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Berejikian, Barry ~ Oral History Interview

Maggie Allen

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

Interview with Barry Berejikian by Maggie Allen
Summary Sheet and Transcript

Interviewee
Berejikian, Barry

Interviewer
Allen, Maggie

Date
September 27, 2016

Place
Manchester, Washington

ID Number
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Use Restrictions

Biographical Note
Barry Berejikianwas born in 1967 in Panorama City, California, and spent his childhood summers going north on camping and fishing trips, particularly for trout and salmon. As a behavior ecologist, he leads the Behavioral Ecology Team and the Hatchery Reform Science Program at the Northwest Fisheries Science Center in Manchester, Washington. He received his B.S. in Environmental and Systematic Biology from California Polytechnic State University in 1990 and his M.S. in 1992 and his Ph.D. in 1995 in Fisheries from the University of Washington. Upon graduation, he joined the Northwest Fisheries Science Center in 1995, where he worked on projects aimed at quantifying the effects of artificial reproduction of salmon and steelhead on natural populations. From 2007 to 2012, he served on the Northwest Fisheries Science Center's Research Council.

Scope and Content Note
Interview contains discussions of: steelhead and salmon fisheries in Puget Sound, pros and cons of hatcheries and wild fish, declining stocks, effects of harbor seals and prey on fisheries, and various research projects over time in the Pacific Northwest.

Dr. Barry Berejikian provides a description of how his career evolved and his work with the Behavioral Ecology Team and hatchery science.

Indexed Names

Dickoff, Walton
Flagg, Tom
Getz, Rick
Mankin, Conrad

Transcript [note: recording at times has audio issues and is unintelligible]

Maggie Allen (MA): This interview is being conducted as part of the Voices from the Science Center's project funded by the Northeast Fisheries Science Center. It is also a part of the Voices from the Fisheries project that is supported by NMFS Office of Science and Technology. I am Maggie Allen and today I am speaking with Barry Berejikian at the Manchester Research Station in Washington State. It is September 27th, 2016 at 10 a.m.

Barry was born in 1967 in Panorama City, California, and he leads the Hatchery Reform Science Program at the Northwest Fisheries Science Center. He received his M.S. degree in 1992 and his Ph.D. in 1995 in Fisheries from the University of Washington. Barry joined the Northwest Fisheries Science Center in 1995, where he worked on projects aimed at quantifying the effects of artificial reproduction of salmon and steelhead on natural populations. And from 2007 to 2012 he served on the Northwest Fisheries Science Center's Research Council.

All right, Barry, thanks for doing this today. Do you mind telling me what inspired you to pursue a career in science and fisheries and how your career has evolved over time?

Barry Berejikian (BB): Sure. When I was a kid my parents used to take us on camping trips north. So we grew up in southern California and we would go camping and fishing in summertime. I sort of fell in love with the outdoors and fishing in particular and then, of course, trout and salmon, so I had a passion for that. Then when I went to school at Cal Poly State University in San Obispo in the Environmental and Systemic Biology Program, they had a fisheries concentration, which I didn't even know when I enrolled at the university, so I was thrilled to have the opportunity to study fisheries. I kind of went from there. I got into it, I learned a little bit about warm water fisheries and fisheries management and a little bit about salmon and then took the opportunity to apply to graduate school. Once I saw that there were opportunities at the University of Washington near where I had spent my summers as a young child, I took that opportunity and my career took off from there.

MA: How did you end up here? Well, first I guess at the Northwest Fisheries Science Center and here at Manchester station?

BB: I was doing my research up at the University of Washington field station called Big Beef Creek. It's near Seabeck and Hood Canal. I was working out there doing my graduate work and applied for a position here while I was still about halfway through my Ph.D. program and the director of this laboratory, the Manchester research station, was Conrad Mankin, and he came out with Tom Flagg and wanted to see what I was doing out there. We'd been collaborating a little bit with them. They got very interested in the work I was doing looking at the effects of hatcheries on juvenile steelhead behavior. Of course, I was interested in what they were doing

with captive rearing of some endangered salmon species, so we kind of had a mutual interest. I applied for the position and was awarded the position in 1994 and started full time in 1995 here at Manchester.

