

TRANSCRIPT

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INTERVIEWER: David Todd

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David Todd [00:00:01] Well, good morning. I am David Todd, and I have the privilege of being here with Scott Holt.

David Todd [00:00:08] And with his permission, we plan on recording this interview for research and educational work on behalf of a non-profit group called the Conservation History Association of Texas, for a book and a web site for Texas A&M University Press, and finally, for an archive at the Briscoe Center for American History, which is at the University of Texas at Austin.

David Todd [00:00:33] And I want to emphasize that he has all rights to use the recording as he sees fit. It is his.

David Todd [00:00:41] And I wanted to make sure before we went any further that that's okay with Mr. Holt.

Scott Holt [00:00:47] Yes, that's okay.

David Todd [00:00:49] Great. Well, thank you very much.

David Todd [00:00:52] Today is Tuesday, April 11th, 2023. It's about 10:15 in the morning, Central Time. As I said, my name is David Todd, and I'm representing the Conservation History Association of Texas, and I am in Austin. And we're very fortunate to be conducting an audio interview with Scott Holt. It is a remote interview. He is based a good many miles from me in the Port Aransas area.

David Todd [00:01:23] Mr. Holt is a wildlife biologist who worked for many years as a research scientist at the University of Texas Marine Science Institute in Port Aransas. While there, he was studying a variety of fish, including red drum, Atlantic croaker, red snapper, billfish, swordfish, spotted seatrout, and of special interest here today, tarpon.

David Todd [00:01:47] So, today we'll be talking about Mr. Holt's life and career to date, and especially focus on what he has learned about the Atlantic tarpon.

David Todd [00:01:59] So, with that little introduction, I want to thank you and then ask you if you might be able to tell us about your childhood and early years, and if there might have been some people or events then that influenced your interest in animals and fish in particular?

Scott Holt [00:02:17] I would be happy to do that.

Scott Holt [00:02:20] So I grew up in a small farming community north of Austin called Bartlett. Bartlett's about 50 miles north of Austin, in between Temple and Taylor. It's in the blackland farming country there. And my father had the, what I think was, the good sense to decide to get out of the farming business. So, he worked for the City of Bartlett in their water department.

Scott Holt [00:02:48] But, most of my relatives were farmers. And my grandfather, particularly, had a small farm. He was a row crop farmer and a cattle rancher, and he had a stream that ran through the land that he was living on at the time, when I was, oh, between when I was born and maybe 15 years old. And I spent a lot of time on that farm wandering up and down that stream, fishing and chasing frogs and all kinds of things that young boys do.

Scott Holt [00:03:24] My father liked to fish. He wasn't a hunter, but he liked to fish. And his neighbor had a small boat and would take us out to Lake Buchanan regularly to go fishing. And on some of those trips, my father and I started bringing back black bass, small black bass, alive, and putting them in that creek that ran through my grandfather's place. You know, actually black bass is a stream species and not a lake species. And they thrived in that little creek.

Scott Holt [00:03:59] So, as a kid, I had the opportunity to go out to my grandfather's place, wander up and down that creek and catch bass. And that was really my first real introduction to sort of the outdoors and fishing. And those were the days when I could go out to the farm and tell my grandmother I was going fishing and come back four or five hours later, and nobody'd paid any attention to the fact that I was gone four or five hours. I'd come back, they'd say, "Catch anything, have a good time?" I don't think you can do those kind of things these days. Times have changed.

David Todd [00:04:39] You know, it's interesting that it seems like there was a time when there was maybe more open, available space with time that was not accounted for. It sounds like that was the case with you. You had, you know, the stream to wander down and hours to do it.

Scott Holt [00:05:02] Yeah, and especially in the summertime. My father's, my grandfather's, farm was about four miles from town, and I and several friends would get on our bicycles and ride out there, spend the day splashing around the creek, ride back home. Yeah, it was a, it was a much freer, easier time than today, for sure.

David Todd [00:05:25] So it sounds like your grandparents and your dad were influential in your interest in the outdoors and being able to spend time fishing and exploring. Did you have any peers ... you mentioned these kids that you might go bicycling in a town with ... were any of them interested in the same thing?

Scott Holt [00:05:46] Yeah. And again, sort of growing up in the farming community, you know, it was a real outdoor lifestyle, um, somewhat outdoor because, you know, we didn't have air conditioning and I think you're kind of forced outside. But, but there were a lot of kids in school with me from early on that enjoyed that kind of thing. And many of them, you know, had access to farms or farm ponds or lived on a farm. So, we had plenty places to go. Any again, this is, you know, a recollection, a reflection, of a different time.

Scott Holt [00:06:25] But you could go up to a farmer's door and knock on the door, you know, as a ten year old kid say, "Can I go fishing in your stock pond?" They'd say, "Sure, go ahead." And so, it was, it was easy to find places to do that.

Scott Holt [00:06:39] And I had a number of friends that with me regularly.

David Todd [00:06:45] Wow. Sounds pretty idyllic.

David Todd [00:06:47] Well, just to sort of click forward a little bit in time. My understanding is that you went to Texas A&M and got both a bachelor's and a master's degree in Wildlife and Fisheries Science. And I was wondering, if your experience there at Texas A&M, or maybe during your earlier years in school might have, you know, introduced you to a teacher or a classmate that, you know, shared this interest and maybe encouraged it as well?

Scott Holt [00:07:25] Actually, no, because of the experience of my family. My grandmother had a couple of years that she was at Baylor, but she was only in college for a couple of years. Other than that, no one in either side of my family had been to college. And, going to college was, you know, I wanted to do it, but nobody knew what that meant. And particularly, my interest in the outdoors: I wanted to do something outdoor kind of thing in my college education. And we had, we had no examples of what that would be like. All I could imagine was a park ranger or, you know, a game warden.

Scott Holt [00:08:14] So, I was looking for a place to go, and I had some experience as a Boy Scout being an usher at University of Texas football games. So, I thought I wanted to go to UT. But when I found out the University of Texas at the time wasn't doing what I thought I wanted to do (they were more biology, physiology), and my parents and most of my family thought that school was way too liberal for me to go to anyway. And A&M had what I thought I wanted, which was Wildlife and Fisheries Department.

Scott Holt [00:08:50] So, I decided to go to A&M and then to facilitate, well, not to facilitate that, but it just happened that my father got a job between my junior and senior year in high school, he got a job with the A&M Engineering Extension Service. So, we moved to College Station.

Scott Holt [00:09:11] So I went from a small school with 18 people in my graduating class at Bartlett, a school where almost no one ever went to college, to a school in College Station, A&M Consolidated, where everybody was expected to go to college. And it was just such a different experience - that really made a big difference in my college career, not so much necessarily in my wildlife orientation, but that one year at A&M Consolidated was just a phenomenal experience for me.

David Todd [00:09:47] Yeah, I guess just to be in that culture where it wasn't out of the norm to go on to college and that was expected and accepted. I can see that.

David Todd [00:10:00] And were there any classmates that that, you know, shared this interest, or teachers or professors who, you know, really made an impact on you?

Scott Holt [00:10:13] No. Really, again, up until I got into college, what I wanted to do was not typical. People didn't have much experience even at A&M Consolidated. I mean, almost everybody there were family of A&M staff and professors. But what I wanted to do in Wildlife and Fisheries, was not typical.

