

Dr. Michael S. Wetz

Interviewed by Dr. Jen Brown  
March 7, 2022  
Corpus Christi, Texas

Transcribed by Alyssa Lucas

**[Dr. Jen Brown]:** Okay, it is March 7, 2022. This is Jen Brown, and I'm here with Dr. Mike Wetz at the Harte Research Institute, and we're here today to do an oral history about his life and work with plankton ecology, water quality, and as well as his work with Baffin Bay. Um, for the record do I have your permission to record?

**[Dr. Michael S. Wetz]:** Yes, you do.

**[Brown]:** Okay, thanks. Um, so let's start, can you tell me more about your background and early life?

**[Wetz]:** Sure. Well, I grew up in southeastern Ohio in a little town of about six hundred people. Actually, it's a village, not a town (both laugh). Um, very rural community and from an early age I started getting really interested in sharks, and I think it's because my brother made me watch *Jaws* when I was like four years old, and I don't know if that scarred me or what, but I was always reading books about sharks and going to the library. So, then, you know, for our family vacation spot was Myrtle Beach, South Carolina, so every year I would try and either go visit the aquarium or go fishing with my dad, but yeah, I was just always interested in the ocean from an early age.

**[Brown]:** Um-hm. What do you think about sharks and the ocean really drew you to—

**[Wetz]:** I don't know, I just thought it was, they were, I don't know what it was about them, really. Um, the fact that they could eat you if they wanted, I thought that was interesting and so I was always interested in, okay, what sharks are out there, what sharks might be harmful, and what do we know about sharks. It just—all that kind of interested me.

**[Brown]:** Did you ever come across any sharks on these trips?

**[Wetz]:** Uh, when we went fishing, we did. We'd occasionally catch them and not know what to do with them. I mean we were just, you know, a bunch of hillbillies (laughs) from Ohio and had no idea, but yeah that was—that was about the extent of it.

**[Brown]:** Okay, yeah. Um, so your family, what did they do?

**[Wetz]:** My dad worked at a coal burning power plant in Waterford, Ohio, and then my mom, she just worked various jobs and also raised me and my brother.

**[Brown]:** Okay. How old's your brother?

**[Wetz]:** Oh, he's thirteen years older than me. So, my parents, they don't hesitate to tell me I was an accident. I mean, I was (both laugh). So, here I am anyway.

**[Brown]:** (laughs) Okay, and did they, um, help foster your interest in sharks and those who—

**[Wetz]:** Yeah, yeah, my mom, especially took me to the library quite a bit to get books on sharks, and then took me to SeaWorld. They took me to SeaWorld quite a bit, near Cleveland, Ohio. So, that was probably the best opportunities I had for that.

**[Brown]:** Okay.

**[Wetz]:** Yeah.

**[Brown]:** Okay, so that kind of covers your interest in marine science.

**[Wetz]:** Yeah.

**[Brown]:** So, did you know that you wanted to go to college and study the ocean and—

**[Wetz]:** I did. I was one of the, I think, rare people that just like ever since I was a little kid I kind of knew what I wanted to do. And so then I went to college at Coastal Carolina University, and I majored in marine science there.

**[Brown]:** Um-hm. And from there you obviously went and got your PhD. Did you know you wanted to get your PhD? What drew you to graduate school?

**[Wetz]:** Yeah, I was very fortunate to have had a couple of internships starting my sophomore year at Coastal. Oh, are we all good (referencing the audio recorder)?

**[Brown]:** Yeah.

**[Wetz]:** Oh, okay.

**[Brown]:** I just—

**[Wetz]:** Yeah.

**[Brown]:** I'm a little paranoid.

**[Wetz]:** Oh, yeah, so I had a couple of internships. I worked—the first one I had was at the aquarium in Myrtle Beach and so I, I didn't at that time know that I wanted to do my PhD and

go into research so I tried a couple things. I worked at the aquarium, and I also had an internship in a research lab at the University of South Carolina with a fellow who was studying harmful algal blooms, and I quickly realized I hated working in the aquarium because it really wasn't about just, you know, working with the animals. You were constantly fixing pipes and doing all kind of random stuff that I didn't find interesting. But I really enjoyed working with the scientists at South Carolina on harmful algal bloom issues because it was something that really connected back to us from a human health standpoint.

**[Brown]:** Um-hm.

**[Wetz]:** So that's how I kind of settled on what I wanted to do with the rest of my life, I guess.

**[Brown]:** Yeah. Yeah. So then what did you do?

**[Wetz]:** Oh, I worked for him for, um, for almost three years. Developed my own independent project and was actually fortunate that he let me run with some ideas and I was able to publish some papers as an undergrad which was pretty cool.

**[Brown]:** Really?

**[Wetz]:** Yeah, and it was also very fortuitous, I was supposed to start graduate school in Oregon State in the fall of 2000, and I had a project that was still underway that I wanted to see to completion so I deferred my enrollment to March of 2001, and in the meantime my wife took a job at the lab I was working at in South Carolina during fall of 2000, so if I had started grad school I never would have met her.

