsight's always 20/20, but in addition to the extended jurisdiction, there was a real push by NMFS to invest, build up, the domestic fleet. I mean, there were low interest loans, a whole bunch of things. And a, we very quickly replaced the foreign effort that we kicked out with the extended jurisdiction, with new domestic effort. And most of the new fishermen were younger, had, probably were, you know, more of the mind that this was something to make money at than, than be a, involved with a resource that you would take care of for the years. So I think part of the hard feelings was this clash between the younger fishermen and the older guys that were getting squeezed out and had a totally different...

JW: Different mentalities?

JB: And philosophy about the resource that they were, they were harvesting. And the old guys went away and these young, young Turks now, they brought, brought in technology. The older guys didn't use GPS too much but these new guys lived by it. I mean, they could repeat every successful tow they ever had over and over and over. They could, you know, literally track down that last school of fish. But it was more the, I think the younger guys felt entitled. That somehow they were entitled to, you know, that it wasn't a privilege, it was their right to, to fish on those fish. And anything that interfered with that, like regulations, was, was not well received. I mentioned earlier that I had gone out on quite a few sea sampling trips. I would say half of those deliberately disobeyed regulations. Some minor things, some totally flagrant. And, and...

JW: What types of infractions?

JB: Well, well, I should point out that as an observer, we made it perfectly clear to them that enforcement would never see the data we were collecting. And, I mean, that was important because we didn't want to just be taken for a ride; we wanted them to fish as they normally do. And we would, we would document that, but we assured them that, you know, there wouldn't be an enforcement guy knocking on their porthole the next morning. So I think that, I think that worked in the sense that they went about their usual business. I was on a red fish trip that, in the Gulf of Maine, that every night they would go into Canadian waters and fish for Canadian haddock, you know. They didn't get caught, you know. Caught a lot of haddock, made a lot of money.

JW: Just business as usual for them?

JB: If they did it, I'm sure everybody else was doing it. Um, the red fish net was a smaller mesh than the net that they were able to use for ground fish. So, you know, if they're going to fish for flounders at night, why bother swapping nets? Just use the red fish net. You catch more fish but you're also discarding a lot of smaller fish. Overage, when there were, you know, like daily quotas, like in Woods Hole, that fleet tied up to the dock, the summer flounder guys.

JW: Days at sea system here?

JB: Well, this is a daily quota. This is a state, state--

JW: Oh, okay.

JB: --state quota. But, you know, there, on any given day, you can see them, you know, either high grading by dumping, you know, keep fishing and then before you go in, dump the smaller fish, you know, and keep the bigger fish. Or, or, since there's rarely an enforcement presence on the Woods Hole dock, just bring in a couple of extra hundred pounds and get it on the truck and you're good for it. And I don't have experience with the other regions, but I have colleagues, you know, over the years, from the other regions. I just don't get the sense that that kind of stuff is going on. There may be one or two cheaters and, and I think they get caught or, or they're shunned by their, their colleagues in the fishing industry, but it just seems like a way of, way of business here.

JW: Was there a goal for observer coverage when the program first started?

JB: Was there, I'm sorry, a goal?

JW: Yeah, like, was there a certain percentage...

JB: Yes, it's always been to, oh, you mean, how many trips to target?

JW: Right.

JB: Yeah, in fact, my wife who still works at fisheries, that's a big part of what she does, is determine, based on the statistics of discard information, how many trips each fishery needs to have to give them a reliable estimate. So that sets up the scheduling for the upcoming year. You know, by quarter, by fleet, by fishery, by species; it's a pretty complicated matrix. But what we're all, what we're also seeing is that there may be a tendency to, um, take observers for a ride; that they'll sacrifice a trip that they have to have an observer on, and maybe do it a little bit cleaner than they would have and cut out some of the shenanigans...

JW: In the present day here?

JB: Yes. Yup. So, you know, there's the, and I think there's some measures we could take to minimize that, maybe electronic monitoring. That's not great for species ID [identification] and other, other things that observers have to document, but, you know, tied in with the VMS [vessel management system] system, maybe you could get the same level of information about where they're fishing and how often they're setting their net, and whether there are these massive discarding events that they have, tend to avoid when they have an observer on board.

JW: So when you were sailing with commercial vessels, what ports would you normally leave out of?

JB: Uh, Rockland, Portland, did Chatham a couple times, New Bedford. Never did Gloucester. Never did Gloucester. And no further south than New Bedford. And a lot of different fisheries. Gillnet, I didn't do long line, but gillnet, a lot of bottom trawl, uh, surf clams, that was interesting. And scallop, over the years, even, uh, trap net, that was like a two hour trip to a trap net out in Harwich, I don't know if you know what those are, but they're...

JW: Like a pound net with a leader, right?

JB: Yeah, exactly, yup. And I think there's still a few guys that do it out of Chatham and Harwich.

JW: Out near, yup.

JB: Nice, clean fishery, because you get out there, the fish are still kicking, the ones you don't want you just net them over and they're, they're gone. So zero discard mortality, and fresh fish, nice fresh fish.

JW: Yeah.

JB: Yup.

JW: So, when, when you were, when you were doing that, is that at the same time when you were also sailing aboard the *Delaware II* and the *Albatross IV*?

JB: Yes, yup. The, you know, the work that the assessment people were most interested in were the bottom trawl surveys so that, that was roughly early March to early May for the spring survey and early September to early November for the fall survey. We did add a summer survey for several years. We had a winter survey that was basically the month of February for key flat fish species, fluke and yellow tail on Georges. There's a shrimp survey that I did many times which flounder is, were...

JW: Is that for northern shrimp?

JB: Yes, um, which I guess are, are nonexistent now, probably because of warming. Their success is pretty much tied to water temperatures.

JW: A cold water species.

JB: Yeah, yeah. And we're losing that. They're at the southern limit of their range. I think the Gulf of Maine northern shrimp fishery is probably history in view of climate change.

JW: What were the priorities for Age and Growth at that time? What, what species were you primarily interested in, and...

JB: We did a lot, because it was our opportunity to get the key biological information on the fish, so that took a lot of sampling. We'd do a thirty minute tow that probably took, you know, depending on the catch, ten to thirty minutes to sort the catch, then we would weigh everything so we would have total species weights on everything. Occasionally you'd have the sub-sample, you know, the big tow. And then we'd break into three teams and measure the fish. We had a pretty structured sampling approach that we would want. So many fish per station per length, and those we would sample for age and growth. At the same time we were collecting age structure, we would sex the fish, determine its' reproductive state, and, for a subset of those fish, we would examine the stomach contents. So we were collecting a lot of information and it was a lot of, lot of processing.

JW: How many were you normally looking for, for each of those categories?