Scott Holt [00:10:41] In fact, when I entered A&M as a freshman, we had a freshman orientation class and this was the first year you didn't have to be in the Corps, and they had a freshman orientation retreat, and several of the prospective students and students who were there leading this retreat convinced me that I didn't, really shouldn't go into biology, there's no future in biology. I should be an engineer. And they actually talked me into it.

Scott Holt [00:11:15] And so I entered A&M as an engineer. But it only took me a semester to realize I didn't really want to be an engineer and transferred over to Wildlife and Fisheries. And of course, once I got into Wildlife and Fisheries, there were other people there who had similar interests, and I finally found people: "Oh, now I see what I'm trying to do."

Scott Holt [00:11:35] So it really took until I got into A&M to really find my footing.

David Todd [00:11:43] You found your tribe.

Scott Holt [00:11:45] Yes.

David Todd [00:11:47] Well, good. And so, once you got into the program of Wildlife and Fisheries, were there important people there that that played a significant role in your life in directing this kind of interest and talent?

Scott Holt [00:12:02] I think it always has to be. I mean, this was a small department. At the time, Texas A&M had had 9000 students. You know, now there's 9000 students in one department there. So, the group was small. And so, you knew you knew all your professors well. You knew most of your fellow students well. So, and my roommates were in the department. So, I had, I made good friends there, starting with my fellow students and the people in the department. So, yeah, it was a very much a family affair at that point. I don't recall one person in particular, but, yeah, it was a pretty close knit group.

David Todd [00:12:55] That's great. That kind of support is really nice, I bet.

Scott Holt [00:13:00] So, another, if I could just quickly sort of elaborate on that.

David Todd [00:13:05] Yes, please.

Scott Holt [00:13:06] When I again, when I went into the department, even though I had been, you know, fishing as a kid, I still didn't really have that fixed orientation on what I should do.

Scott Holt [00:13:20] And I started in Wildlife which is the upland game group, deer biologists, if you will. And, you know, during the summers, I got an opportunity to work for Parks and Wildlife. At the time, they would come and just ask you if you want to be an intern with Parks and Wildlife. And I did that for two summers and I was introduced to the fisheries part of it through doing those internships. So I said, "I think I'd like to work on fish rather than deer."

Scott Holt [00:13:54] And then, the last semester of the last year between junior and senior year, you had to go, in \Fisheries, you had to go to Galveston for summer classes. And I'd hardly even seen the ocean in my life before I went to Galveston. But, by the time I left there, I said, "Oh, okay, I want to do saltwater fisheries."

Scott Holt [00:14:19] So, ah, it took a while to finally get my bearings. That's where I wound up is being interested in saltwater fisheries.

David Todd [00:14:31] And then I guess you graduate from A&M and several years later you complete your master's degree. Was there a particular focus of that work? Did you do a thesis or other kind of intense study on some subject?

Scott Holt [00:14:51] Yes, yes. So, the brief story there was that between my junior and senior year (this is just another opportunity that you don't really get these days, I think, in a large university), but I started working for one of the professors that had a research project on the effects of power plant effluents on fish, you know, the heated water effluents of power plants. So as an undergraduate, I worked with the graduate students on that project. And so, by the time I graduated, I had a good feeling for what research was going to be like.

Scott Holt [00:15:35] And so, I actually was accepted into graduate school right away. And I started graduate school essentially the day after I graduated as an undergraduate. And I was working with that professor that I had been working with. So, I was going to be working on power plants.

Scott Holt [00:15:54] And so the day after I started graduate school, the Army came calling. I was drafted. So, I spent two years in the Army, and the last year was in California at Fort Ord, which is out by Monterrey. And I came very close to going to University of California, Santa Cruz, which is just up the road.

Scott Holt [00:16:17] But, they didn't really have - it was kind of like the University of Texas story - they didn't really have exactly what I wanted. And importantly, they didn't have research funding. And I had a research assistantship waiting for me at Texas A&M when I came back. So, it really wasn't a very hard decision. So, I decided to come back to A&M to do my graduate work there.

Scott Holt [00:16:44] So, soon as I came back, I started on that power plant project, which, this one was down in Galveston Bay. I was working on one power plant at Bacliff, looking at the effects of the heated water effluent on the fish in Galveston Bay.

David Todd [00:17:07] Well, you have had a lot of formal training both in college and grad school and, of course, your career later. But, I'm curious if there was anything just in the general culture, you know, books or films or TV media in general, that might have had an influence on your life and your interest in wildlife and conservation.

Scott Holt [00:17:38] Well, you probably get this kind of comment almost universally. But, you know, that was when Jacques Cousteau was starting all of his exploits that you could follow on film and television. So that sort of romanticized the whole idea of marine biology. But other than that kind of a genre, yeah, I can't really come up with anything specific.

David Todd [00:18:17] Well, I understand. The Calypso was, I think, a powerful image, and I bet encouraging.

David Todd [00:18:27] So, 1974, you, I understand, started at the University of Texas Marine Science Institute in Port Aransas, and then stayed there for, gosh, 35 years, I think.

Scott Holt [00:18:43] That's right.

David Todd [00:18:45] How did you start there?

Scott Holt [00:18:47] Well, as my graduate work, as I say, I was working on the power plant, fishes at the power plant, and I started working on it, to give you sort of a long story, I'll try to make it short, but I started working on the analysis procedures for the data that we were collecting. It was a large data set. And ecological data are a little more difficult to analyze than experimental data in the lab, say, where you can set things up with this or that.

Scott Holt [00:19:24] And I got a guy, actually a grad student from California, who was developing a big computer program for doing ecological analysis. And I got him to come help me set it up at A&M and got it running on the computer there at A&M. And I figured out how to use it and how to apply it to our problem. And there were four or five other graduate students in in our program that were studying different aspects of the power plant. And for the most part, they wound up using the procedure that I had developed.

Scott Holt [00:20:04] And towards the end of, you know, finishing my degree, I got a phone call from a guy at, here at the Marine Science Institute, says, "I need the kind of analysis that you can do for a project we have here. Do you want a job?"

Scott Holt [00:20:24] So, it's pretty hard to turn down a job offer from UT Marine Science Institute. So, I packed up and came to Port Aransas.

David Todd [00:20:37] That's great. You had an invitation. That's better than a cold call.

Scott Holt [00:20:42] Yeah. And, you know, I stayed here, so. I essentially have never looked for a job. It was easy.

David Todd [00:20:52] Well, that's fortunate.

David Todd [00:20:57] So, you know, one of the things that you studied, and this is just one small splinter of, you know, lots of projects, lots of studies, lots of creatures, but, you know, today I was hoping to hear about your interest in and research on Atlantic tarpon. And I was curious what your first encounter might have been with the tarpon.

Scott Holt [00:21:25] Yeah. And this was long before, actually, long before I was even at U.T. We, a number of the fellow students and I, would often go down to South Padre to go surfing and fishing down there. And there was a little park there in, down in South Padre that we could, where we would camp. And I remember one morning, I woke up in my tent and I looked out. And you could see the jetties, and we'd been fishing there off and on the jetty for a few days. And I looked out and I saw lots of birds at the end of the jetties. So, I got up, took my fishing rod out there with a little box with a few lures.