MA: That's pretty much right after you got your Ph.D.?

BB: Yes. I've been here, I started my Ph.D. in '92, completed it in '95, and I've been working hereevery since.

MA: So you must enjoy it?

BB: Yes. [laughs] I've never had a reason to leave. [laughs] Some days are better than others, but generally it's a great job. It's a great job.

MA: How has your role here changed since '95?

BB: I came in as kind of a researcher. They were asking me to look at, again, at effects of hatcheries on salmon behavior and ecology. We've worked on numerous different aspects of that, all the way from juvenile kind of competition, competition between hatchery and wild fish, to adult reproductive ecology, kind of really describing reproductive behavior and reproductive success of both hatchery and wild salmon. Then more recently have gotten into moremigrational behavior and work on how salmon and steelhead utilize the near-shore marine environment, what factors affect their survival and behavior.

We've really worked on a large number of different projects. My role here has been from one of kind of an independent researcher to leading a research team we call the Behavior Ecology Team. After about 10 years, I became a supervisor and managed that group for a number of years, and now more recently I'm the Program Manager for what they call a Hatchery Reform Science Program and now I'm responsible not only for the Behavior Ecology Group and doing the things that I mentioned, but also captive brood stocks that are reared for recovery of some of the region's most endangered stocks. In addition to that, I'm responsible for running this laboratory now. And the laboratory is about 22 acres, has over two dozen buildings, and some 30 employees. So, my role has kind of grown over the years. I still try to stay involved in the research and they have great research projects, but I have an incredibly capable staff who are all doing more and more every day and do a better job [AUDIO ISSUES BEGIN]
running these programs.

MA: What has been a program or project that you're most proud of or most enjoyed doing?

BB: Wow, they've all been enjoyable and interesting. I would say that we're really excited right [AUDIO ISSUE ENDS] now about a couple of things. One of the projects that we're doing is I can kind of see it right out my window. We're looking at steelhead trout, smolts, migrate through Puget Sound. One of the technological advancements has been in acoustic telemetry, which are miniaturized tags that emit an acoustic ping and we set up hydrophone arrays throughout Puget Sound. Those arrays can detect individual fish as they migrate past. So, we've been quantifying the rate at which they travel, how many of them are surviving and dying, and their migratory

pathways as they move through Puget Sound. What's cool about it is that we have been outfitting one of their potential predators, a harbor seal, with a hydrophone, a listening device. So, the harbor seals when they're underwater can essentially be listening for those steelhead tags. We also put a GPS tracker on those harbor seals so when they come to the surface we get a location, so we get to know where and when harbor seals are encountering steelhead. And if the tag detection patterns are such, we can determine whether or not they've been preying on them.

It's a really neat puzzle to kind of put together all these different pieces and really get at really directly a predator/prey interaction from a behavior ecology kind of perspective. That hasn't been possible before, so we're really excited about it. The goal there, of course, is to estimate a predation rate by harbor seals on steelhead because we think that it's a major factor that's changed over the last 20 or 30 years and is putting steelhead trout kind of behind the eight-ball in recent years, particularly those that have to migrate through Puget Sound. That's one aspect.

The other one is really trying to identify what factors are influencing domestication, what are called domestication selection in salmon and steelhead. Basically what that means is how hatchery populations diverge from natural populations and how heritable that is, how much it's either genetic or epigenetic. We've gone from trying to identify whether or not hatchery fish are different from wild fish or natural origin fish to trying to figure out how we can lessen that divergence. How can we create a hatchery environment that causes less of a change in the behavior ecology and genetics of hatchery fish? We do that by rearing fish in different ways and then tracking the fate of those fish after they're released. That's been a really cool multi-disciplinary project that involves genetics, behavior, ecology, epigenetics, and it's kind of just getting started, but we think is where the science needs to go because we know that hatcheries are here to stay. They're used for species recovery, they're used for harvest augmentation, and we need to figure out how to do them in the best way possible.