JB: Um, well, the rule of, the basic rule of thumb was one fish per centimeter per station. So depending on the size range you caught and how many you could, you know, have as many as thirty or forty samples on one station. But, you know, stations vary by depth, by substrate, so one station could give you a bunch of red fish and grey sole; the next station you'd get cod and haddock, you know, so forth and so on. We'd kind of, we'd analyze, well, from that information, you know you would age, let's use grey sole that I'm most familiar with.

During the age survey you would probably during the course of the 400 stations, you would collect maybe 500 age samples using that one fish per centimeter per station rule. And from that, we would construct an age-length key so that we had a key we could apply to all the other unsampled lengths to get an estimate of the age structure. And it's kind of like working backwards, but we could, you know, analytically determine the, you know, the, um, precision of these age-length keys and then make adjustments as needed in future surveys. So there were some species where we had to, like, do three fish per centimeter, or maybe three fish over a certain length per centimeter, or something like that. And we were constantly reevaluating these age-length keys.

JW: Under what circumstances would you have to go in and tweak the key?

JB: Quite often as a species got less abundant, you would need to be opportunistic and when you did catch that species, you had to sample it heavily. I remember in the late '80s haddock were virtually gone and, Stratum 16 is the big strata at the eastern end of Georges Bank, it's in, totally in Canadian waters, but, you know, haddock don't care what side they're on. And that's the, historically the center of the Georges Bank haddock population. And in the late '80s, normally we have twelve survey tows in Stratum 16, and I remember being out on a cruise where we caught zero haddock in those twelve tows. Fortunately that was, um, foreseen in that they gave me a bunch more random station locations. But I think I had to do twelve more tows just to get a decent number of haddock in, in Stratum 16.

Sometimes if there's a strong year class you would oversample the smaller sizes, so that would be an adjustment. And, and it really required survey Watch Chiefs because they're running the watch, you know, the sixteen, six person team of samplers, to be able to think on their feet and make those types of decisions. I can't stress enough how important a well-schooled Watch Chief is on these cruises. You know, I think we've had, we've been fortunate over the years to have a consistent group that would, you know, take the extra effort. They may be, they may work in a different group altogether, but they would make the effort to learn the, the sampling and the adjustments that would be necessary to...

JW: So the Watch Chief was watching over all of the--

JB: Yup.

JW: --on-deck sampling activity--

JB: That's right. Making sure--

JW: --determining the schedule as well, or--

JB: Yup. Making, well, the Chief Scientist is pretty much the scheduler, the Chief Scientist would--

JW: Okay.

JB: --lay out the cruise track and work with the ship to go from A to B to C, yup. The Watch Chief would, but the Chief Scientist couldn't be up 24/7 so the Watch Chief would, you know, on each individual tow make decisions about sub-sampling and prioritize the species sampling. For most, most stations you could sample all, all the species. There would be enough time. Sometimes when stations were close or catches were heavy you'd have to make some, some hard decisions. And we would freeze, freeze and bring back some specimens, quite often small fish that were difficult to extract otoliths from and see.

JW: Yeah, I was going to ask if, if you were aging the fish using the otoliths on the ship or if the otoliths had to be sent back to the lab to actually do that...

JB: They're, they're aged back at the lab. The Canadian, some of the Canadian surveys wouldn't fish twenty-four hours. They would lay to for like eight hours or so, or maybe ten hours. Ten, ten to six, so that's eight hours. But these were huge ships compared to what we had, and they could carry extra staff so, on many of the Canadian surveys during that eight hour period when they were not fishing, they would have some age readers on board that would age some key species. And by the end of the cruise, they'd come off with the age data right then and there. But these were, many of these species were, they were using whole otoliths. You know, they couldn't section it, see. That, that just wouldn't have worked, so, um, you know, I think that approach. We, we had talked about, when, when the *Bigelow* was being, um, brainstormed there was a lot of discussion about, you know, doing stuff different. Chuck Byrne, have you, have you interviewed him at all?

JW: No, no I haven't.

JB: Yeah, you should, he was the Center, um, key person in the development of the *Bigelow* class of ships. I think the *Bigelow* was a second or third, they built four identical ones. And Alaska got the *Dyson* first and we may have been second. And it was kind of a departure from previous ship building approaches by NOAA.

JW: Why was that?

JB: Well, the, the *Bigelow* class was under the assumption that one size fits all. And in practice one size fit nobody. The Alaska Center was immediately unhappy with the *Dyson* because they felt it was too small for the conditions--

JW: Oh, really?

JB: --that they needed to fish in. You know, in the Gulf of Alaska--

JW: Yeah.

JB: --and the Bering Sea.

JW: Right.

JB: We, we felt the *Bigelow* was too big. In fact, it still can't come into Woods Hole without dredging. There was some dredging done out in the Steamship channel so at least it could get to the WHOI [Woods Hole Oceanographic Institute] dock but I guess it would take another million dollar plus amount of dredging to get it over to our dock and that's not going to happen.

JW: Yeah.

JB: So it's been in Newport. And it's not convenient to have your vessel not right outside where you can do stuff. I mean, you tie up a lot of staff time running back and forth and I don't think the crew interacts with the, you know, the Science Center like they would have if they were, it's important to have buy-in by the ship's crew in what we're doing. If, if, um, and we've always been on the, walking a fine line between who works for who. In reality, these ships work for us. But somehow, you know, there's this mentality that they're, they're doing us a favor or whatever. It's quite often a battle, a Chief Scientist will have to fight with the Commanding Officer.

The, but I think, when we had, one of the best Commanding Officers we ever had was Jack Moakley, and he kind of bubbled up through the ranks. He was the captain of the *Gloria Michelle* and, for two years when they were doing state surveys here, and the shrimp survey. He, he lived in the area, he bubbled up, you know, he understood the science, understood what we needed to get done out there. We've had other COs [commanding officers] that come from other regions that they just want to get back to the dock as quick as they can, and they've got, and, you know, a lot of reasons why we couldn't do this or couldn't do that, or.

One important, um, event that happened during my tenure was the use of trawl mensuration packages, like Scanmar or Simrad, trawl sensors. Because we never really knew--

JW: What did they do?

JB: Well, they measured things like wing spread--

JW: Okay.

JB: --and also temperature. In the old days, we had to drop an XBT at every station to get bottom temperature. And now we're able to get temperature with the trawl sensor. The, but we could also tell what weather or sea state conditions would do to the trawl. And we could calculate the trawl's efficiency, you know, from, from the standard. And we actually found that we were able to fish in heavier weather than we had assumed earlier without the package, so that, that was a good thing, to be able to get this thing going. [cell phone ringing] Do you need to take that?

JW: No, I think that's, that phone's actually from the previous occupant of the room.

JB: Okay.

JW: So maybe we'll shut, I'll pause it for.