Scott Holt [00:22:16] And I got out there and I saw the big things rolling around in the water. "What in the world is that?" And after a handful of casts, I hooked one. And it was tarpon, of course. And I managed to lose all of my lures, all on my line. And I never even came close to landing one on my small tackle. But that was just the most exhilarating thing I had ever encountered, was these tarpon rolling off the jetty out there. It didn't necessarily turn me into a tarpon person, but I remember that vividly.

David Todd [00:22:55] So this tarpon - you managed, it sounds like, to hook one, but he ran off with your lures and line?

Scott Holt [00:23:04] Yes. I mean, I had fishing tackle for, you know, for a 5-pound redfish and these were 30-pound tarpon. You know, you'd hook one, they'd jump in the air, and throw the lure at you. Or, if you actually hooked on, they'd just take it. Then you had to put on a new line, find a new lure.

David Todd [00:23:27] I've heard they're very difficult to hook - that bony mouth.

Scott Holt [00:23:32] Yeah, most of it. You know, and I didn't have the right tackle. It was just a phenomenal experience to see those fish, and have them bite the lure once in a while and jump in the air. Yeah.

David Todd [00:23:44] So they did go airborne?

Scott Holt [00:23:46] Yes. Often when you would hook them, they would jump. And usually when they did that, they'd throw the lure back at you.

David Todd [00:23:58] Oh boy. You've met your match, it sounds like.

Scott Holt [00:24:02] Yeah, really.

David Todd [00:24:08] Well, other than seeing them rolling off the jetties, I imagine they have a very long and complicated life history and a complex niche they fill in the ecosystem, and I was hoping you might be able to give us a little bit of an introduction to that role that they have.

Scott Holt [00:24:32] Yeah. And I think probably a lot of people are familiar with the stories of old Port Aransas. I mean, this used to be called Tarpon, at one time, before, I think that was in late 1800s, early 1900s, they called this Tarpon.

Scott Holt [00:24:51] So, in the past, there were these huge schools of tarpon that came, showed up in the summer, and, you know, would leave in the winter. And maybe we'll talk about this in a bit, but, you know, we now realize that they're migrating in and out of this area.

Scott Holt [00:25:16] And the tarpon is a, is a very long-lived fish. And it's very surprising how long some fish can live. And we can know that age in a lot of fish (it's a little more difficult in tarpon). We can know it in a lot of fish by looking at a bone that occurs in the inner ear. It's called an otolith, which is the Latin for ear bone, and it grows very uniformly, like a tree. So, when you take one and mount it and slice it, it's very much like looking at tree rings. And, and those are quite accurate when you get them counted right.

Scott Holt [00:26:03] So, we we found with the red drum, for instance, and black drum - they live a 40, 50 years. And the same is apparently true with tarpon. The otoliths are harder to use, but other methods have shown that they live, you know, they can live 60, 80 years.

Scott Holt [00:26:21] And the females will, you know, mature eggs. They mature at about ten years old. And so for that ten years to whatever, 70 or 80 years, the females will mature eggs every year. And they have a life history that's pretty similar to a lot of sort of pelagic, open

water, fish, and that is that they produce a lot of eggs. They have a very, they wind up pretty low survival, long-term survival.

Scott Holt [00:26:59] So, the, a female will release maybe a million eggs every time she spawns. She may do that four or five, six times a year. So, you know, they'll put eight to ten million eggs a year into the water.

Scott Holt [00:27:15] And it's a process, again, better understood in some other species but we've seen it with redfish in the laboratory so we know how that works, that males will, one or two or three males, will very closely accompany the female, and probably through pheromones, they know when she's about ready to release the eggs.

Scott Holt [00:27:40] And then, and so, in an instant, the female will make a (this is red drum) will make her rush to the surface, release the eggs, the males come, release all the sperm right in the middle of all the eggs. And remarkably, in the wild, fertilization is almost 100%: kind of wonder how the sperm can find the egg just kind of swimming around out there in the water.

Scott Holt [00:28:05] But almost certainly the same thing is occurring with tarpon. So, the eggs are fertilized in the water. And that's the end of it. Of what the tarpon have to do with the eggs. They're mostly fertilized in the water. They hatch. And I don't know anybody knows for tarpon. And again, I keep going back to redfish. They hatch within about 24 hours. And then, in the warm waters where tarpon spawn, they probably hatch within 24, 36 hours as well.

Scott Holt [00:28:38] Tarpon are really unique in that they're in this group that includes bonefish, ladyfish and then, oddly, eels. Hard to imagine how they're related, but somehow they're related by the kind of larva that they have. It's called leptocephalus, which means "little head". And it's a strange-looking thing. It's a flat eel-looking thing. It's nothing like most of the larvae.

Scott Holt [00:29:12] So, the leptocephalus develops for 20, 30 days just floating in the water. They have very limited ability to swim.

Scott Holt [00:29:25] And then at some point, they will metamorphose. It's a little bit like butterfly caterpillars. They just go through a complete change, and change from this sort of flat eel-looking thing into a little fish.

Scott Holt [00:29:45] And we don't understand nursery requirements very well, but they get carried inshore. And the nursery areas for tarpon are almost certainly somewhere inside, not in the ocean, but inside estuaries, bays.

Scott Holt [00:30:05] And they're incredibly tolerant of poor water conditions. Not the leptocephalus larvae so much, but the juveniles when they're growing in the nursery area. So, they do, I mean, they can almost live in water without any oxygen, anoxic water, because they can gulp air. And they're tolerant of high salinities. So, they're, it's a very tolerant fish as juveniles.

Scott Holt [00:30:42] And at some point, you know, maybe after a year or so development, we, again, we don't know their early life history all that well, they move out of the estuary into the ocean, and pretty much then, you know, join the offshore population.

Scott Holt [00:31:00] All tarpon will go into estuaries and even rivers occasionally, but they're basically a marine fish.

Scott Holt [00:31:09] So that sort of finishes the life history.

Scott Holt [00:31:14] So, again, they mature about ten years old. And we think that the young ones may not be as migratory as the older ones, but there's a lot that's not known about tarpon.

David Todd [00:31:32] And their, the niche that they fill? Are they, I guess, a sort of top-level predator. Is that fair to say?

Scott Holt [00:31:43] I'm sorry. They're a what?

David Todd [00:31:44] They're a sort of apex predator, Is that fair?

Scott Holt [00:31:49] Well, not, not necessarily. In the marine system - it's easier to think of it on land - there's sort of fewer levels sort of the food web, if you will, or food chain. But in marine systems, there's a number of levels there. And tarpon feed largely on fish, but fish that are herbivores. One of their main foods is menhaden, and anchovies, and fish in that group.

Scott Holt [00:32:28] And so, essentially, tarpon are feeding on the grazers, menhaden (kind of skipped a step there). Menhaden are plankton eaters. So, it's a short step from, you know, the primary producers (on land, that would be grass), to the herbivores which on land, that would be say, deer, to the thing that eats them.

Scott Holt [00:32:57] In the ocean, often the apex predators, you know, there are two or three more steps before you get to the fish they eat. But tarpon are mostly feeding on the fish that are herbivores.

David Todd [00:33:14] Okay. All right. That helps. Sorry for my confusion there.

David Todd [00:33:20] You know, one of the things that I was intrigued by, and again, don't know much about this, but it sounds like tarpon are a pretty ancient design, that they have a heritage that goes back millions of years. Is that, is that true?