MA: Have you found out how you can do them in the best way possible yet or do you have any ideas from that?

BB: We have made some success. Again, we just kind of started working on that aspect of it, but yes, we know now how some aspects of the culture environment can affect the behavior or fish after they're released. We think that one of the key aspects is allowing, for steelhead now, which is one of the species that's endangered here in Puget—or threatened with extinction here in Puget Sound and endangered in other places, is that to allow them to express their natural life history. So, when these fish are in the natural environment, they might go to sea at age one or age two or age three, but in hatchery environments and nearly all hatcheries force them out of the hatchery at age one, so they don't have the growth opportunity to get to the size that they need to to migrate to sea. So, that causes size-selective mortality after release and what the exact implications of that are, we don't yet, but we do know that that's happening and that there's some heritability for that growth rate and for size of release. So, we're starting to chip away at it and there are certainly other things that are going to be involved in that, but that's one of the key ones.

MA: What about the seal/salmon relationship? You said it's changed throughout the years? Why is that?

BB: There's been an ecosystem shift in Puget Sound. In the mid- to late-1980s steelhead were doing pretty well in Puget Sound. They were surviving at a high rate and there were lots of them. Very quickly in the late 1980s and early 1990s, steelhead populations everywhere along the coast declined, but they've stayed depressed in Puget Sound whereas in other locations they've bounced up and down; they've done okay. That's related to their poor marine survival. Steelhead that migrate through Puget Sound have had poor marine survival since the early 1990s. A lot of other changes occurred in Puget Sound at that time. Harbor seal populations were increasing substantially following the Marine Mammal Protection Act, so the lack of harvest of harbor seals, and a lot of other species that harbor seals would prey on including things like Pacific cod and rockfish and lingcod and herring, the rest of their forage base has declined.

What we think is happening is that for this brief period of time that steelhead smolts are migrating through Puget Sound, that harbor seals are taking advantage of that brief abundance and their switch over to steelhead to some degree, and again, we haven't quantified exactly what that rate is, but they switch to this abundant food source for a short period of time and they go back to feeding on other things. With a healthier ecosystem in Puget Sound, where there are lots of other, lots of abundant marine fish species, they may not have bothered with that in the past. We think it's a confluence of a number of different factors that's putting steelhead at greater risk of predation. It's not limited necessarily to steelhead. Steelhead migrate at a larger size than most of the other species of salmon, than all the species of salmon, steelhead is a trout but the same genus. And the species that migrate at a larger size are the ones that are doing poorly and the ones that are migrating at a smaller size and would be less likely to be preyed on by harbor seals and other pelagic mammalian predators like maybe harbor porpoise, those are doing better. So, there's been a really profound ecosystem shift and it looks like steelhead have got caught up in that.

MA: Do you have any predictions for the future of that? Where you see it going?

BB: I don't have any predictions. [laughs]

MA: That's okay.

BB: And the challenges here are pretty striking because if we're right about it, then really what it calls for is the need to restore the Puget Sound ecosystem and that's going to be challenging with the human pressures that are placed on it. So, I don't have any predictions. [laughs]

MA: I was just wondering if you did. What about some challenges you've had working in the scientific field or in the government?

BB: Challenges. Well, I would say the biggest challenges of working for the government are just simply that it's government. The government bureaucracy is challenging and what I've learned over the years is that it's nobody's fault. There are just a lot of layers to it and those layers are inserted by public pressures, either through the administrative branch or through Congress and we have to abide by all of those rules and regulations. It really creates a burden, but you just have to learn how to navigate that as best as possible and remain productive. The

folks that I've worked with and that I know at the Northwest Science Center all have to deal with that, but also try to do the right thing in that regard, but also try to push through that and be as productive as possible and produce the science that's needed for management. It's a challenge but it's something that everybody deals with. It's still a great job and a great place to work. You just have to figure out how to meet those challenges.

MA: Yes. What about collaborating with other scientists? You mentioned especially since you're out here you're collaborating with the Center in Seattle and things like that?