**[Brown]:** Oh.

**[Wetz]:** Yeah.

**[Brown]:** How did you two meet? Just in the lab or—

**[Wetz]:** Just in the lab. It was a really small lab (both laugh).

**[Brown]:** Okay.

**[Wetz]:** I was, like, hey new person, you know, let's, let's go have dinner or something.

**[Brown]:** Oh, nice.

**[Wetz]:** Yeah.

**[Brown]:** So, she moved with you out to Oregon?

**[Wetz]:** Yeah, so she moved out there about a year after I did so we kind of did the distance thing for a while and then she found a job and came out there.

**[Brown]:** Um-hm. Okay.

**[Mike Wetz]:** Yeah.

**[Brown]:** Well, tell me about your experience in graduate school.

**[Wetz]:** Oh, it was awesome, I went to Oregon State University and their oceanography program and I did a lot of work with plankton and looking at plankton and carbon cycling and plankton—what causes plankton blooms off the Oregon coast. Um, so I went to sea a lot, I spent about a hundred days at sea, and I think I enjoyed it for the most part but, you know, there was one cruise where we had 35- to 45-foot seas easily and for about two days straight and that kind of made me realize I think I want to go work in the estuary again (both laugh). So yeah, but it was a really beautiful place, lots of really interesting things happening out there and the Oregon and California coast is really on the—on the sort of front lines of the climate impacts on marine systems. They are really seeing a lot of changes and it's just changed incredibly over the past twenty years since I've been there. But since I was there—it was a really amazing place to work.

**[Brown]:** Now, Corvallis is not—I mean is there a separate Oregon State, like, lab on the (both laugh), okay.

**[Wetz]:** Yeah, they had a—what at that time it was a fairly small lab in Newport. And of course, since I graduated there, I'd been getting all this crazy funding and NOAA moved there so now Newport is just this amazing burgeoning place on the Oregon coast, and they built their lab up so I missed out on all that, but (both laugh) I still enjoyed most of my time I spent in Corvallis, and then I would go to sea out of Newport.

**[Brown]:** Um-hm.

**[Wetz]:** So.

**[Brown]:** And what did you write your dissertation on?

**[Wetz]:** It was basically looking at how carbon gets cycled when you get the big diatom blooms off the Oregon coast. So, diatoms are a type of phytoplankton, they are very iconic, you know, most early oceanographers study diatoms as sort of the base of the food web and Oregon gets these huge blooms off the coast every year. So, I was looking at where does the carbon go when these blooms happen and so that's what it boiled down to.

**[Brown]:** Where does the carbon go?

**[Wetz]:** Well, what we found is that when the blooms are developing, most of the carbon stays locked up in the cells, but then as the blooms start to sort of hit their senescent phase, meaning their stopping their growth, there's a good bit of that carbon that kind of gets released back into the environment and gets chewed up by little bacteria and things.

**[Brown]:** Um-hm.

**[Wetz]:** And that was, you know, our view of marine food webs changed a lot. We used to just focus only on the carbon that was trapped in the cells, but then we started to realize, hey there's all this other carbon that's going back into the environment and really sort of—it's just a different view of how the food web works.

**[Brown]:** And how does climate change and those changes you talked about on the coast play into that?

**[Wetz]:** Um-hm. Well, one of the most striking examples I think is they've been having these, what'd they call the Great Pacific warm blobs I guess you call them, these big patches of really warm water that develop off the Northeast Pacific there. I think 2015 was a really bad year but it's been happening more and more. And what that does is it kind of prevents this oceanography—this oceanography process called upwelling. Um, it prevents that from happening so upwelling is where when the winds blowing a certain direction, it allows the water to move in a way that brings up deep water to the surface, and it's just cold, really nutrient rich water that fuels the, the food web. But with this warm blob of water just kind of caps the—caps the ocean off and it, so you get less primary production, so less of the plankton there. It also tends to favor these plankton that are not good for the environment, so harmful algae blooms, and it's just been a not great thing for the ecosystem out there. They have issues with the fishery, it causes problems for the whales that, you know, rely on these plankton blooms, just a lot of—a lot of changes happening out there, that to me is really striking that it's just happening so quickly.

**[Brown]:** Hm, interesting.

**[Wetz]:** So yeah, you know, lot of people refer to that whole area from California to Washington as sort of a canary in the coal mine for a lot of the climate impacts that we might expect.

**[Brown]:** Um-hm. So how did you shift from, um, studying the Pacific Northwest to the southern coast?

**[Wetz]:** Oh, yeah so when I was in South Carolina I worked in the estuary quite a bit so I'd always kind of had a, you know, there's always a fond place in my heart for estuaries just because there right at that interface where we've got a lot of urbanization and built infrastructure, and then these really critical habitats on the water. So, there's just a lot of things happening in the estuaries. So I was fortunate. I connected with this really famous estuary

ecologist. He does a lot of water quality and harmful algal bloom issues in North Carolina, and I ended up doing a postdoc with him in Morehead City, North Carolina, in the University of North Carolina's Institute of Marine Sciences, and so that kind of drew me back into the—into the South, and into working in estuaries again.