Scott Holt [00:33:40] I'm not an evolutionary biologist, so I'm not really qualified to tell you sort of exactly how that might happen. But there are several critters that sort of fall into that category. Alligators, crocodiles are another good example. And the geologic record for those things suggests that, yeah, what you would find a hundred million years ago is pretty similar to what you're seeing now.

Scott Holt [00:34:19] But, in reading about that from the evolutionary biologists saying, "Well, yes, but, they're not exactly the same." I mean, some things are much newer, some things evolved much more recently.

Scott Holt [00:34:35] And the crocodile, I think the crocodiles are known better, written about more, than tarpon.

Scott Holt [00:34:43] But there are things in the in the geological record that are very similar. But the scientists caution they're probably not exactly the same.

Scott Holt [00:34:57] But yeah, it apparently is a, "ancient" I guess is the right word - an ancient fish.

David Todd [00:35:08] Well, it sounds like from what you were saying before, that they are hardy and tolerant and can put up with these salinity ranges and anoxic conditions. And I guess that sets you up for being a pretty sturdy, long-lived design.

Scott Holt [00:35:28] Yes, I think that's certainly true. But, you know, it also is true that that doesn't necessarily set you up to be highly abundant. Just because you're tolerant of a lot of conditions, it doesn't make you sort of the most abundant fish in the sea. So, it probably may have never been a highly abundant fish. They've just been a successful fish for a very long time.

David Todd [00:36:02] That's, that's helpful. Thank you. Good. Good distinction there.

David Todd [00:36:08] So. I was hoping that you could talk a little bit about your study of tarpon over the years. You know, certainly one of only just, you know, many other topics that you've looked at.

David Todd [00:36:27] But, one of the things that I thought was particularly intriguing was that your partner, Joan Holt, also has studied tarpon. And so, I thought it'd be nice to know just a little bit about that overlap, that sharing, that that the two of you have of for, you know, academic work. Scholars, you know, often are kind of maybe more solo efforts or with, you know, colleagues at a school. But this is very interesting to me that you worked with your wife on this.

Scott Holt [00:37:08] Yes. And, you know, we met in graduate school. I was talking earlier about the project at Galveston, working on the power plants. And Joan came down to work on that project. She was one of the other students that was doing other kinds of things on that project. And obviously, over the couple of years we were there, we got to know each other. Sort of hit it off, became a pair.

Scott Holt [00:37:44] And when I got the job offer it at U.T., she had just finished her Ph.D. there as well. She said, "Well, I'll come down there with you and get a job." Which is, you know, pretty, shows a lot of confidence that she was just going to come down and get a job. And of course, she did just come down and get a job, and worked her way up through the ranks, if you will, pretty quickly winding up her last year working at U.T., she was the acting director of the Marine Science Institute.

Scott Holt [00:38:25] But, since she was a graduate student in that same program, we had similar interests. And that has happened throughout our career. After we'd finally got our feet really on the ground, both started working on our own independent projects here, it turned out she was working in, she was actually running the group for a good while, called the fisheries mariculture program. And they work primarily in the laboratory developing methods for rearing, particularly redfish, but other things as well.

Scott Holt [00:39:07] And my research was mostly field work. I was more of an ecologist.

Scott Holt [00:39:14] So, it turned out that, with some regularity, things I was interested in the field could be studied in the lab nicely, and things they found in the lab could be extrapolated or asked about in the field.

Scott Holt [00:39:28] So, we often had very similar interests and were involved in similar projects, but doing the work from a different angle.

David Todd [00:39:42] I see. So, she was more doing lab, bench work and you were more in the field doing your studies there?

Scott Holt [00:39:54] Yep.

David Todd [00:39:55] I see. Okay.

Scott Holt [00:39:56] Then we often shared graduate students. The student would do some work in the field and then also sort of address some of that with laboratory work. So there were a number of students that (I was not able to actually sponsor a student; only Joan could do that), but many of them would work, they would do their fieldwork with me, and their labwork with Joan.

David Todd [00:40:26] And I think one of the things that you worked on together was to help organize the first and third International Tarpon Symposia, which happened, I think, in 2001 and then in 2004.

Scott Holt [00:40:45] Mm hmm.

David Todd [00:40:47] Tell me about those symposia, and the reports that came out of them and, you know, the community that that drew together.

Scott Holt [00:40:56] Um, yeah, we, you know, we became involved in tarpon work mostly through this group, Tarpon Tomorrow, that was kind of started up by a non-scientist over in Corpus Christi, Paul Swacina. He was an avid tarpon fisherman and asked several, you know, tarpon fishermen and biologists to join and see if we could understand something about tarpon.

Scott Holt [00:41:32] And, as I said, it wasn't our primary research area. But, we were happy to to work with him some. So, one of the ideas sort of early on was to see if we could put together a symposium, if you will, to attract people who had been working on tarpon, just to try to get a baseline, to get some idea of what do we know and what do we need to know and how do we go about making progress on tarpon?

Scott Holt [00:42:11] And so, that was really the first symposium: it was put together with that idea. And Joan was really the one organizing. And she had a great, at the time, she had a great executive assistant who was very good at making all the contacts and helping with the organization. So, without her, without Mina Smeal there, we would have had a really hard time getting this done.

Scott Holt [00:42:42] But, putting the word out to see if there was interest, there was a lot, of course. Florida had several people working on tarpon. And I was a little surprised by the number of people that in Mexico and even throughout the Caribbean who were working on

tarpon. And so, there was a lot of interest and a lot of people were excited about coming to this meeting.

David Todd [00:43:20] So, what were some of the topics do you think that were of most interest, and you know, where you were trying to set the baseline and then try to map out maybe a way forward for conservation?

Scott Holt [00:43:35] Yeah. Well, the structure that was set up was to invite people to to give presentations. That's a standard procedure at that technical science meetings of all sorts, is people give a, usually, a 15-, 20-minute presentation. And I don't know, I think we did this for a couple of days. And then, after these presentations, we had some roundtable discussions and trying to be a little more innovative or creative about figuring out where do we go from here.

Scott Holt [00:44:22] So with what was learned from the presentations and I think three quarters of the presentations, maybe more, were, you know, technical science people. But, there were a couple of presentations by non-scientists. Most fishermen don't want to stand up in front of a big crowd of scientists and talk about fish. But, some people were willing to do that. In a roundtable discussion, there was a little more. Input from fishermen. I mean, if you look at the list of people who came, there were like 80 people, maybe, came to this symposium. And probably 50 or 60 of them were scientists and the rest were either fishermen or guides or resource, the resource people were technically trained, but not necessarily scientists.

Scott Holt [00:45:20] And so the roundtable discussions were really a more free-ranging discussion of, okay, so here's what we think we know. Here's where we need to go.

Scott Holt [00:45:30] And the problem, one problem that was really apparent with tarpon is that it's a recreational fishery almost everywhere. And even in Mexico, where it's actually caught for food, it's not actually a commercial fish. It's like incidental catch. Maybe they intend to incidentally catch it, but it's not a commercial fish. So, it's not part of the Mexican science program's research efforts.

Scott Holt [00:46:07] And in the United States, it's largely a catch-and-release fishery. There are still some kill tournaments, but it's mostly, or at least there were. But it's mostly a catch-and-release fishery.

Scott Holt [00:46:22] So the data that were available are not very robust. And there isn't a lot of fisheries-independent data collected on tarpon.

Scott Holt [00:46:37] So it turns out there's a lot that needed to be known. And the enthusiasm at that symposium was really high.