JB: So that was a big aid to both the ship's crew and the Chief Scientist out there to make decisions about when we had to stop fishing because of sea state or weather conditions. Technology is great. We had none when I started to sea, it was really pretty crude.

JW: What were the main instruments that you used early on?

JB: Well, the ship did have Loran but it was Loran-C, it was way before GPS. And Loran had issues. It wasn't as accurate, and as far as communication, we just had radio and there would be one daily call, the Chief Scientist would call into the lab; there was no, like, personal traffic going on. When, when satellites and, you know, email became available, I think that really changed people's willingness, sort of the general lab staff's willingness to go to sea or not. I think early on it was a small nucleus of sea goers. And I think when communication, when they could communicate with family or supervisors or whatever, it kind of opened up the floodgates. More people were willing to go to sea because they didn't see it as, you know, twelve day totally out of touch--

JW: Exiled.

JB: Yeah, exactly. So that was a good thing. And that, we used to just have email or satellite links every four hours, but now it's continuous. It's way better.

JW: What was the shipboard environment like? What, um, what did the, who did the crew normally consist of?

JB: Well, for, let's take the *Albatross IV*, for example. Scientifically there would be a Chief Scientist and two six-person watches, each headed by a Watch Chief, so there's thirteen scientific staff and, for many years when I first started going, we would have an, a bird observer, we used to call him, someone from the Manomet Lab...

JW: Oh, really?

JB: And they would do sea birds and, um, marine mammal sightings. Usually on steams between stations, that would be their transept, and they would generate population estimates out of that.

JW: Interesting. And that's not the case anymore?

JB: No. No, in fact, the Protected Species Program has their own surveys and--

JW: Okay.

JB: --and so forth and so on, so that, that far superseded the information they got from the Manomet things. Um, when FSCS, are you familiar with that term?

JW: No. What does that stand for?

JB: FSCS... Fisheries Ship Computing System. FSCS. Yeah. I guess that's it. It was, and, and I was one of four people that was part of a total redesign of our sampling protocols. Ralph Mayo, Janice Forrester and Mike Fogarty were the other three. As a prelude to

FSCS, but it was essentially replacing wooden measuring boards that, you know, the measurer would have to, you know, provide the length to a recorder, you know, recording everything on paper. FSCS was a digitized sampling system so we had electronic measuring boards, you know, you would just put a magnet at the fish's tail, that length was captured. Electronic scales, put the fish on the scale hit a button when you had a stable weight. The recorder no longer had a data sheet and a pencil; they had a monitor. And you would be able to enter like sex, reproductive state, food habits, information all that kind of stuff electronically.

JW: When did these changes come into play?

JB: FSCS was probably early 2000...

JW: Okay.

JB: Maybe late, late, no, maybe, maybe mid '90s. It went through kind of a lengthy development. It was done mostly on site which was, which was impressive. We had, um, Paul Kostovick and Nancy McHugh who are still working at the lab, were heavily involved. Bill Kramer, who has retired, was also heavily involved. And there was some national group, but the Northeast just ran with it way faster than everybody else, both in developing it and implementing it.

JW: Yeah, I was going to ask--

JB: Yeah.

JW: --where, where we were in terms of--

JB: Our sampling, it was pretty revealing because it turns out that our sampling was far more extensive and more complicated than any of the other regions. They did fewer species, less sampling, that kind of stuff. So it made sense to design FSCS around the Northeast's needs and then you could dumb it down for the other, the other groups.

JW: So is it correct to say then that the Northeast kind of led them in those technological improvements and changing--

JB: Yes.

JW: --sampling protocol to involve that--

JB: Yup.

JW: --those devices?

JB: Yes, it's safe to say that. And a lot of people worked hard on that. But, I kind of got away from my point, but once we developed that system, you know, of course stuff happens at sea so you needed a FSCS person at sea. So that vacant berth that we had for the bird person previously was now filled by the FSCS person. And, you know, they

tended to float between the watches and quite often you'd have to go get them up at 2:00 a.m. to fix something.

JW: What sort of troubleshooting would they do?

JB: Usually, I hate to say it, but for the first several years, it was operator error. It took awhile to get, not just the Watch Chiefs but the recorders up to speed with how to use the software. It, it is in a, I don't know what version they're on now, but, you know, every iteration it got better and better and faster and faster. It's probably something else right now. But what it did was allow the data to be available much more often. Initially it still needed a fair amount of auditing after the fact. But later versions you could actually, the Chief Scientist, would be responsible for this and the FSCS administrator, but actually audit that data at sea so that when you got back, and you could transmit the data, like, you know, so it just sped up the whole data availability thing. That put more pressure on Age and Growth, my group, because we still had to age the fish back at the lab. But before, we would usually have the fish aged for a given species and cruise by the time the audits had been completed by the survey unit. Now the data was essentially clean and we needed to speed up a little bit to make the age data available.

JW: So that must have put more pressure on the schedule, then.

JB: Yes, it did a little bit. The, also at the same time we went into a period where the managers and the assessment group worked together to do fewer assessments per year. So a single species may not be assessed but every three or four years. So instead of trying to be current with everything at the same time, you know, there was sort of a rotation--

JW: Cycle through.

JB: --and you could schedule the aging around that rotation. And that schedule was mapped out in, you know, several years in advance so you could, you know, do some good planning.

But I diverted from your original question about the makeup of the ship's crew. So there were fourteen berths for scientists. I think the ship's crew consisted of thirteen people. I'm sorry. Twenty-three people because total would be thirty-seven. Thirty-seven on the *Albatross*. So there was the Commanding Officer, the Executive Officer, then two other NOAA Corps watch standers for a total of four there. There would be an electronics technician, there would be a Chief Engineer and then two watch standing engineers and a wiper, sort of a utility guy. There would be a galley staff of two to three people. And then there would be six to eight deckhands that would operate the gear; as things got more technologically advanced, we were able to go from four to three. But you, you always needed like a lead fisherman up on the deck or the, I'm sorry, on the bridge or the back bridge for the boom and the winches. And at least two guys on the deck.

JW: Was the lead fisherman someone recruited from the commercial fishing industry?

JB: Early on, yes. Later on they, some of them were developed from coming aboard the NOAA ships and bubbling up. Yup. The whole *Delaware II*, probably was, had the last group of former fishery guys. They were pretty, pretty funny guys. They were curmudgeons, most of them. They, they enjoyed, enjoyed fishing, enjoyed being at sea, didn't really understand the science but didn't, didn't really, it didn't really bother them. I think most of our struggles with crew was at the officer level. They seemed to have a different agenda than everybody else on the ship. So it, you know, it's a big, big, it's thirty people, thirty plus people thrown together for twelve to nineteen days for, in the case of our survey cruises. And all the complicated human dynamics that can go along with that. You could really get to know people out at sea. And quite, I'm sure it exists to this day, but at the lab there's sea goers and non-sea goers. And I think there's, that there's some camaraderie among the sea goers that the non-sea goers don't have. It, it's, you should do a cruise sometime. Maybe you already have, maybe you've been on--

JW: No, no I haven't had the chance--

JB: --eight, eight thousand days and I don't know about it, but, just, and we have had some of the social scientists over the years. Barb Pollard would go quite often, John Walden, is he, he's still--

JW: Oh, yeah, downstairs, yeah.