**[Brown]:** Um-hm, and where did you go from there?

**[Wetz]:** So, I spent two years as a postdoc, and then I took a faculty position at Florida State University in their Department of Oceanography, uh, started there in December of 2008, um, and then all three of us new hires got our pink slips in May of 2009.

**[Brown]:** Oh.

**[Wetz]:** So, yeah it was really a weird time so that was right in the middle of quote unquote Great Recession, but FSU had just hired a whole bunch of us and then, you know, they had these, I guess you could say, perceived budget issues affecting the university, but what we learned sort of after the fact is that there were a lot of politics. Apparently, the provost at that time really had it out for the oceanography program and so used the budget issues as a way of really hammering the department. So got laid off. They kept me on for a year with the stimulus funds that came out, but in the meantime, I was fortunate to land the position here because it was—it was a pretty bleak job market at that point.

**[Brown]:** Yeah, yeah.

**[Wetz]:** Um, but it was a struggle, you know, we had just bought a house thinking we'd be there for a while and just found out we were having our second child and, and then to get a pink slip in the mail that was—that was pretty brutal.

**[Brown]:** How did you deal with that?

**[Wetz]:** Um (laughs) I, I don't know. I didn't handle it too well, but we got through it. I think I probably shed a few tears at some point just—but it, I mean it, it happens. It's rare but it happens. But yeah, had a great family network and great support network and family and friends and we got through it.

**[Brown]:** Um-hm.

**[Wetz]:** Found a job. Moved on.

**[Brown]:** Yeah.

**[Wetz]:** It is what it is. So—

**[Brown]:** Yeah, so you got the—when did you start here then?

**[Wetz]:** I started here in, um gosh, August of 2010. So, let's see, I got my layoff notice in June of 2008. Somewhere around in there and stayed on for a year at—no, let's see, so that was, I'm trying to get my timeline. I try to forget that—that whole time period (Brown laughs). Maybe they kept me on for a year and a half or something like that with stimulus funds, but another colleague Brian Arbic, he went to the University of Michigan. I came here. We both kind of left at about the same time so they must have kept us on for over a year.

**[Brown]:** Um-hm.

**[Wetz]:** With stimulus funds.

**[Brown]:** Yeah.

**[Wetz]:** So, yeah, I try and put the FSU experience out of my mind (laughs) as much as possible.

**[Brown]:** I don't blame you.

**[Wetz]:** Yeah.

**[Brown]:** That's pretty crazy.

**[Wetz]:** Yeah.

**[Brown]:** Um, but you got the job here so.

**[Wetz]:** Got the job here and, it was—it was really nice, so I came here right when TAMU-CC and the College of Science and Engineering, they were really trying to ramp up their research. And so, I think I was actually the first hire to actually get some startup funds to build a lab. And so, it was also just a really great experience because it was unique in the sense that I was able to speak with the dean, Frank Pezold, a lot just about, hey, where should we go from here and how can we do this and just share ideas. He was just a really welcoming person and, and really trying to grow the research enterprise here and so it was just, it was an amazing experience. I don't think if I had gone anywhere else that I'd have that level of access and ability to offer input on what we should do.

**[Brown]:** Um-hm. And when you came here did you know what you wanted to study? How did your scientific background change or?

**[Wetz]:** Yeah, I didn't really know. I had an idea, but it was in 2012 when some of the Baffin issues started popping up, and so I kind of redirected my focus to start to address some of those issues. Prior to that we were doing some work with some students in Oso Bay just because it's really accessible and it also has some water quality challenges, but Baffin really kind of took us in a new direction.

**[Brown]:** Um-hm. Um, can you tell me more about some of the more interesting and important things that you've discovered about Texas bays and estuaries?

**[Wetz]:** Yeah, you know, I used to think that there was this straightforward relationship between the fresh water coming in, which delivers nutrients, and then presumably plankton blooms and the productivity of estuaries. But I think what we've come to realize is that that's not necessarily the case, and part of it is these systems are just so shallow that even when you don't have a lot of fresh water going into them, they can still stay productive because of nutrients and other fuel for the plankton that kind of builds up in the sediment and then gets released back into the water. So, I think they're very resilient ecosystems, and I know that freshwater is a big, big concern and the amount of freshwater going into them, and it's certainly important but from a primary productivity standpoint, it seems like these systems can kind of adapt to dealing with not having as much fresh water coming in at times.

**[Brown]:** And what's the role between freshwater inflow for water quality?

**[Wetz]:** Um-hm, well, it can be good or bad. So, what the freshwater inflow does is that it creates the salinity gradient that is really good for a lot of estuarian organisms. It also brings in the nutrients that fuel the base of the food web, the primary producers, your plankton, but it can also be bad especially if the quality of the water coming in is not good. And that's one of the things we're seeing in Baffin Bay, which is that—and you can talk to some of these folks that, that you'll talk to, and they'll tell you that it used to be that when you got a good rain event you'd get all this clear, clean water coming into the bay and it would kind of flush it out and act as sort of a reset on the bay and it was great. Now the quality of the water coming into the bay is not good, so it actually causes a lot of negative things to happen in the bay. So the freshwater is great, but it has to have good quality as well.