Scott Holt [00:46:50] Unfortunately, that didn't translate, and I don't really know why that didn't translate into, you know, a lot of money being poured into fisheries research. Unfortunately, that's always the story is, you know, for any research like that to be done, somebody has got to pay for it. And there was just never was, never has been, a substantial financial backing for fundamental tarpon research.

David Todd [00:47:27] That's interesting. So, if I'm following you, it sounds like fisheries that have some sort of broad-based commercial aspect to them - that they're caught by, you know, folks who will take their catch to market - those kinds of fish get maybe more research

attention than those that are purely recreational. And I guess in this case, not even for food, but, you know, for sport. Is that where you're going with this?

Scott Holt [00:48:04] Yeah, that's it. Yes. You know, in the U.S., for many, many years the federal agency that was in charge of fisheries research was called the Bureau of Commercial Fisheries. And which the names are tells you everything. And so what they worked on, excuse me, were fisheries that that were commercially fished.

Scott Holt [00:48:35] Over time, it has shifted so that agencies, more at the state level than the federal level, but even at the federal level, they're coming around to this idea that the recreational fishery is of value. And so, it's worth looking at things that are mostly of recreational interest and not, you know, commercial harvest interest. And that's getting more and more and more obvious as so many populations of fish get overfished. And, you know, they're hard to come by, but there's still a lot of recreational fishermen.

Scott Holt [00:49:19] I mean, the red drum is a perfect example. Because they were a commercial fish for a long time. But in the eighties, I guess, they were declared in Texas to be a recreational fish and you couldn't sell it. But the recreational fishing for red drum and trout, I don't know the numbers, but it's, you know, a hundreds of millions of dollar business in the state. And so, the state puts a lot of effort into studying redfish and trout, flounder.

Scott Holt [00:49:57] But, you know, the recreational fishery for tarpon, the people that fish for them are rabid about it. But, there aren't that many tarpon and there aren't that many fishermen. And so, the allocation of financial resources kind of goes where the activity is and tarpon just does not now, and really never has, had a lot of emphasis put on it.

Scott Holt [00:50:32] And, since it's a a catch-and-release fishery mostly, even the recreational data is, you know, kind of sparse. One of the things that about the federal fisheries people and the state sponsor or do is dock surveys, so they intercept people bringing their fish into the dock, where they can weigh and measure them, and ask them about effort and maybe take some samples or whatever. And in a pure catch-and-release fishery, there's no access to the fish. So, you know, the data about the fishery is sparse.

David Todd [00:51:22] That is so helpful. So, although there are probably lots of folks renting hotels and eating in restaurants and buying boats and fuel and spending money on catching tarpon, if they only come back with a story, there's not a lot of robust data about the effort and the fish that they caught.

Scott Holt [00:51:47] Yeah, especially these days. And I would say that there are not a lot of people, you know, that are staying in hotels and eating in restaurants that are targeting tarpon. I mean, it's a small community now that rabidly fishes for tarpon. There are a few guides, you know, that'll take people out. But it's not a, I mean, compared to the number of people that go fishing for (I keep bringing this up) but compared to the number of people that go fishing for redfish, go fishing for tarpon, the tarpon fisherman are a very small community.

David Todd [00:52:34] Well, this is so interesting and great insight to compare, you know, one recreational fishery and another, and why one seems to get a lot of attention and funding, and maybe the other, the tarpon, not so much so.

David Todd [00:52:52] So, but there has been some interesting research that's been done. And I think you were one of a number of authors who collaborated on a paper that I thought

was really intriguing - The Migrations and Movements of Atlantic Tarpon Revealed by Two Decades of Satellite Tagging. And it sounds like these fish are very migratory and but maybe not in a way that people understood for a long time until this kind of data became available. So, could you tell us more about what you, you and your colleagues learned?

Scott Holt [00:53:28] Yeah. So, people, you know, fishermen, sort of forever, I guess, have attached tags to fish that they have caught and released. But almost entirely those tags are (have various names) but they're like spaghetti tags. So, it's a little tag that has some information printed on it that might have on it when and where it was tagged. But more often, it has a, you know, a number you can call or somebody you can write, and say, "I caught this fish with a tag on it".

Scott Holt [00:54:10] And, you know, tens of millions of tags have been put on all kinds of tags like that have been put on all kinds of fish. And hundreds of thousands have been returned. But, you know, you get one, two per cent, maybe, of tags returned. And when you do, you know two things, you know where you put it on and where it was caught, and that's it.

Scott Holt [00:54:38] I mean, you learn a lot from it, but it's not much data return for a lot of effort.

Scott Holt [00:54:47] And so, with the advent of the communications satellites, you know, GPS and that kind of thing, people, particularly one company called Wildlife Computers, started developing tags that could actually carry a little computer in them and had the ability to transmit that data in one form or another at some time, transmit those data via satellite back to your lab, so that you didn't actually have to recover the tag to get data back.

Scott Holt [00:55:27] But the problem is, and was and still is, that these things are pretty big. And when we were working with them 15 years ago or so, they were bigger than a cigar. And so, having to stick that on the back of a fish was, it had the potential for interrupting the activity of the fish and other downsized fish carrying that thing around. To some extent, it limited the size of the fish you could put it on because they have to drag this thing around.

Scott Holt [00:56:03] But tarpon were big enough that they lent themselves to carrying those tags. And so, this research effort you're asking about was led by Dr. Jerry Ault out of the University of Miami, and they were putting these tags on fish that are all around the Gulf, well, mostly around the eastern Gulf, around Florida, east and west coast of Florida, down into the Caribbean.

Scott Holt [00:56:36] And then they expanded their work some over into Texas. And I got involved with them when they wanted to work in Texas, primarily helping them put tags on and chasing after tags that had come often and grounded somewhere. If the tag washes off, when the tag comes off, you can program it to come off when you want it to come off. It usually comes off before you want it to. But, you can program it when to come off. When it does, it floats to the surface and sends some summary data back to your lab.

Scott Holt [00:57:18] But, if you actually find the tag, it stores very detailed data on the memory card inside the tag. And there's so much data that it can't be transmitted by satellite. But, if you can find the thing, you get tremendous amount of data back. So, when one of our tags would wash up somewhere on a beach or in the bay somewhere in Texas, I'd get the calls. Can you go find that tag? So, I spent some time chasing after washed-up tags. Those were my involvement with that project.

Scott Holt [00:57:56] But then, finally, after, and as I think you can tell from the title of the paper, after 20 years of having all these various studies in various places, they did a big meta-analysis to produce this paper to try to understand the distribution and movement of tarpon throughout the Gulf, East Coast, into the Caribbean.

David Todd [00:58:26] Well, and these tagging studies, what did they reveal about the migration and movements of these tarpon?

Scott Holt [00:58:41] Probably the most interesting thing, and there were already hints that this was true. But, to me, one of the most interesting things about this is that the tarpon are, one, they're following food, but they're, they are affected by temperature as well. They don't like cold water, so they, the adults pretty much follow the, or are limited by it, put it that way, the 26 degree Celsius water temperatures, or something in this 79, 80 degree water. So that's, you know, that's warm water.

Scott Holt [00:59:28] And so, they may move north into this warmer water in the summer when it warms up. But move once. Excuse me. They move back south when it gets cold. So they have the seasonal movement of moving north in the summer and south in the winter.

Scott Holt [00:59:49] And it had been suggested.