JB: Poor John Walden, he, he was on a cruise, on which I was Chief Scientist. We were out on the southeast part of Georges Bank which is about as far as away as you can get. And there was a good storm and, you know, when you're out there, you just jog, you just ride it out, you can't work, you just hang on for a day or a day and a half or something like that. He passed a kidney stone--

JW: Really.

JB: --during that period, he was in utter agony and--

JW: That must've been terrible.

JB: --it, you know, we really, had a quandary as to whether or not we had to run him to Canada or not. You know, thankfully it turned out okay, but he was wretched. And stuff like that happens. We had a lead fisherman on the *Albatross* have a major stroke and, and he was essentially dead by the time he hit the deck. The crew wouldn't let him go that easy; they performed CPR for three hours until a helicopter picked him up and took him off, but it was to no avail. We've had people, you know, badly injured, you know, broken bones, separated shoulders, that kind of stuff.

The, there's always, usually there's two people that, on board. Usually one of the fisherman and one of the officers have medical training. And they're on, you know, they're on the radio or the phone with medical people all the time to make decisions. But quite often we have to run people in. Chuck Byrne, who I'd mentioned before, stuck his hands in a pile of fish and there was a stingray in there, and the spine got an artery in his hand. You wouldn't think that would be too bad a thing but he had a severe

reaction to it, his hand got huge, he was in shock. We had to have the Coast Guard run out and take him off. It's, it's an isolating situation in a lot...

JW: Yeah.

JB: But, do you know Steve Wagner at all, does that name mean anything to you?

JW: No, I haven't come across it.

JB: When I started going to sea in '82, he was a deckhand. He was one of the, you know, low, low level fishermen, able body seamen. Steve studied, his, and there's a lot of downtime at sea, you know, we worked, back then we worked six hours and we were off six hours. Now it's twelve and twelve which helps with a lot of those sleep issues that the six and six contributed to. But Steve, instead of watching movies, he would study. And he studied and he studied and he studied. And he bubbled up, became lead fisherman, took every exam possible and he ended up being both the Commanding Officer of the *Delaware II* for several years and the last Commanding Officer of the *Albatross IV*.

JW: Wow.

JB: Yup. And he--

JW: That's a long way to go.

JB: --he's, he lives right in Woods Hole, right on Woods Hole Road. He's very active in the Coast Guard Auxiliary now. But that, that rise was virtually unheard of, from deckhand to CO. And he wasn't in the NOAA Corps, he was a civilian person all the way. But.

JW: So with, with the aging of the, of otoliths, how did that process change, or evolve, from the early '80s up to when you retired?

JB: The, the premise is, the otoliths are different shapes. Gadid otoliths are long and skinny, flat fish otoliths are usually round, disk shaped. Red fish ones are totally asymmetrical. But each otolith has a center, a nucleus, and there's always an orientation, one way or another depending on the shape, that gives you the best view of all the growth rings. But you've got to section it through the nucleus. And when I began my research and I was doing my work with the Age and Growth Unit as it existed since the '60s, they were sectioning--

JW: On the witch flounder?

JB: Um, yes, I was doing witch flounder.

JW: Yeah.

JB: --they were sectioning only one or two species at the time. I know they were doing red fish. But it was very labor intensive, one otolith at a time, and it required a little

cardboard tab that you would put a piece of scotch tape on. You would very carefully, you'd have crosshairs on the cardboard tab, you'd put a blob of melted wax on there, position the otolith in the melted wax, depending on the species for the right orientation so that those crosshairs would delineate the center. Put another blob on top to cover the whole thing, put this little cardboard tab in a diamond saw, or a saw that had a chuck that would come down and be sectioned by two diamond blades that were spaced very narrowly apart. And it would probably take fifteen minutes to, from start to finish, to section an otolith. You multiply that times hundreds, and we weren't just getting samples from the, um, just the surveys, we were getting them from the commercial fisheries as well. So it was so slow. We had four of these saws going with technicians, you know, the smell of melting wax was pervasive for all that time.

JW: Why the cardboard on either side?

JB: Um, that would, that would peel...

JW: Was that only for positioning purposes?

JB: Yeah. exactly.

JW: Okay.

JB: The, that was a bottleneck and that, for many, many years, limited our ability to, you know, sample. We had to be very efficient in, in our sampling. In the, right around 2000 or so, I, it kind of happened in a hurry, but my long-time boss, Frank Almeida, he was the head of Age and Growth from, throughout most of the '90s, I guess. And he very quickly became Branch Chief to replace Marv Grosslein, and then almost, within six months of that, became Deputy Director under John Boreman, and so I succeeded Frank as head of the Age and Growth. And then when he became Branch Chief, in addition to Age and Growth, I became the Acting Branch Chief. Within, within that program also is the Food Habits group and the Apex Predator group in Narragansett.

JW: And did you retire shortly thereafter?

JB: No, no, I did the Acting Branch Chief thing for two and a half years.

JW: Okay.

JB: Nancy Kohler did another year and a half. Do you know Nancy from Apex Predators in Narragansett?

JW: Yup.

JB: Yup. And then we finally hired Rich McBride from, from Florida. But I've remained the, for ten years, the head of the Age and Growth Unit. But in the, in the early '90s the Canadians had, I'm sorry in the late '90s, the Canadians were experimenting with mounting otoliths in these blocks of resin and then you could section several otoliths at the same time. But they were kind of making it up as they went along, but I researched it and there was a company in England that was making the equipment, you know, the,

most importantly the saw that you would need. But the rest of the equipment, the trays for the blocks of resin, the video system that you needed to mount the otoliths precisely through the nucleus and everything.

And I told my Division Chief we had to have that, you know, we, we could not keep up with the demand unless, unless we could better automate what we were doing. So it was a \$25,000 investment which was huge, I mean, I don't think, I don't think she spent \$25,000 on us in the ten prior years. But she, she bought it and, you know, we had this wonderful guy come over from England and set it up for us. But it saved our bacon and it allowed one technician to mount, mount and section what it would probably take, in one day, what it would previously take four technicians a week to do. So it was a huge, it was a quantum leap in our ability to produce these sections.