**[Brown]:** And what happens when it's not of good quality? What does it do to the bay?

**[Wetz]:** Oh, all kinds of things. It can trigger persistent high levels of algae in the water. It can cause the types of algae to change to less healthy algae. It can cause low dissolved oxygen events in the water. When you get a lot of algae in the water that can also decrease the amount of light that goes to the bottom, and so in places where you have lots of seagrass beds, they need light. So, if you've got poor quality water and lots of algae, they don't get the light they need and then they die.

**[Brown]:** Is that what happened in Baffin Bay with the brown tides? Is that why the seagrass died?

**[Wetz]:** Yeah, there was documented losses of seagrass both in Baffin and the Laguna Madre from the brown tides.

**[Brown]:** Um-hm.



**[Wetz]:** Yeah. So the water quality is sort of that, you know, other part of the story.

**[Brown]:** Um-hm.

**[Wetz]:** There's the quantity side, but also you have to have good quality water.

**[Brown]:** Yeah. How do scientists define water—good quality water?

**[Wetz]:** Um-hm, well it depends on who you ask. So, a lot of the state agencies will have standards, so basically levels that they set, for different indicators of water quality, and so if you exceed that level for a certain amount of time, et cetera, et cetera, then they consider the water to be either be impaired or have some kind of level of concern, and generally those levels are based on some either prior studies or, well, basically, it's based on other evidence linking those levels to some harmful impact on the environment, and that's what it boils on down to.

**[Brown]:** Um-hm. Okay, do you define water quality in the same way in your lab?

**[Wetz]:** Yeah, well, hm, that's a good question. So, it's a little complicated in the state because so the big water quality issue we work on are nutrients like nitrogen and phosphorus, and then the algae blooms. Um, a lot of states are developing real hard standards for each bay system for nutrients. Texas does not have nutrients standards so far. So there's still a lot of wiggle room in there in terms of how we define good or bad water quality, I guess you could say.

**[Brown]:** Um-hm. Have you, um, observed or studied any kind of changing water quality trends in Texas?

**[Wetz]:** Yeah, we're actually fortunate in that the TCEQ maintains a long-term monitoring program and they have data on a lot of different water quality indicators from every bay system, so we have a really nice long term data set, and we'd been doing a lot of work over the past five years to, to mine that data and look at trends.

**[Brown]:** Um-hm, what sort of trends are you seeing?

**[Wetz]:** Big picture, the thing that amazes me most is that despite all the population growth we've had on the coast and other changes, our water quality is in generally pretty good shape on the Texas coast. We do have some bad spots, I guess you could say, like Baffin Bay. That's certainly one of them, and there are other areas where there are some problems, but I'm kind of surprised we are in actually pretty good shape for now. We want to keep it that way. We don't want to become the Floridas of the world. Our state agencies, and in particular, the General Land Office, they're really trying to stay on top of this being proactive and developing approaches to facilitate the growth on the coast, but also trying to alleviate the negative impacts on water quality.

**[Brown]:** Um-hm. What else do you want to talk about kind of in general outside of your work in Baffin Bay?

**[Wetz]:** Hm, give me an example. What are you thinking?

**[Brown]:** Well, I'm not sure (laughs).

**[Wetz]:** Okay, uh. I don't know. I'm pretty excited about, you know, a lot of our initiatives right now that we are trying to get off the ground are really trying to get ahead of the curve, so to speak, kind of going back to that issue of, okay so we are in pretty good shape now let's keep in that way. Let's not become a Florida. And so to do that, we're trying to do things like developing a harmful algal bloom monitoring network, which in our field monitoring, people are kind of like, "Oh, monitoring, more monitoring," but what we're trying to do is get data in real time so that we can get warnings out there to the public and to resource managing agencies so we can prevent any real harmful impacts to people and potentially the environment before they happen. Again, we don't want to be the Florida's of the world. We don't want to get caught flat footed dealing with these issues. So that's one of the initiatives we're really trying to get out there. And then also we've been working on this report card initiative, which basically we're taking a whole bunch of different data, so water quality, fisheries, on oysters, habitat, and even on socioeconomic conditions, and we're trying to pull all this together to give a really comprehensive assessment of the health of each of our bays and of the Texas coast as a whole. And what that does is it will help us to really say okay, where do we need to focus our efforts over the next x number of years in terms of either restoration or conservation efforts. And it also gives us sort of a baseline as the coast continues to change so we can see, okay where are those areas that, that might become problematic in the future. And what's really exciting about that is it's involved a lot of stakeholder engagements so I've gotten to meet a lot of people up and down the coast. And, and so it's been really fun, and it kind of circles back to my experience with Baffin Bay which is when I moved to Texas, I didn't really know what to experience or what I would experience in terms of conservation interests and things like that, but through Baffin Bay and the report card, it's just amazing to me how many people care about the bays and the coast, and how many people are willing to step up and do something about it. I mean it's—I've never lived anywhere where it's been like that. So yeah, the report cards been really fun. It's stimulating intellectually, but it's just been fun to get to know a lot of people on the Texas coast.