Scott Holt [00:59:54] Can we stop for a minute?

David Todd [00:59:55] Of course.

Scott Holt [00:59:56] I've got to, I got to do something to clear my throat.

David Todd [00:59:58] Sure. Absolutely. Do that. Please.

Scott Holt [01:00:03] Okay. We'll try again.

David Todd [01:00:05] Sure. Sure. So, when we were talking earlier, you were talking about the seasonal movement of these tarpon.

[01:00:11] Yes. And so, this north / south movement, it turns out from, as I say, there were already some hints of this being the case, but it turns out from looking at the tagging data, that the fish that are in the northern Gulf of Mexico in the summer move back south in the winter. And the ones in the western Gulf move down to Mexico. And the ones in the eastern Gulf move down into southern Florida.

Scott Holt [01:00:49] And in the summer, they, those two groups, if you will, meet. They're off Louisiana. And in fact, they get, they mix in that area.

Scott Holt [01:01:07] But, when the migration starts going back south, they segregate based on where they came from. So, basically, the fish that came from Mexico, go back to Mexico. The ones that came from Florida, go back to Florida.

Scott Holt [01:01:23] Of all the tagging data that they had, there was never any record of one that had been tagged in Florida going to Mexico, or one tagged in Mexico or Texas going to Florida. So, there are different groups.

Scott Holt [01:01:41] But the genetic studies suggest that they're not genetically different. It doesn't take very much genetic mixing for the other geneticists to say, okay, these are not separate. That doesn't take much.

Scott Holt [01:01:57] And that probably happens in the in the pelagic larval stages, more than the adults. They get mixed up. They get caught in the loop stream, the loop current, currents coming through the Yucatan Strait and into the loop current. So, it's easy to see how genetically they get mixed.

Scott Holt [01:02:19] But the adult populations really don't mix.

Scott Holt [01:02:23] I think that was one of the more interesting things to me.

Scott Holt [01:02:27] And for the Texas tarpon, it does seem to be pretty clear that in the winter, most of the fish go back to Mexico. I hear stories of tarpon being found in the deep rigs in the Gulf where the water might be warm enough. But I don't, it doesn't seem that that's a place that's a, certainly, well, it's not a place that's an important winter refuge. And, you know, as we said earlier, tarpon have been around for millions of years and oil rigs haven't been out there very long. So that's not part of their life history.

Scott Holt [01:03:10] They move back into the Mexican waters almost entirely in the winter, early spring, which is probably where they spawn. And then they follow the warm water and the food back to Texas and Louisiana in the summer.

David Todd [01:03:28] Well, I guess this migration must make it complicated, maybe difficult, to manage tarpon. I mean you've got so many sort of cooks in the kitchen, you know, whether it's Caribbean Islands or, you know, Florida agencies or Texas departments, or maybe, you know, Mexican officials. Is that something that y'all, you know, discussed among yourselves, or is that sort of outside of the kind of analysis that you were focused on?

Scott Holt [01:04:01] No, no, no. That was very much a topic of the discussion at both of these symposia that were held.

Scott Holt [01:04:11] And there was a lot of interest from the fisheries people in Mexico. And they have an active recreational tarpon fishery down there. But, you know, again, the Mexican fisheries agency is actually a bit like the old commercial fisheries group in Texas, that it's not a commercial fish. And so, they don't work on it and, you know, they don't have a big push to manage recreational fish.

Scott Holt [01:04:54] It's not so much a catch-and-release fishery down there. I was down there for one of the, I went with the Dr. Ault on one of his tagging projects down in Veracruz. You know, they were catching and landing some really big tarpon. I'd never seen a 200-pound tarpon before, but they're, those are huge fish. So, they are kill tournaments. But, the fisheries people in the government are not doing that - that's not an emphasis of their work.

Scott Holt [01:05:28] So, the fisheries data from Mexico are pretty weak as well.

Scott Holt [01:05:37] And another issue that we kind of got from visiting with the scientists down there, particularly with the third one, the third symposia which we held in, or was held in Veracruz. There were a lot of the Mexican fishermen, fishery scientists and fishermen there.

Is the substantial changes that have happened in their estuaries over the last 50-75 years, as the land has been developed for, particularly for, banana plantations, but other kinds of agricultural activities. So, there's thoughts, but they don't have much data to support it - is it that the nursery habitat has changed substantially in Mexico over the last well now it would probably be 75, 100 years.

David Todd [01:06:38] Well, you know, that brings up a question for me is that, you know, as you pointed out, I think around the turn of the last century, Port Aransas was called Tarpon, and there was this, you know, really active tarpon fishery off the Texas coast, which, as I understand it, sort of tapered off in the fifties. Why do you think it was that the tarpon declined?

Scott Holt [01:07:08] Yeah. Good question. And there, you know, that was another sort of feature, another point of the symposium was, you know, trying to at least see what the data might be to support that, or to understand the question. And there's very little.

Scott Holt [01:07:35] One thing that we don't really know, you know, from historical data in Texas is whether this was ever an important nursery area. There's not a lot of records of tarpon. There's some old, really good fishery surveys done here. One of the best ones is published in ... 1929 is the date of the publication. By John Pearson, he worked for the Federal fisheries people. So, he did a really extensive survey of fish up and down the Texas coast. And tarpon are not, juvenile tarpon, are not an important part of the fish that he surveyed even back at that time. So, it's not clear that Texas was ever a important nursery area.

Scott Holt [01:08:49] A lot of people point to the construction of dams and cutting off fresh water that's coming into the coast. But as we were saying earlier, the juveniles are really tolerant of bad water conditions. So, it seems to me, and it's just my personal opinion, that cutting off fresh water from the lakes and rivers would not ruin the habitat for small tarpon. I mean, it might even make it better, because there's less competition for it in those bad water condition.

Scott Holt [01:09:29] But in Mexico, you know, we know that's an important nursery area. And if they've changed the nursery conditions there, that certainly could be a source of a lot of the decline.

Scott Holt [01:09:45] You know, in that third symposium, I think we'll probably get to it, but I'll just jump ahead to it, is a study that Joan headed up looking at scales, tarpon scales, in the Tarpon Inn. And so, she got a student, a summer student, to go and get all the information. Back in the day, the fishermen would take a scale off the tarpon they caught and write something on it, typically, ideally, their name, the length of the fish, and the weight of the fish, but they write something on it, put it on the wall in the Tarpon Inn.

Scott Holt [01:10:30] So, they got all the data off of the scales. And with the help of a fisheries modeler that we knew in Canada that worked with us and tried to summarize what those data might mean. And one of the, sort of the bottom line of that, to me, was that it's very likely what's called recruitment failure, that is, we quit getting young fish coming into the population. And since these fish live 60-80 years, you can have a fishery on old fish for a long time.

Scott Holt [01:11:12] But, the younger fish didn't seem to be coming into the population, which would, to me, would suggest that there was problems with nursery habitat somewhere, and probably in Mexico.

David Todd [01:11:31] So were there some, maybe, changes in the estuaries down there? You mentioned that there was development of agriculture for bananas and other plants. Maybe there was some dam construction? What do you think might have been in play there?

Scott Holt [01:11:49] No, I don't think they did much reservoir construction down there. You know, that's a very wet area. I don't know that they've decreased freshwater inflow.