BB: That's been really rewarding. One of the cool things but also the challenges is that there have been some really great advancements in some of the technologies in the last really 10 or 15 years. Some of the tag technologies that I mentioned has allowed us to collaborate with a large number of people around Puget Sound. We work with nonprofits and we work with tribal and state agencies, universities, and so forth. But the genetics tools have also been really cool and I'm not a geneticist and I don't understand a lot of that stuff, but I'm fortunate enough to work with some excellent geneticists here at Manchester and now also at the Science Center. That's really broadened my view and understanding of the world because they're very patient with me and they're willing to explain things to me over and over again. [laughs] That's been a great learning experience to work with the geneticists at our Science Center.

MA: You said you work with nonprofits and tribes, so do you interact with like the public at all for your job?

BB: Yes, we do. That's typically through the nonprofit kind of route, so we work with local salmon enhancement groups that work a lot with volunteers and interns, so we get to work with those people. We work with a lot of private land owners that provide access to the rivers and streams that we work in, so we get to interact that way as well. I think that's really, really important because a lot of these salmon conservation actions can't just be coming from government. If they do, then people will not participate so it's really both important and rewarding to work with people that are on the ground that own the land and the water and they all want to see lots of salmon. Sometimes there are competing interests, so yes, we get a good chance to interact with people out in the communities.

MA: I was going to ask about you mentioned competing interests like them, because most people will respond positively to the work you're doing and challenges you had talking to private land owners and things like that.

BB: Yes. That has been rewarding.

MA: What about the office here at Manchester? How has that changed since you've been here?

BB: Let's see, how has it changed? Not a lot. [laughs] We're more connected now because of technology and it used to be that we had an administrative person over here and we funneled everything through them, but that's all handled now through emails and online stuff. Yes, it hasn't changed a whole heck of a lot. We have a good group of people that work here. We always have. There's been a lot of turnover. When I came here, I was the young kid on the block

and would sit and have lunch with all the guys that had essentially founded this station back in the '70s and '80s and learned a lot from them, and now I guess one of the reasons you're interviewing me is because I'm one of the old guys. [laughs]

MA: Yes. You've been around, yes.

BB: Yes, I know and that's kind of a strange thought, but I would say one thing that has changed pretty dramatically here is that we have really built up the science capabilities of the research station. We have a seawater lab and rearing facilities and aquaculture facilities that are really the best in the nation for our agency, and the staff which are really our most critical resource is outstanding. So, we've got a lot of young bright scientists who are all passionate about what they do and that's what makes it really cool to come to work.

MA: Yes. How often do you go to Seattle and do you ever go to like D.C. for your work?

BB: I don't go to Washington, D.C. very much. I've been there for some training and whatnot, more it's interaction with the West Coast region when we're interfacing with management, the regional office. My trips over to Seattle are kind of sporadic. It's more when there's something going on, a particular project, and it may be I don't get over there for two or three months if there's no need to. Again, because we're all connected now, we do a lot of our meetings online and what not. Not that I don't like being there, but getting there is getting difficult. The traffic issues are so bad now that it's really a challenge to get to Seattle for me, even though I can pretty much see it from here.

MA: [laughs] So you work with sablefish and Pacific cod and lingcod working with aquaculture? Is that correct? Figuring out how to --

BB: Yes, those are kind of some different projects, so the lingcod work is work that we're not doing anymore but it was essentially to test whether or not you could rear a marine species, release it into the marine environment, and then recovery. It's kind of a stock enhancement, kind of like a salmon hatchery type of approach and it was done on a pilot scale. The funding for that vaporized during the economic downturn, so we had to stop that work, but it was productive. We showed that we could do it in Puget Sound.

The sablefish work is something that's really grown here at the station under the direction of Rick Getz and Walt Dickoff. I have had two, now one, staff that are working with Rick on that project. That's aquaculture for the sake of aquaculture, so that'd developing the technology to rear fish in captivity that can be produced for the market for food. They've been very successful in a short period of time at learning how to spawn, rear the larvae in juveniles, and get fish to adult size in a short period of time. That technology is about ready to be transferred to industry, so it's been a pretty good success story.