**[Brown]:** Um-hm. Can you talk about your move over to HRI and what's that meant for your work?

**[Wetz]:** Yeah, it, you know, I've loved my time in the college [College of Science and Engineering] and I'm still a faculty member in Life Sciences, and the main difference is I don't teach as much, but what that does is it allows me to spend a lot more time with the stakeholder engagement and outreach side of things and so it's really allowed me to kind of dig in and get some of these initiatives off the ground, and I think it's hopefully been very beneficial to the university, but also the community.

**[Brown]:** Um-hm. What year did you start over here?

**[Wetz]:** Uh, 2018.

**[Brown]:** Okay.

**[Wetz]:** Yeah. So, I had about a good year before COVID hit (both laugh).

**[Brown]:** Brutal.

**[Wetz]:** So, yeah.

**[Brown]:** Um-hm. Well, maybe just—do you want to expand on that, of kind of the role of the pandemic, and what it did to your work?

**[Wetz]:** Um, sure. So, from a practical standpoint, I mean we've still got out every month on the water and did our sampling, so we didn't really miss a beat there. I have a great team of lab crew who just made things happen and I couldn't—we couldn't have made the progress without them. So, from that standpoint we were fine, but what, what the pandemic did is it kind of hurt our ability to get out in the public and hold meetings and really bring solutions to bare on some of the issues we're working on. And so now I'm seeing as the pandemic hopefully starts to wind down, we're able to get back out there and there's just this pent-up interest in getting things done, and just over the past month we've had some pretty big successes with Baffin Bay and, and I think we are going to see more coming down the line.

**[Brown]:** Um-hm. That's great.

**[Wetz]:** Yeah.

**[Brown]:** Okay, well do you want to switch to the Baffin Bay part of it?

**[Wetz]:** Sure.

**[Brown]:** Or do you have anything to add?

**[Wetz]:** No, no that'd be fine.

**[Brown]:** Okay, um, well can you tell me how your work in Baffin Bay started?

**[Wetz]:** Yeah, it was—I got a call from Jace Tunnell, who at that time was at the Coastal Bend Bays and Estuaries Program, and he, you know, he told me that he's been communicating with a bunch of folks from down around Baffin who were coming to him with a lot of concerns about the health of the bay. So, we convened a little group and started looking at some of the issues,

and I think we realized that there was, you know, probably issues with water quality, but we didn't have great data to be sure. So, then we went down and met at Scott Murray's house, we met with about forty of his friends and neighbors and folks who shared a lot of great anecdotal information about changes in the bay. And what we ended up doing is, you know, we took a couple of different routes. We developed the Baffin Bay volunteer water quality monitoring program to try and get more water quality data and then Jenni Pollock and Greg Stunz started working on some fisheries issues down there and trying to figure out what was going on with black drum in particular. So, we took a couple of different paths and just started trying to get data that we needed.

**[Brown]:** Um-hm, and what was—what did you need, what sort of data did you need?

**[Wetz]:** Yeah, we were—so the state has a water quality sampling program and I mentioned earlier it's great in that it's been going on for a long time, but their kind of missing some components that I think we needed to really figure out what the issues were down there. And it's kind of limited in the sense that they only go out every four months. They're really resource limited, and they only have two stations in the bay. What we did is we got the volunteers to help us really expand that monitoring network in the bay so that we could cover all of the arms of the bay where the creeks come in and then we could really start to figure out, okay where and when are the water quality conditions less than optimal.

**[Brown]:** Um-hm. And what was going on in the Baffin Bay that concerned Scott Murray and those folks?

**[Wetz]:** Um, several things. So, they were having some pretty big fish kills. So, at that time, I think they had probably four or five major fish kills just over the past five years, and this is trophy trout and drum. They'd also had the persistent brown tide algal bloom, and also the black drum they were catching something like seventy-five percent of the adult drum had this jelly flesh. You basically couldn't sell them or eat them or anything, they just had no muscle on their body. It was really weird. So, just kind of all these things coming together to say, um, something's off with this bay.

**[Brown]:** Yeah, so, um, why did you want to include these citizen scientists in the monitoring work?

**[Wetz]:** Yeah, well, we wanted to get started quickly and there wasn't a lot of funding. So, you know, they offered to provide us their boats. They took us out every month. We were able to get started and get data quickly, relatively inexpensively. But on top of that, you know, they just had a lot of great knowledge about the bay and gave us some ideas on where to sample, and we also knew that if there were issues that we were going to need, you know, this group of individuals to kind of help shepherd us and push us towards solutions. So that, you know, that there are a lot of advantages of working with the volunteers.