Now the hardest part of that transition was finding resins that were not dangerous to my staff. The, the, what the Canadians were using were toxic and, and I, and the Europeans were just as bad but they didn't have the same health standards that, you know, OSHA [Occupational Safety and Health Administration] has. But I, I didn't even, you know, get involved with OSHA. We do have...

JW: Was this an epoxy kind of...

JB: It, it exactly was. And I worked, probably spent more time with this one chemical company to get the right stuff, because you had to mix a couple things together.

JW: How many parts did it consist of?

JB: Um, two, a resin, a main body resin, we want, the resin was clear but we had to put black coloring in for the contrast. And then a hardener at the last second. And you had to work, work quickly once you put the hardener in. But I probably spent three, three months or more, they, they, we had to upgrade our ventilation system in the Cottage, we, you know, had to get a special hood and we also had to build a hood around the video system where the actual mounting was done too, to ensure staff safety.

JW: They wouldn't be overcome by the fumes.

JB: Yup, yup. But, you know, nothing that was carcinogenic, I mean, I'm, of all the, of all the things I'm proud of, that was one that, I took the time and was able to successfully come up with a chemical that was safe to everybody. Because I wouldn't have it any other way.

JW: So how long did it take to develop that, and how many--

JB: I would say--

JW: --chemicals and other variations did you have to go through--

JB: I would say--

JW: --in that process?

JB: --probably, once the equipment was set up, it probably took us four months to really get it, and the first three of that was coming up with the right, right chemicals. But it required, previously all our age samples were in the envelopes, these small envelopes where the sample was collected at sea or in the ports. So the sectioned otolith from the old system, sectioning them one at a time, would be carefully folded into a little piece of paper stuck back in the envelope and then when the age reader had to age that sample, have to pull it out the envelope with forceps, get the little section, put it under the scope, put it all back once you've aged it, and write the age on the envelope. And then during the age entry part, staff would have to go through all the envelopes to get the fish ID, the length, the sex, the maturity and the age.

In the new processing system, all that information was put on a data sheet as the otolith was being mounted in the resin. And then all the data entry subsequent. Oh, and you would end up with a strip of five or six sections, and that was so much faster for the age reader to age, because you could age, you know, not, you wouldn't have to keep playing with them, you could just age that strip, you know, in a couple of minutes or less, and write all the information on a sheet. So it not only sped up the sectioning, but also the aging and the data entry part. And these were all necessary for us to keep up with the increased availability of the survey, survey data.

JW: So prior to the advent of the machine then, how many otoliths were you having to section?

JB: We, we,

JW: You know, at one time?

JB: Yup. A good year in, under the old system, would be perhaps 30,000 sections. When I, when I left in 2010 we were probably doing 100 to 150,000 sections.

JW: Wow.

JB: And I'm sure it's even greater, I'm sure it's even greater today. So it was a quantum, quantum leap. And if, don't know what I would have done if my Division Chief hadn't agreed with me to get that equipment. It was a scary investment at the time, and it doesn't sound like much money now, but it was. And I'm eternally grateful. She was also on my master's committee.

JW: Oh, really?

JB: So that helped. We did have some history.

JW: And this was in the mid-'90s, you said?

JB: Um, late '90s.

JW: Okay, late '90s.

JB: Late '90s, yup. Well, probably early 2000, because it was after I took over as, um, head of Age and Growth.

JW: How many age readers did you have working for you at the time?

JB: Uh, my total staff when I left was sixteen. Most people had aging responsibilities. Some people had two or three species. Some of the technicians that did the mounting and data entry would just have one. So, I think, I think we were aging around twenty different species. So that group of sixteen aged, aged that amount. Again, some people aging two or three... I know, when I decided to retire, I was aging five different species at the time. And some of that was because I'd inherited those species from people who had retired and so forth and so on, and so I had to schedule training to pass those species on to, to other staff over that... I had decided two years before I actually retired, everyone said "no, no, don't think like that, don't announce your retirement two years in advance". It was the best thing I ever did because I, again, the same Division Chief--

JW: To be able to ease that transition and...

JB: --exactly, and she actually got me a couple of temporary positions, contract, contract positions which I wouldn't have had otherwise. And the, I lost my train of thought, there was another benefit to that, um, oh, and I was actually able to be on the search committee for my successor. So we, we had a pretty seamless transition. He didn't overlap me because he had to get out of his other position so we missed each other by a couple of months, but I worked closely with him that first year to.--

JW: Yup.

JB: --do that.

JW: Were there any other aspects of the, the preparation of the otolith, besides the resin? I was reading somewhere about having to bake the otolith?

JB: Yup, we do, we still bake cod otoliths to this day. Bake and break.

JW: What's the purpose of baking?

JB: Um, the baking at a certain temperature, the otolith is a, just a glob of calcium and it's just calcified stuff. And the intensity of the calcification varies by temperature so a species in the north Atlantic where there's a nice seasonal temperature is going to have highly calcified zones related to fast growth, then you're going to have a poorly calcified zone related to slow growth which is usually winter. Fish, being cold-blooded, are, you know, their feeding is temperature dependent; when water's warm, they have to feed more to maintain, you know, metabolic rates. When it's cold, some species stop feeding altogether. They don't starve, they just don't grow. But that results in a poorly calcified zone in the otolith and those are what we're really targeting, is counting the dark zones in the otolith. We call those annuli. And, so in the case of cod, and we tried it on several other species, but baking changed the color of those zones and it made it easier to see, see the rings, the annuli in the cod otoliths.

JW: At what temperature would you have to bake it?

JB: I think it was like 650 degrees we, it was kind of tedious, but we had it over in the, there's a, over in the main building there's a, we call it the cutting room, but there's a dissection room and for fish processing. And we'd have a big oven in there, and you know, and it was like, fifteen minutes at 650, and then the age reader would snap them when they were ready to age them. We didn't have to section them, just snap them. **JW:** You didn't have to use the diamond saw to--

JB: No.

JW: --break those apart?

JB: No. The, probably the, well, it's kind of egotistical to say legacy, but probably the thing I'm proudest about is the QAQC program that I established. It irked me all the years that I was in Age and Growth that we didn't have a better one, or didn't have one.

JW: What did that stand for?

JB: Um, Quality Assurance, Quality Control. It was pretty easy to standardize the sectioning and, you know, that I wasn't worried about. But the aging. When I first started in Age and Growth, we kind of functioned on a two age reader system. You'd have a primary age reader and then someone else was also trained on that species and too infrequently, in my view, they would age a small subset and, for comparison, and see how closely they agreed. But there was no real protocol, no, it wasn't really etched in granite, it was just catch as catch can. And it was easy to blow it off, you know, "oh, we're too busy to do those kind of things".