Scott Holt [01:12:05] But the problem that they, the Mexican scientists, were talking about was water quality. You know, they're cutting down forest and putting in, you know, pineapples and bananas, and they use a lot of herbicides and pesticides. So, the water quality in terms of clarity would change because of all the sediment. And there were a lot of herbicides, pesticides. I mean, these are just anecdotal things we were hearing from the scientists, but it sounded to me like they were convinced that the quality of the nursery habitat had declined substantially over that, you know, 40, 50 years, or more.

David Todd [01:12:52] Well, it's interesting, from what you're saying, that these are such long-lived fish, it might be, you know, changes that happened years ago and the impact was maybe covered up because the adults live such a long time.

Scott Holt [01:13:13] Yeah, to some extent that, you know, I don't know if the fishermen ... I never talked with or interviewed any fishermen who had fished during that time. But, I don't know if they thought that, you know, they weren't catching little fish anymore. I mean, that's what the data from the scales looks like. But whether they recognized that or not, you know, I don't know.

Scott Holt [01:13:42] Of course, that happened in the forties, fifties, into the sixties. The fishery kind of went away in the sixties. Just weren't that many fish coming anymore.

Scott Holt [01:13:58] But the data from the scales seem to suggest that, you know, there are fewer and fewer small fish to replenish the population. And that would, you know, ultimately, even if they were long-lived fish, that would ultimately, you know, result in a smaller and smaller population.

David Todd [01:14:21] Yeah. Well, I see you told us a little bit about their life history, and their ecological role, and their migrations and movements, and some of this interesting and maybe mysterious story about what might have happened to cause their decline.

David Todd [01:14:43] I'm curious if you have any thoughts about what sort of strategies might be effective to bring tarpon back. There have been some catch-and-release regulations imposed and I guess there have been other kinds of efforts, but does anything seem promising to you?

Scott Holt [01:15:06] I'm sorry to have to be pessimistic, but I think there are two difficulties with the idea of bringing them back. And that is, if we are, and maybe these two are intertwined, but if this idea that the populations are largely separate east and west, then for tarpon in Texas, which has declined dramatically, and in part of Louisiana, and this is in

contrast to tarpon in other parts of the even the Gulf of Mexico, but other parts of the of the world where tarpon are still doing fine.

Scott Holt [01:15:53] If that's, so, what are the structure of our population? It's this migration from Mexico to Texas and they're primarily spawning in Mexico. Then, you know, the success of that population depends on successful recruitment. And if the problem, if the problem, is largely in nursery areas of Mexico, then one, it's kind of out of our hands. You know, we in the United States who are interested in the fishery can't go fix things in Mexico. We can certainly offer encouragement in a variety of ways, but in a sense, it's kind of out of our hands in that way.

Scott Holt [01:16:46] But, you know, universally, there is some progress, I think, being made on people being more attuned to environmental issues and environmental degradation. And I think that's true. I get this this feeling from the people in Mexico that, you know, they're aware that there are problems, and there's an effort and interest in addressing those problems.

Scott Holt [01:17:21] So, you know, fisheries are amazing in the way they can, again rebound from low population numbers, particularly with this high fecundity level, you know, where they're releasing millions and millions of eggs, that if there's a bottleneck somewhere and you remove that bottleneck, it's quite a sudden rebound.

Scott Holt [01:17:50] So, if that is an issue, what I'm sort of guessing at, is an issue - nursery quality, nursery habitat quality in Mexico changes - then there's a real likelihood of them rebounding.

Scott Holt [01:18:11] There are other potential issues people have brought up, and maybe it's a food supply issue. You know, we don't have as many menhaden and anchovies as we used to. You know, some various fish populations of fish are changing. So, it may not it may not be entirely in the nursery habitat. You know, it could be a food supply issue.

Scott Holt [01:18:37] But, without the data from the past to really understand sort of how the population works, it's hard to say now when they're sort of gone, if you will, why did they go, where did they go, and how do you fix it?

David Todd [01:19:02] That's intriguing. So, part of the difficulty is just the baseline is kind of sketchy, so, to know how to return it to that former condition is complicated. You just don't know where to.

Scott Holt [01:19:16] Yeah.

Scott Holt [01:19:17] Restart it. Okay.

David Todd [01:19:22] So, one thing I was always curious about, though, when we're talking to people about living ecosystems, is what sort of impact climate change might have on, you know, the creature in discussion, and here, of course, the tarpon. I mean, do you think that climate change may might lead to warmer waters and a change in the migrations and maybe a change in where their nurseries are found?

Scott Holt [01:19:57] It's possible. You know, that is one of the things that we have seen here on the Texas coast. One of the most obvious effects of this, what is now a relatively slow

change in the climate, is that the winters are warmer. You know, it's not so much it's getting hotter, but the winters are warmer.

Scott Holt [01:20:22] And that warmer winter temperatures has allowed a number of things that are not cold-tolerant to either move north or remain north. Black mangrove is a really good example that's a more tropical / subtropical species. This is not red mangrove like, you know, the big mangroves that you see in Florida. Black mangrove is a smaller mangrove plant. But it's not really cold-tolerant. And over the last 50 years, we've had more and more black mangrove in the marsh and it's kind of taken over.

Scott Holt [01:21:04] It got its comeuppance in February 2021 and essentially almost all died. And so, you know, this movement to the north has had a setback, but warmer winter temperatures are allowing a lot of things to move north.

Scott Holt [01:21:22] So it's, in that sense, it's conceivable that, as temperature slowly warm that, yes, the tarpon, you know, they may not have to move as far south. Suitable nursery habitat may, you know, move, if you will, to the north. And again, if this is a reasonable assumption on my part mostly that there are difficulties in the nursery habitat, you know, far south Gulf, if there was, if the nursery habitat wasn't temperature-limited, they might move north and there might be more suitable habitat.

Scott Holt [01:22:11] I mean, that's a whole lot of hand-waving speculation, but, well, that's conceivable.

David Todd [01:22:18] Yeah. Well, thanks for doing a little conjecturing there. I hope I didn't ask you to go too far out on the diving board, on the walk-the-pirate plank.

David Todd [01:22:34] So, something else that I was curious to talk about with a person who's been a scientist for so many years, is just the role of science in wildlife conservation? You know, I think about your coming out of the Wildlife and Fisheries Science Program at A&M and in over 50 years, there's just been a huge amount of research done about wildlife and I guess a lot of that gets imported into conservation. And I'm curious, you know, what, you know, are we understanding these systems better, are we able to manage them better? Or are these, you know, whole networks of creatures and energy flows and nutrient flows just too complicated to ever understand fully, and really make a difference.

Scott Holt [01:23:29] Yes.

David Todd [01:23:31] Yes!

Scott Holt [01:23:36] Yeah. I am amazed at how technology has changed and our ability to learn things has changed. I mean, just the development of these satellite pop-up tags and now, you know, all that kind of technology is getting smaller and smaller and smaller.

Scott Holt [01:24:01] And I'm just thinking of bird biology where you can now, you know, again, in the past, you know, they put rings on their legs and it was just like our spaghetti tags. You'd get, you know, where you tagged it and where you know, where the duck hunter shot it.

Scott Holt [01:24:22] But now, even on smaller birds, they can put transmitters on the back of the birds and follow them, you know, minute-by-minute as they fly from the Arctic to Tierra del Fuego. And the amount of information that we're able to develop now is just phenomenal.