**[Brown]:** Yeah, and was it an easy sell to get them involved?

**[Wetz]:** You'll have to ask Scott (both laugh). They were pretty eager when they came here in May, I think it was, no, I think we started training them in April. They came up here and we brought them into the lab and trained them on how to use some of the equipment and they seemed pretty eager. It was a great group to work with.

**[Brown]:** Um-hm.

**[Wetz]:** Yeah.

**[Brown]:** What sort of training did they receive?

**[Wetz]:** They learned how to use our handheld, it's called a sonde, it's an instrument you drop in the water, and it measures the temperature, the salinity, dissolved oxygen. So they learned how to do that and then we also showed them the proper ways to collect the water samples so we can be confident in the data we were getting back.

**[Brown]:** Um-hm.

**[Wetz]:** And then just more basic stuff just like how to record your field observations, things you were seeing out there, and any kind of notes that needed to be taken.

**[Brown]:** Um-hm. So, they just went out every month and then you collected the samples from them? How did that work?

**[Wetz]:** Yeah, we usually sent one person out with each boat just to make sure if there were questions and things. And so what they would do is they would collect the water and go out about seven in the morning usually, and go collect the water and bring it back to shore, and then one group would leave, usually out of Bird Island Basin, and they would collect samples on the east side of Baffin Bay and then they would go back and those samples would come back to the lab where we would process them. And then there was another group that would leave out of Hubert-Kaufer Park [Kaufer-Hubert Memorial Park] and they would bring the samples back to Scott Murray's house, and we would process samples under his little garage there.

**[Brown]:** Um-hm.

**[Wetz]:** Yeah, so.

**[Brown]:** What—I mean, what processing took place with each of these samples?

**[Wetz]:** Oh, you'd have to take water and put it in different bottles. Um, some of the water had to be filtered so we would set up little filtration apparatuses, and the volunteers would have their little graduated cylinders and they'd be measuring water out and doing all kinds of stuff.

**[Brown]:** Um-hm. What were you looking for?

**[Wetz]:** We were trying to figure out what the levels of different nutrients like nitrogen and phosphorus were, how it changed over time, how it varied with natural conditions, and then also how the algae responded to those nutrients. And so we were just really trying to figure out, okay is there a problem with nutrients in this bay because a lot of the symptoms seem to point in that direction but we didn't have great data to suggest that, and the other thing was, you know, there was a lot of early work done on brown tide that essentially concluded that it was just this sort of natural phenomenon, seemed to not indicate that there were any nutrient problems. But then when you look at that those older studies, you realize that they were missing a huge pool of the nitrogen that's in the water. They just didn't measure it because it was kind of hard to measure it at that time. But so that kind of left us with this perception over ten, fifteen years that there was nothing wrong with the bay, and so what we did is we tried to get a more comprehensive look at the nutrients in the bay, and sure enough what we found is that the levels of nitrogen in this bay and in particular, a certain type of nitrogen, it's on the order of two to three times higher than anywhere else on the Texas coast and about as high as you would measure in just about any other bay system in the US. So, you know, our data really showed that we've got some nutrient problems in this bay.

**[Brown]:** Um-hm. Can we go back a little bit? Can you tell me why the nitrogen was hard to measure in these earlier studies?

**[Wetz]:** Yeah, I think that at the time those studies were done, there wasn't really great recognition that that type of nitrogen could really even play a role in the environment, and then what we learned since then is that type of nitrogen is actually able to be used by certain types of algae and its usually the algae that are not good for the ecosystem. So, you know, on top of not really just recognizing that that type of nitrogen can be important, um, the analytical techniques were a little bit rough for measuring it.

**[Brown]:** And can you tell me more about what brown tide actually is?

**[Wetz]:** Yeah, it's just a really small type of plankton. It's about, oh, it's about three microns in size. I can't give you a good analogy for what that is, but it's really small.

**[Brown]:** Okay (laughs).

**[Wetz]:** Basically, it's like a very small nondescript little ball and there's all kinds of plankton. There are really charismatic ones that have all kinds of spines and things and brown tide's really not, it's just this little ball. And it seems to be well adapted for environments like Baffin Bay that occasionally get really salty. And one of the things that it does, is it produces this sort of nasty mucus layer around itself to kind of protect itself, and so that's why there's this perception that it maybe isn't great for food webs either, like who wants to eat that, you know. But it is capable of using that form of nitrogen that we found to be really in high levels in Baffin Bay.

**[Brown]:** Um-hm, and when it's in the water and blooming—I mean what does it look like? What does it smell like?

**[Wetz]:** It basically makes the water look like chocolate milk, and I mean, we've all kind of been out here in the bays where it can be turbid at times, but just imagine, persistent water looking like chocolate milk for months at a time, and the problem is it prevents the light from getting to the seagrass beds and so they die off and then it causes all kinds of other cascading effects.