MA: Yes, I was going to ask if it's been commercially, but not yet it's not?Almost?

BB: We're right at that point, I think, yes.

MA: Have you interacted with like commercial fishermen who are against that because they catch sablefish, too?

BB: Yes, I haven't directly. I have [AUDIO ISSUES] heard of those conflicts and it's always been kind of a mystery to me why the commercial fishing industry and the aquaculture industry don't get together, because it seems like they're compatible and it could provide a continuous stream of seafood to the market. My understanding is there have been some like business acquisitions that have maybe moved things in that direction and maybe we'll be seeing more of that, but fishermen are working seasonally and aquaculture is year around, so maybe there's an opportunity there, but directly, I don't have any interaction there.

MA: Where do you see the future of your field as a whole going in the future? Like you mentioned technology and things like that that are affecting it a lot?

BB: Yes, I think that with some of the genomics tools and the bioinformatics and a lot of the mathematical techniques that are really cutting edge and a lot of those things I know very little about, but am aware of them and work with some of those people that do that. I think that that's where things are going. The information transfer is immediate. The ability to analyze large chunks of data, which is needed for some of the genomics work, is improving but still catching up. The data generation is greater than the ability to analyze it at this point. So, I see that as being the real growth area. I mean, we're getting to the point now and, when I say we I mean they, are getting to the point now where individual genes or suites of genes can be identified for certain traits. As a behavioral ecologist, that's an exciting thing because now we can understand the genetic underpinnings of how fish behave, how they interact with their environment, how they're selected for or against. So, I see that as being a real growth area. The thing we have to be careful of is that those are really expensive things to do right now and they probably always will be to some degree, so we have to prioritize what things do we need to know versus what things would we like to know? And we need to focus on the things that we need to know and that sometimes is a challenge.

MA: Right. So what do you think are the most important things that you need to know?

BB: Again, I work in the hatchery world and I think we need to know, I think we need to understand what hatcheries are doing to fish, both in a positive and a negative way. If we can do that, then we can better fit hatchery production into the natural landscape. I think that should be the goal. We should move beyond just identifying what the problems are and start moving towards some of the solutions.

MA: What advice would you give to aspiring scientist fish people working in fisheries in your area?

BB: What advice would I give to them? I would just say to follow your passion. I think that probably yes, the most motivating factor for people is, for the staff that I have and the scientists that I've worked with, is that they're most successful and most productive when they're doing something they really love. That sounds kind of like everyone can't do what they love, but if you can find that and pursue that then you'll be successful. Then the other piece of advice I would

give is while you're doing that, try to make sure that you understand why you have that position and that job and what is the goal and the mission of your agency or whoever you're working for, because you've got to figure out how to channel that passion and that thing that you're doing that you love towards the end product. Some scientists do get astray sometimes and do things that they like to do that may not be the most important things to do, so the challenge is do what you love to do but do the most important work that you're being asked to do.

MA: Right, yes. Cool. That's pretty much all the questions. I guess I'm just curious as to what it's like living out here in Manchester or in this area? [laughs]

BB: I live here because I love it out here and I live about a half hour south of Manchester in a town called Gig Harbor. It's very peaceful. It can be a little bit isolating sometimes at the lab here because we're in kind of a rural area, but I can't imagine being anywhere else. The big city is, I like being within reach of the city, but it's not for me. So, this kind of suits my comfort zone.

MA: Right. You're just only a couple hours if you need it to go to the city.

BB: Yes, exactly.

MA: So, it's not too far.

BB: Yes.

MA: Do you have any plans in the next five to 10 years for yourself? Like you're going to stay here?

BB: Yes, I will probably stay here, unless they kick me out, until I retire. My challenges right now are just trying to take on this new role as managing the station and kind of trying to take it to the next level.

MA: Did you say when you started this position again?

BB: Yes, about three months ago.

MA: OK.

BB: So it's been recent and I'm learning fast. [laughs] I hope.

MA: Well, thank you, unless you have anything else to add about yourself or anything else?

BB: No.

MA: All right.

BB: It's been a pleasure. Thank you.