Scott Holt [01:24:44] So, on one hand, the amount that we know, the amount that we can learn, is just, it's just amazing. I don't know that there's enough of us to try to assimilate all that information we can get. But, you know, we're developing the technology to assimilate the data along with developing ways to acquire the data. So, all of that is very encouraging and rather daunting, you know, in how much information is out there.

Scott Holt [01:25:21] Whether we're able to turn that into better management, to me, is a whole lot more a question of willingness. You know, for the most part, fisheries management is much more managing people than managing fish. You know, the fish don't lend themselves to being managed very well. But, but you can manage people better. And so, we change what we do and how we do it, and the fish populations often respond to that.

Scott Holt [01:26:04] You know, if you if, if you're catching way too many of them, you stop catching them. You know, as I said earlier, you get a pretty quick rebound in the population. And you didn't do anything to the fish. You didn't tell the fish to do anything. You just quit doing things to the fish, or quit doing things to the habitat. To the extent that we're willing to do more, then we have a wealth of information, I think, to know what to do, much more than, I mean, even when I started, you know, in the seventies.

Scott Holt [01:26:42] So, I'm optimistic in that there's a lot of, we're developing so much information and the people are largely aware of it.

Scott Holt [01:27:00] [Excuse me.]

Scott Holt [01:27:01] But, will the general population use that? I just don't know.

David Todd [01:27:11] Yeah, I guess it is a question of willpower and political support and, you know, accepting cultural changes.

David Todd [01:27:22] I mean, one of the things I've been curious about and would love to hear what a scientist's view of this is, is that I've been sort of personally kind of stunned at folk's dismissal of aspects of, you know, scientific evidence, factual proofs that support use of vaccines or support, you know, the acceleration of climate change and so on. Do you see a shift in people's willingness, you know, among the sort of general public to accept science and accept the things that you are discovering and passing on to the fund of knowledge?

Scott Holt [01:28:12] Yeah, and I don't, I don't quite know. I don't quite know why. You know, and people have sort of complete belief in some aspects of science and, but other aspects, you know, they don't.

Scott Holt [01:28:32] And to some extent, it seems to me that that's sort of how it affects people personally. You know, just something sort of as simple as measuring the air temperature. You know, I mean, that's science. You know, it takes, you know, an instrument to do that. And for the most part, everybody believes that, you know, when it's 90, it's 90.

Scott Holt [01:29:02] But other kinds of data, and you're talking about vaccines, but, you know, wetland conservation and that kind of thing, the data are there, just like the temperature. But, doing something with it or about it has a more personal effect and they, in a way, can choose whether to use it or not. And in many cases, they don't want to use it. It's easier just to not believe it. And then you don't have to feel bad about not using it.

Scott Holt [01:29:41] So, I am discouraged. So, what looks to me like a move to ignore, or not believe, a lot of science that's coming, a lot of data, information that's coming out now.

Scott Holt [01:30:00] But part of the issue, I think, goes back to what I was saying a while ago, how much information there is. You know, we're gathering so much information so fast and it turns out some of it is not always right. And that's the science, the scientific method, is, "Oh, you know, we thought we knew that, but now we're learning something else, so what we thought we knew before is not exactly right."

Scott Holt [01:30:23] And the public goes, "Well, what am I going to believe? You said it's just, you know, twenty years ago, and now you're saying that. So, what am I supposed to believe?" Well, that's the way science works. But, it's not easily understood by the public, and particularly when we're asking the public to do something that personally affects them.

Scott Holt [01:30:45] You know, if it's a certain kind of management activity that affects the pocketbook, you say, "Well, I'm not going to do that because it'll cost me a lot of money. You're telling me it's better for the environment, but it costs me a lot of money. So, I'm not, either I don't believe you, or I'm not for it."

Scott Holt [01:31:12] I understand that.

David Todd [01:31:16] Yeah, I guess it's hard to maybe accept and believe things that are inconvenient and awkward and, you know, disrupt your life or cost you money. It's a hard thing.

David Todd [01:31:32] Well, you know, another sort of general question, if you could look on your Ouija board and tell us what you think. What is your outlook for the future of wildlife conservation in Texas? You know, the tarpon, of course, is one example, but maybe beyond that. Any thoughts you'd like to share?

Scott Holt [01:32:03] I guess I'm more optimistic in the way you frame that question. And I have kind of left the aquatic world and gone to the terrestrial world more since I retired. I've been retired now 12 years. And I own some property and, you know, Texas is almost entirely private property, compared to places other in the West where state and federal government, particularly federal government, owns so much land. And so, conservation and certainly terrestrial-based conservation in Texas is based on the cooperation of private landowners. And it appears to me that to a large part, private landowners are becoming more and more attuned to conservation issues and conservation programs are more accepted. And so, I'm optimistic about that.

Scott Holt [01:33:10] And, you know, even with fisheries, you know, as the regulatory bodies, you know, have to change regulations and lower the, some limits or sizes, at least the fishing community, for the most part, is tolerant and supportive of that.

Scott Holt [01:33:36] And I did sort of have one interesting observation, I suppose, over time. When I was working, and I didn't work in the management field, I was in a basic science field. But, as regulations were being proposed and data were being assessed, I kept hearing from organizations that would say something like, "Well, we believe in sound science. We would do certain things if they were based on sound science."

Scott Holt [01:34:14] And I kept looking at those comments and thinking, "Well, how do you know what's sound science?" I mean, I'm a scientist and I have trouble sometimes figuring out whether science is sound or not. So, how does a conservation organization or a fishermen's organization say, "We will follow the sound science, but, you know, if it's not sound science, then we're going to question your plan."

Scott Holt [01:34:45] And I finally came to the conclusion that sound science, for many people, is science that gives an answer you like. And if you don't like the answer, it's not sound science. And I think that that may sort of extend to this whole issue we talked about a while ago of whether people believe in science or not. You know, if it's given an answer that you don't like, then you question the science. And if it gives you an answer, you do like, well, that's good science.

David Todd [01:35:18] I love human nature. You know, we always like to have people agree with what we think.

David Todd [01:35:27] Well, I've kept you for a long time. Let me just ask one last question, and that is, is there something we should have discussed, heard you talk about, you know, learned from you, that we somehow skipped over today? I would love to hear if there's something you'd like to add.

Scott Holt [01:35:56] No, I don't, no, I don't think so. You know, we could change the subject to something I spent more time working on, and, you know, talk the rest of the day. But, you know, in terms of sort of our work with tarpon and how I got there, no, I don't think so. I think we've had a nice talk.

David Todd [01:36:20] Well, I'm very grateful and want to thank you for spending time. And I'm doubly grateful because you were so kind to talk about things that are, you know, somewhat, you know, smaller of a portion of your work, because I know you've done a lot of interesting and important work with red drum and trout, and billfish, and I mean, gosh, the list goes on and on. So maybe you'll indulge just with another visit in the future. But for today, thank you so much.

Scott Holt [01:36:56] Yep, you're quite welcome.

David Todd [01:36:58] All right, well, have a good day. And now you can tell your handyman that he can start making noise.

Scott Holt [01:37:06] Okay, I'll tell him.

David Todd [01:37:07] All right. Thank you, Mr. Holt. I appreciate it.

Scott Holt [01:37:10] Yes, you bet.

David Todd [01:37:11] Have a good day. Bye now.

Scott Holt [01:37:13] Thank you. Bye bye.