**[Brown]:** Um-hm.

**[Wetz]:** So, that's basically what happens.

**[Brown]:** Can you tell me more about the effects it has in the ecosystem?

**[Wetz]:** Um-hm, yeah, I mean the main thing are the loss of the seagrass beds, and then of course when the seagrass dies, that releases even more nutrients back into the water. So that's that cascading effect. There have also been some studies saying that the brown tide is not a great food resource for other plankton, which suggests that there may be impacts further up the food chain at some point and I don't, you know, we don't fully know, but I mean, it's not a hard leap to go from this nasty little mucus ball to thinking, okay, it's probably not great for other things that need to eat.

**[Brown]:** Um-hm. So, when you started taking these samples what are some of the things you discovered about that?

**[Wetz]:** I think the main thing was that, you know, that we have these really high levels of nutrients and then we started looking back at some of the historical TCEQ data and realizing that there at some point had been an increase in just overall nitrogen in the system. Um, and our data gave us a better idea of what types of nitrogen had really been involved there. We also learned a lot about how drought and wet cycles affect the system and how it works. The other important study that was done was a study by Mark Besonen, who's a scientist here, where they took sediment cores so they tried to get an even longer-term record of changes in the bay. I think what was important about their study is that they showed that the levels of algae somewhere back in the 1850s–1860s, you start to see a gradual increase as we start clearing the watershed and building farms and things, you see that gradual increase. Somewhere in the, I don't know, it was hard to say for sure, but probably the sixties, the seventies, um, it was almost like, you know, a sharp exponential increase. So definitely that also highlighted that, yes, this bay's been undergoing changes for a long time. There's also natural variability, but in recent decades something has changed to where the system is definitely exhibiting problems with nutrients. And algae.

**[Brown]:** You know, it seemed like in your one article that was like I think 2016 or '17 that there were a lot of questions that remained unanswered?

**[Wetz]:** Um-hm.

**[Brown]:** Can you talk more about that?

**[Wetz]:** Yeah, um, I mean one of the big questions that we'd had is where are the nutrients coming from and we've had some studies funded since then that have really helped us start to pinpoint where they're coming from. So, for example, when I had first started, there was this perception that it was the agricultural producers that were really responsible, through their putting fields into production and fertilizer runoff and that kind of stuff, and I think what the data has shown since then is that the nutrients that go into Baffin Bay, it's coming from a lot of different places. You know, I'm sure there's some agricultural component there, that's hard to deny, but we also have major problems with sewage treatment in that watershed. There are some of the sewage treatment plants that are not up to code. I mean, instances of raw sewage being dumped into the creeks, you can imagine it's just—it's not great, and it is what it is. It's a rural poor watershed. It's hard for some of the communities to maintain their infrastructure and hire people to maintain it so we have issues with wastewater. We have issues with septic tanks that are discharging, and not doing a great job of treating the water and putting stuff into the bay. It's a combination of things that are contributing to the changes in the bay.

**[Brown]:** What do you think is needed to address these problems?

**[Wetz]:** Well, I think we're starting to get there in that we've formed a stakeholder group and really the first thing is to talk about it. And so, we've got this group of about 150 people, you know, agencies, landowners, businesses, you name it, um, that have been getting together and talking about these issues, looking at the data, trying to figure out what to do next. Our partners at the Texas Water Resources Institute are completing what's called a Watershed Protection Plan, which is basically a menu of things that landowners and municipalities can do to reduce their impact on water quality. That's going to be a big deal because that's going to open up new funding for fixing some of the problems. But at the same time, there are projects that we're trying to get funded now, sort of larger scale restoration projects through programs like the RESTORE Program, or the Natural Resources Damage Assessment program, trying to get these larger scale projects in place to minimize impacts on water quality and improve the quality of the water going on into the bay.

**[Brown]:** Um-hm. Well, let me go back a little bit. Um, what were the reactions from those citizen scientists to your work and to your studies?

**[Wetz]:** They were always very positive, I mean, they seemed to enjoy it. I really enjoyed seeing them kind of come together, it seemed, you know, a real comradery forming there. Um, I will say after about four years they, they were kind of like, "Okay, what's next, you know, we have the data now. What are we going to do?" and so that's what we've been working hard since then is getting the solutions in place to fix the problem. You know, they obviously volunteered for a reason. They want to see the bay fixed and preserved for future generations so that's what we're working hard to do now.



**[Brown]:** Um-hm. Can you tell me more about the benefits of doing citizen science?

**[Wetz]:** Oh, yeah, that's a great question. You get to meet new people. Um, from a practical standpoint, we were able to get more data, more frequently than I could ever imagine just by us doing it on our own, but we're also, you know, by working with these folks, they have so many ties in this community and in Baffin Bay in general that gave us this natural stakeholder base as we made that transition from getting the data to trying to find solutions. We had this sort of built-in network of people who could help us start to expand our network and reach the right individuals.

**[Brown]:** Um-hm, and that's where the stakeholder group—

**[Wetz]:** —Um-hm, that's right—

**[Brown]:** —was formed? After the studies were conducted?

**[Wetz]:** Yeah.

**[Brown]:** Okay. Um, are there any drawbacks to doing citizen science?

**[Wetz]:** Oh, I haven't found any. Um, in other places they sometimes run into issues with data quality but in our case, we put them through pretty rigorous training and of course we've always had somebody out there as well, so I always felt really good about the data we we're getting. I did not find any drawbacks to be honest with you.