But it wasn't robust in terms of generating statistics on precision and accuracy, and it seemed like we would always take a beating in meetings. If there was an assessment problem, the first culprit was the aging. Oh, it must be bad aging. When we did, we joined assessments with the Canadians, they'd always say, "oh, you guys aren't aging things right". And we did have exchanges, but again, they weren't robust enough to really give you any sense of how good or bad that aging was. And it kind of came to the forefront about the same time I became head of Age and Growth, I was asked by an Australian researcher to help him write the keynote address that he delivered at the Otolith Symposium in Australia that summer. And I didn't travel to it, I could have but I, instead I sent one of my junior staff that I really thought would benefit more from going. And she did. But in, in putting, and the, the component of the keynote address that I was involved with was evaluating QAQC programs in Aging labs all around the world. And that's when it struck me, is, we've got to do better, you know. This just, what we're doing here in the Northeast, is not acceptable in my mind. Probably the Northwest Center was doing the best, in my, in my view.

JW: What were their protocols?

JB: Well, they, they would routinely, um, test their age readers. I'll explain it more when I get to what we implemented. So I think it was in 2003, I told my Division Chief, Wendy, who, who kindly gave us the sectioning equipment, that we had to, we had to do

something better. And I said, "to do this, we're probably going to take a hit for a year because we would have to spend more time on developing some reference collections and some second, second readings". But I, we actually looked at the assessment schedule and 2003 was a good year to take a hit, we could get by, it wasn't a heavy aging year. So, again, bless her, she signed off on it, trusted me to do it.

And so we, and the, my junior staff that I sent to Australia, she was very helpful too. She did some of the programming for it. But we set up a system where we didn't rely on two age readers per species anymore. That was a luxury we weren't going to be able to afford anyways. But we would regularly test an age reader, have them do a second reading of stuff they had already production aged. So if someone aged a survey cruise, before I made that data available to Pop-Dy [population dynamics] for use, that age reader I would select a hundred or so random samples from the production aging and have them re-age those. And we would calculate a variety of statistics, coefficient of variation was, was the big one, but test of symmetry for any bias.

And, and to be honest, I was scared to death to implement this. It had to be done, I knew that, but I, my fear was, well, what if we're not doing that good a job? What the hell then? And my staff amazed me. The, the CV, you know, CV over five is a concern. We were getting CVs of ones and twos, stuff like that, with no bias. Percent agreement is per-, perhaps the least useful metric, but we were always getting percent agreements above eighty percent. And this got implemented as a regular thing. So if you finished aging a commercial quarter, you know, 500 cod samples from quarter three, again, there would be a test of the age reader. And, you know, first the age readers were all uptight about taking this test, but as it built on itself and the excellent results were pouring in, you know, it was fun. They looked forward to it and they were proud to do it.

The other thing is I put all this stuff on a website that anyone could see. It was totally transparent. And we didn't hide a bad, bad test. And occasionally there were some. And that would require some remedial action, but it was all out there for people to see. We also established some reference collections for key species: cod, haddock, yellow tail, fluke, three or four others. And that took much more time because, in that case, you had to have multiple age readers agree on an age for the samples in that reference collections. And quite often that involved sending samples to state agencies or Canadians to have those, and if you had four or five people aging a species, you know, keep, keep the ones that everybody agreed on, throw out the disagreements, and you would have a 3 or 400 sample reference collection. In addition to all the, you know, regular tests that my staff would take, the people aging those key species that had reference collections, would have to calibrate themselves against the reference collection once a year.

So we were starting to very quickly develop some strong evidence about the quality of aging that our lab was doing. We were able to totally shut up the Canadians, that no longer, because they didn't have this, or, or, not to share. And it, it also, I think, pleased the assessment people. I mean, it reassured them that the aging was pretty good. But it also gave them hard statistics where they could take that, whatever level of uncertainty in the aging and carry that through their models to see what the impact of aging uncertainty was. And for many species it proved to be negligible. You could, you could have eighty percent agreement and that wouldn't really change the outcome of a VPA

[virtual population analysis] output or anything like that. So I think that was very reassuring for the assessment people as well.

And, and I couldn't have stressed more to my successor that he must continue this thing and he has, it's, the website is impressive, you know, we've got thirteen, fourteen years now of test after test after test, you know. The reference collections exercise gives you accuracy, because those are considered to be known aged fish, so you can test for accurate aging. All the other tests, you know, the second readings, are considered to be precision, precision tests. We can test for both, you know. And we've been lucky, we've had some opportunistic chemical, or biochemical validation of some of our aging. I explained that cold temperature, warm temperature thing; that causes the ratio of the Oxygen 18 isotope to Oxygen 16 to fluctuate through the year, and you can actually take little dremel drillings across an otolith, a transect of an otolith, and document, you know, validate that what you're calling annuli truly are, based on that O18 to O16 ratio. And there's some other, you know, elemental analysis type, chemical elemental analysis things that you can look at. For some of the older samples, the period in the late '50s, I think it was like '58 to '62 there was actually some atmospheric testing of atomic bombs both by the U.S. and the Russians, and that put down a signature--

JW: Oh, with strontium 90?

JB: Yup, yup. So there's radioactive isotope information there. But all these things reassured us as to, you know, that we were indeed aging these things correctly. And there's still a lot of uncertainty when you put a, take all that diverse data and throw it into an assessment model. I mean, at least aging is the least of the concerns now. And before I think it was quite often a major concern. So that's, that's been a real positive thing. Of those uncertainties, we always thought that, I don't know if you've, if you're familiar with the assessment stuff or not, but a recent phenomenon has been, it's a problem, and it's called the Retrospective Pattern. In assessment, you do an assessment in year Y, and it hangs together good. But maybe five down, five years down the road, things diverge from what the previous assessment would have predicted. And we've wracked our brains trying to reconcile why this happens, this Retrospective Pattern. And there's, there's been, like, adjustments that have, you know, been made and they've kind of done some workarounds to deal with it, but the real reason for it. For a long time aging error was thought to be part of it, but that's, that's been put to rest.

JW: What's the thinking on it now in terms of...

JB: Well, the, the most likely culprit is something we'd always dismissed, was landings data. We always felt that the system we had, gave, you know, plus or minus, was giving us good information on the landings. When you see the whole Carlos Rafael thing, we don't know. You know, was he the only guy doing that? I mean, he was, and one of the species was witch flounder, and my poor wife has to do the witch flounder assessment this fall. But she doesn't even know what the landings were the last several years because his witch flounder were being called haddock. And is that an isolated incident, or is it more pervasive? You know, that's a huge source of uncertainty, probably would have the biggest impact in a VPA type model, if you can't trust the landings. So, I don't know.

JW: So what do you think is the future for otolith reading and the use of aging data in stock assessments?

JB: One, one thing I didn't complete in my career, and I gave a good stab at it, was to get image analysis systems to read otoliths and take people out of it. I worked closely with a couple guys in Alaska. This, this is something I could not get any money for, even, even Wendy didn't buy into it totally. I tried Headquarters, but there were, there are these guys in Alaska that were image analysis wizards. They had set up systems for fish passages on many of the salmon rivers so they could identify the different species of salmon, you know, just have a camera watch it all and identify a sockeye from a pink and all those things.

JW: Right.

JB: They thought otoliths were a piece of cake and scales. And I sent them yellow tail scales, winter flounder otoliths, and their preliminary work was excellent. The, it would still take some technician to align the things in a meaningful way to, for the image analysis system to look at them. And, you know, some work as to how to record that data and again, you'd probably want to test it. I know early on I detected that directionality, I don't know how they were actually doing it, but if they turned an otolith ninety degrees sometimes they'd get a different result.

JW: Interesting.

JB: Yeah. Yeah. So you'd have to work out a bunch of details like that, but I, I basically ran out of time and didn't really have the financial support to pursue that. And one of the, one of those guys left, left the company and I believe he's at Headquarters now; I don't know what he's doing there. So that kind of fell apart. But I think that...

JW: Have others tried to jump in and--

JB: I tried--

JW: --pick up the search?

JB: I tried to get my successor interested in it, but I think he was overwhelmed. I mean, he, he basically went from finishing a master's to a state job in Georgia and then up here and it, the learning curve was considerable up here. And, and he's had some staff turnover and he's had to assume more of an aging, when he came in he didn't have to age anything, it was my gift to him. But he's had to assume a fairly heavy aging workload. And they've actually added a couple new species, so, you know, I'm not being critical of him at all, he's done a great job. But, I don't know. We need, I think that's the future. And it, and I think it could take so much of the subjectivity out of, out of aging. You know, it's almost a, um, you're almost cut your own throat when you tell people it's like counting rings on a tree, you know. Because that sounds so simplistic. But these otoliths are not that easy to interpret. The, the, you know, zonation isn't crystal clear. And there's things like spawning checks and...

JW: What does that mean?

JB: Well, when the fish spawns it's a little stress on the body so it can put a, a highland zone or a poorly calcified zone in the middle of a growth zone that could be mistaken for an annulus if you weren't, weren't aware of it. Winter flounder in warm areas sometimes will shut down in the summertime, they'll actually bury themselves in the substrate and do nothing for a few months and they put down what we call an [unintelligible] check, where they've been passive again. But, you know, we know those things and it's just a matter of the age reader being aware of them. But if you were to put the image of an otolith on, you know, next to a cross section of a nice oak tree, you'd, you'd see that aging a fish is pretty complicated compared to counting rings on a tree. I, it's a useful analogy but it's a misleading one.

JW: Overly simplistic.

JB: Yeah.

JW: One thing I was going to ask before that I forgot, was how long does it usually take someone to become proficient on reading an otolith?

JB: Depends on the individual. Some, some people are gifted; they're, they're locked into pattern recognition. Some people it's a total waste of time; they're never going to get it. And it kind of takes a special personality to be able to do this thing over and over and over. Age and Growth historically has been known for having some characters, and some, you know, typically they're, um, not as highly educated, you know, there's a couple college graduates, there's one person with a master's in the group now. But for the most part, it's technician-level people that have shown an aptitude, not all of them do. And some, some people can do perfectly well with a scale but not an otolith, or vice versa, or one species but not another. Some of that's just trial and error and I think I was fortunate to have so many years in the group before I took over the group to know, know the staff, to have aged with them, be involved with training and that kind of stuff.

JW: To have literally aged with the staff--

JB: That's right.

JW: --while you're aging. [laughs]

JB: We have, we can view things on an image analysis system, we have two over at the Cottage so you can put samples up and have group discussions on them and stuff like that. And we have a really nice microscope that'll accommodate two readers at the same time, two sets of eye pieces. And you just have to spend a lot of time slogging through it. Training it, training the new age readers is unpredictable, you know, some get it right away, some...

JW: A substantial investment and time.

JB: Yup. Then, then you hate to have turnover when, when you've got somebody trained. You want to hang on to them. It's not for everybody, clearly. Women seem better at it than men. Not sure why, I don't know, probably a left brain, right brain kind

of thing, I don't know. I don't know what it is, but women seem to lock into those patterns quicker.

JW: Do you have any other recollections about the scientific community and its' makeup here when, when you first arrived?

JB: Yes, I do. Actually, I, I had a fortunate pathway through fisheries. When I started, again I was balancing my thesis research versus work, but I actually started as, in the Assessment group for Steve Clark. There were three or four assessment scientists that I knew even before I even got to Woods Hole, you know, when I was doing, you know, research at UMass I was aware of their work...

JW: You knew them by reputation.

JB: Yeah, yeah. Excellent, excellent assessment scientists. Steve Clark, who's deceased, he was my mentor, he was on my committee. Fred Serchuk, who recently retired, Vaughn Anthony who was a notch above them. Okay scientist, good, pretty good assessment instincts, but he, he was a bulldog in dealing with industry and the Council. He looked out for his staff. Ralph Mayo is another senior assessment person that was great. Emory Anderson, who you talked to. You know, in more recent years, Paul Rago would be one. Gordon, Gordon Waring was in Assessments for quite awhile and then Swent over to Protected species. But I got my start in the Assessment group. I was, um, a technician for Steve Clark. And the, my first summer there we put, we did the first ever witch flounder assessment and the next summer we did the first ever white hake assessment. But my initial work was at the assessment level, so I was immediately had to learn all the data sources, you know, the commercial data, the survey data. We didn't have much observer stuff going on then. The, you know, any state survey data that was relevant.

JW: Was this all landings data or aging data as well?

JB: All, all that stuff.

JW: Yeah?

JB: For which there wasn't any, um, actually for white hake there wasn't any, but white hake is now a species we currently age. But, just, you know, pulling together survey indices, you know, trends in abundance and biomass, landings patterns, where, where are the fish being caught? I mean, for witch and white hake we didn't know any of that stuff. I went to sea a lot, but, but I think having those couple of years in the Assessment group made me appreciate the quality of data that they needed to do their job right. And that's something I was able to carry on when I went to survey for a year, and then to Age and Growth. I had a better appreciation. And I think it also contributed to the good relationship I had with the assessment people. The, um, I've seen it in other labs where the aging group and the assessment group aren't on the same page, or they have different agendas or don't trust each other or whatever. It's not a, not a pretty sight.

And I think the Northeast Center has been fortunate over the years with Judy Penttila with Frank Almeida, with, um, my successor Eric, in maintaining that strong

relationship with the, with the assessment group. The age data is such an important component of these age-structured assessments, I mean, that, that sets your mortality rates and, um, delineates your projections outwards. You need to know what the age composition of a stock is year after year. And it'd be great if you could just ask fish how old they were and not, not do all the work that's necessary to determine that. But, I think image analysis would be, would be the next big breakthrough. You know, they're doing it for some species somewhere. There's been some very successful single species approaches, but I think the Northeast has to get on board that train. But if I never aged another fish, that would be okay too.