**[Brown]:** Um-hm. Okay. Um, what do you hope—What did you hope that the citizen scientists would get out of the project?

**[Wetz]:** Well, I really hope that they would learn more about the bay and maybe challenge some of their own perceptions about what's going on in the bay and how it works, and I think that's the case. I mean, I've definitely noticed from when we started to where we are now that how they talk about the bay and, you know, what they think is happening, and then also what they want to see. I think it's changed quite a bit.

**[Brown]:** Yeah.

**[Wetz]:** So, I think they've learned something as I've learned a lot as well.

**[Brown]:** Yeah. What would you say your most memorable experience working in this project was?

**[Wetz]:** Oh, that's a hard one. There are so many things. Um, gosh, it's—I can't point to one. It's just the times that I went out with them on the water and hearing their stories, that's always

been a real fun part of it. Hearing the stories and also hearing what their desires are for the bay and what they want to see happen, but so many of them, and I'm sure you'll talk to them, that they just talk about wanting future generations to be able to enjoy what they've enjoyed. I just thought, that's really special, and they're willing to put the time in to, you know, into making that happen.

**[Brown]:** Um-hm. You know I know one of our questions to ask them is, you know, what does Baffin Bay mean to you, but I wanted to ask you that as well.

**[Wetz]:** Oh, Baffin Bay has been just such an important component of my career. I mean I spent the last nine years working on Baffin Bay that it's really become a focal point of my career so, you know, I owe a lot to the folks down there and it's been a real honor just getting to work on this—this challenge, and it's also just been very rewarding intellectually. I mean, we've started off really not knowing anything, and I've learned a lot about it. So now, for example, we're putting together a special issue of a journal looking at similar systems, working with colleagues in South Africa and the French Mediterranean and Australia. So trying to look more broadly at these types of systems that are in these more arid and semi-arid regions and some of the challenges that their facing and so I think Baffin Bay's been getting out there and on the world stage too.

**[Brown]:** And can you tell me more about—I don't know how to word this, why—why it's important for people to know about Baffin Bay outside of, you know, this area?

**[Wetz]:** Yeah, um, so that's a good question. I think, you know, thinking very big picture, the arid and the semi-arid regions around the world are kind of on the front lines of climate change and so a lot of climate models suggest that we may see expansion of these zones of low rainfall. And from our perspective, we're kind of wondering okay is Baffin Bay kind of an example of what Corpus Christi Bay or Copano Bay might look like in one hundred years or something like that, you know, just because it does just get that intermittent rainfall, otherwise it's pretty dry. So, I think one of the things we've learned is that systems and that these ecosystems in those areas just because they don't get a lot of rainfall, they don't get a lot of flushing, they're just very sensitive to pollution, poor water quality, unlike the, uh, I'm trying to think, some of the estuaries in the northeast of the US where you get a lot of rainfall, a lot of river flowing through it. They're always flushed. They don't have the problems that we do. These types of estuaries are very sensitive to changes.

**[Brown]:** Um-hm.

**[Wetz]:** That answer your question?

**[Brown]:** Yeah. Yeah.

**[Wetz]:** Okay.

**[Brown]:** What, um, what do you think is needed for the future in Baffin Bay? You kind of covered this a little bit, but.

**[Wetz]:** Yeah, I think anything we can do to increase its reliance and what I mean by that is—so we have the nutrient problems now, but in the future Baffin Bay is, and this whole region's going to be experiencing other challenges, in particular, increasing air temperature and water temperature. What that means is that, as the water temperature and the air temperature warm, the amount of oxygen that the water can hold, it goes down and that also means that you're probably going to see changes in rainfall. So, as we move forward, Baffin and the upper Laguna Madre, it is likely to become an even harsher environment just because of those large-scale changes. So, that's why it's important that we now get a handle on the pollution that is going into the bay. So, we can make it as ready as possible for these other changes that are coming down the line.

**[Brown]:** Um-hm. Um, I think that covered a lot of what I wanted to talk about. What did I miss?

**[Wetz]:** I don't—nothing comes to mind.

**[Brown]:** Okay (laughs). Did you want to add anything?

**[Wetz]:** I think you wrung me out, I'm pretty good (both laugh).

**[Brown]:** Okay. Um, do you want to add anything else?

**[Wetz]:** No, I just—I'm really appreciative of you doing this, though.

**[Brown]:** Okay.

**[Wetz]:** This, this has been, you know, seeing the passion of these folks, and I've always just wanted to try and do right by them, and I love their stories so I'm just excited about this and being able to capture it, because I think what they're doing is really special and it, you know, they're a role model to me but I think they could be a role model to a lot of Texans and beyond Texas just by virtue of them being willing to put their time and efforts towards solving these issues. That's, that's really amazing.

**[Brown]:** That's a great place then. So, I'm going to turn off the recorder.

**[Wetz]:** Okay.

**[Brown]:** Thank you.

(end of recording)