JW: Wouldn't be problematic? [laughs]

JB: No, no. I was ready to retire. I, I had planned for it, I had gotten some additional resources by announcing it early and it, it prevented that, you know, six month panic of training new age readers or whatever. It was pretty smooth. And, and it goes on. I don't know if you know where the Age and Growth Unit is, in the Cottage?

JW: Where is the Cottage exactly, is that--

JB: Well, you know where the aquarium--

JW: --right near Pop-Dy?

JB: You know the aquarium building...

JW: Yeah.

JB: And then there's the town dock and the boat ramp; the next building over...

JW: Okay. Really.

JB: It used to be a Cottage. In fact, it used to be a residence for the Director.

JW: Was that also where experimental fisheries? Or Exploratory Fisheries Research was conducted as well?

JB: I don't think so. This was, this was, there was a building that was down the street in Woods Hole and actually got moved and turned 180 degrees to its' current site after the '54 hurricane.

JW: Interesting.

JB: But it was the...

JW: Did they move it for purposes of preservation?

JB: I think to, Fisheries grabbed it as an opportunity to have a residence for the Director.

JW: Okay.

JB: So Herb Graham, back in the '50s, lived there. And I think Marv Grosslein, when he came, lived there briefly until he found, found some other housing. But it was, it's called the Cottage and that's what it was, you know, probably a summer cottage that had been winterized and had a kitchen, you know, it's kind of laid out like a house with a big central room and a, um, it, it, um, is an entity unto itself. It can be very isolating if you want it to be, you know, you're not interacting with staff from the other groups or other buildings, or it can be a pleasure to be isolated from all that stuff. You know, depended on your approach. The, one galling thing I had. I had, like, a pretty much a war with the safety people over the years. They would nitpick at a lot of things related to the Cottage. And I, part of my motivation, other than my staff's health in doing right by the resins, was to avoid any kind of conflict with them. But to this day, the Cottage is still not handicapped accessible. And I can think of three occasions where me and some of my burlier staff had to carry wheelchair bound people into the building, which I just found totally unacceptable. It just galls me that something hasn't been done about that, particularly since there's room for a ramp in the back to get into the back of the building. Just...

JW: So ADA compliance is still a goal for some year.

JB: Yeah. You can make everybody else do it, I guess, but if you're the government you don't have to do it yourself. Whatever. But Jim Craddock was, well he worked at WHOI [Woods Hole Oceanographic Institute], and he was a deep, deep water expert; deep, deep sea fishes. And we were getting involved with some of those and he was wheelchair bound in later years and we had to carry him in. Dave Hiltz who works at the lab now, his wonderful wife Yvonne, who passed away several years ago, was wheelchair bound and she, she worked for DMS and did a lot of the programming for our data entry, age data entry systems. When we had to get her over there, we had to carry her wheelchair in. I don't think we minded carrying the wheelchair, but I think it was embarrassing for them.

JW: Well, if you have any, any other parting thoughts or other things that come to you, we can...

JB: I, I couldn't imagine having a better career than what I had. I mean, there were always, you know, always problems and issues and but that goes with everything. I would say the exceptional people that I worked with over the years made it above and beyond what I could have dreamed of. Overachievers, fishery patriots. I mean, people that care about the resource. I mean, I don't think any of us want, you know, the oceans so full of fish you could walk, walk across them on their backs, but we want sustainable fisheries. And I think the happiest thing is when we have haddock recover, you know, miraculously, like it did with the 2003 year class, I mean, that just came out of nowhere. And now it's, now it's great. Pollock's doing good.

We don't want fishermen to suffer and go out of business or anything, but, but, but we have some responsibility to the resource too. I guess I see it, if industry is mad at us and the green groups are mad at us from opposite ends of the spectrum, we must be doing something right. Or, I hope so. But, you know, the time at sea with, with so many different individuals, the, so, you know, some of the senior staff when I came here, the

example they set, Fred Serchuk. I, one of my side jobs in retirement is I'm on the board of the Woods Hole Historical Museum. And I think you know, I think you know Jennifer Gaines...

JW: Yeah, I know Jennifer Gaines, yeah.

JB: Yeah. She, she spoke highly of you before.

JW: She's great.

JB: She's retiring in a couple of weeks.

JW: Yeah.

JB: We're lucky to have an observer. But we had our annual meeting a couple of weeks ago and one of our exhibit themes this year has been the history of the cod fishery on Cape Cod.

JW: Right, I remember she mentioned that at the holiday--

JB: Yup.

JW: --party.

JB: Yup. And we had a couple speakers and our speaker, the, at our annual meeting was Fred. And he did a great job on the history of the cod fishery and everything. But I had the pleasure of introducing him. You know, and I ran through his resume and all that stuff, all the bullet stuff. But then I said "that to me, the true measure of Fred was the example that he set to people, that we were only as good as our data, so if you worked at NOAA Fisheries and you had to collect data, collect good data, you know. If you analyzed that data, you had to analyze it objectively and carefully and thoroughly." And those, those were things we learned from people like Fred and Steve Clark and Emory, who you talked to.

I, I'm sure we have some, some people there today that are the same, but there's a disturbing number of people that are policy people, even at the Science Center where, you know, I could see them being up at the RO [regional office] or Headquarters, but we got policy people now that, I don't know if some of them have even touched a fish, and they're making decisions about the science without really listening to the scientists anymore. You know, there are decisions that are made from a policy perspective. And, and we've been through these cycles before. In, in, when I first came to the lab there was a very controversial Center Director put in place. In fact, before he even hit town he was quoted in the Globe as saying that, "we don't need all those scientists, we just need to hire thirty economists to manage the fisheries". So, it, you know, that was a tough beginning. So I'm hoping that things will swing back the other way and that the science will...

Scientists don't do a very good job of tooting their horn. They, they tend to let the product speak for itself and if you have people who can't interpret the product properly

then, then it's not properly appreciated. We have some excellent, you know, Paul Rago is top notch, Chris Legault now is top notch. Mark Terceiro, there's others in that assessment group, and I hope that they can have a chance to be as influential as, as people like Steve Clark and Fred Serchuk and Emory. That's, that's the hope anyways, and that they're not overwhelmed by the policy wonks. So that's a, that's all I have to say and I'm sticking to it.

JW: Okay. Well, Jay, thank you very much for coming by and for sharing your candid thoughts today, and memories and perspectives.

JB: Yup.

JW: I appreciate it.

JB: They can't fire me now.