

TRANSCRIPT

INTERVIEWEE: Tom Miller

INTERVIEWER: David Todd

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David Todd [00:00:03] All right. Well, good afternoon.

David Todd [00:00:04] I'm David Todd, and I have the privilege of being here with Tom Miller.

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, and for a book and a website for Texas A&M University Press, and finally for an archive at the Briscoe Center for American History, which is based at the University of Texas at Austin.

David Todd [00:00:32] And I want to stress right here that Mr. Miller would have all rights to use the recording as he sees fit.

David Todd [00:00:41] And I wanted to check in with Mr. Miller and make sure that this is all a good arrangement for him.

Tom Miller [00:00:48] This sounds like a final arrangement. We're ready to go.

Tom Miller [00:00:51] Good. Good. Well, then, let's get started.

David Todd [00:00:55] It is Friday, January 12th, 2024. It's about 2:40 PM, Central Time.

David Todd [00:01:04] My name, as I said, is David Todd. I'm representing the Conservation History Association of Texas, and I'm in Austin. We are conducting a remote interview with Tom Miller, who is currently in the Laredo area.

David Todd [00:01:18] And, Mr. Miller is the founding and recently retired director of the Lamar Bruni Vergara Environmental Science Center at Laredo Community College. And he served there for more than 20 years, and welcomed over 250,000 students and adults during that time to its educational programs and to visit its cages and tanks holding bobcats, alligators, raccoons, gray foxes, javelina, deer, and a variety of plants. And the educational work at the center was prefaced by his work as a teacher at Alexander High School.

David Todd [00:01:54] So, for roughly the past 15 years, Mr. Miller has been heavily engaged in surveying, studying and protecting the endangered Texas hornshell mussel, which is native to the Rio Grande and its tributaries.

David Todd [00:02:07] So, today we'll be talking about various things, but we'll of course, focus on Mr. Miller's life and career to date and especially emphasize what he can teach us about the Texas hornshell mussel.

David Todd [00:02:23] So, with that introduction, I wanted to just ask you about your childhood and early years, growing up, as I understand it, in Minnesota.

Tom Miller [00:02:34] That's correct. On the beautiful St. Croix River, the border between Minnesota and Wisconsin.

David Todd [00:02:43] And, so did you have some experiences in or around the river?

Tom Miller [00:02:49] Absolutely. My mom had been a lifeguard in her youthful days. And so, we were taught how to swim down by the river. You know, that was a good break after hoeing in the garden all afternoon. We'd have a short swim. We were about a mile away from the river, and we had access to both a public beach, and then my parents also had some friends, and they had their own beach.

Tom Miller [00:03:15] And, we were very lucky. As it turned out, a couple of different habitats, as I'd later find out, you know, through my, you know, inquisitiveness back then. But, it was a wonderful river. The St. Croix was one of the original eight rivers in the Scenic Waterway system designated by our government. And so, it's been really preserved since 1968.

Tom Miller [00:03:45] So, it, you know, was a great time, great place to, you know, to grow up on.

David Todd [00:03:53] And so, it sounds like your mother and your family in general, made it possible for you to visit the St. Croix and, you know, kind of avail yourself of the river. But, was there anybody during those early years that was sort of teaching you about that habitat and about the creatures that inhabited the river and then the banks nearby?

Tom Miller [00:04:19] Very definitely. I think when I was actually reviewing and thinking about it, it was really what started me on this whole career. But back then, you know, the questioning that I had to make, I was a pre-teen and there were some teenage boys, and they were all using a mask and snorkel, in the river. And they were diving what they were calling, "clams". And, of course, I was curious. We were probably down there swimming and I wanted to see what they were doing.

Tom Miller [00:04:50] So, they were throwing them to me and I was, "Oh, these are pretty interesting. A lot of different shapes and sizes." And, and then they, one of them, and I think his name was Ted Baltimore. But he said, "Oh, don't throw him that one. That's a pretty one." And I said, "Well, doggone it, why couldn't you throw that one to me?"

Tom Miller [00:05:09] And so, I guess I figured out I had to go and look for them myself. And, so as soon as I could, I was able to get a hold of, or purchase, or maybe my mom purchased it for me, but a mask. And so I started looking in the river myself, you know, 65 years ago.

David Todd [00:05:30] Very nice. And so, did you become closer with some of those other kids that were diving.

Tom Miller [00:05:37] They were older. And really, I came from a large family - ten children, five and five. And so, with these sisters and brothers, we were able to, you know, I got them interested, too. And, you know, I think we, you know, the Saint Croix is interesting. It has

almost the same amount of different mussel species as the entire state of Texas. And what's also, because it's been preserved, all historical records of all the mussels are still there present, which is very unusual.

Tom Miller [00:06:15] You know, we'll look at the Rio Grande Valley later, but, it was, you know, it was something. So I probably collected more than a dozen species over the years. And, one of them, I think I might have been maybe even mentioned it to you one time. There was, there is a very large, one of the largest by volume, mussels that we have. It's called the giant floater, *Pyganodon grandis*. And, hauling this one back from the river, I cut myself. So, I still have about an inch and a half scar. I was marked by a mussel early on.

David Todd [00:06:53] That's great.

David Todd [00:06:56] So, your education about these mussels, was it, or about the natural world in general, was it from just experiencing it, or did you have manuals and guidebooks, or did you have friends?

Tom Miller [00:07:12] It was still early in my life, so, you know, I hadn't really set on anything. But I think probably one of the, the big factors that got me going down the pathway of a biologist was being able to work. I had a older person in the neighborhood who was moving on to college, and he was, he'd say, "Well, do you want to come over and work at this farm that I work at?" "Well, okay, sure."

Tom Miller [00:07:37] And so he brought me over, and it was a very special place. It was, a headquarters of what they call Valley Creek - pristine creek with trout, that lead on into the St. Croix River, very close to where we would have been swimming.

Tom Miller [00:07:56] And, this water, bubbling up through pure white sand with 40 degrees year-round, you know. It, you could just, when you were thirsty, you just went over there with the dipper and grabbed some water. And for this gentleman, there had been some tremendous floods, the year previous, and he had lost a lot of his banks and fish. And so, he had gone through a huge reconstruction of his waterways.

Tom Miller [00:08:25] His name was Jack Schmidt. His family had made a huge fortune. They were the Smith Welding Equipment and Supplies. During World War Two, they sold the government untold, probably millions, of dollars' worth of stuff.

Tom Miller [00:08:40] And so, this was a real special place, and, and, he spent, at that time, I'm sure, a fortune on gabions. And, so I was able to work with making breeding beds, making waterfalls, growing watercress, looking at snails. We had beavers. We had eagles. We had deer. We had, you know, lots of wildlife that I worked on with this.

Tom Miller [00:09:11] And because I'd, you know, I would bike over, I would ride my bike about four miles to get to this place. And, you know, he saw that I was a steady worker, and it was the only job I had all through high school, all through college.

Tom Miller [00:09:25] So, it was really what helped me make. I could go down there and split wood or, you know, work on, you know, cutting holes in the ice to see if he wanted some bubbling done, you know. But, did a lot with working with fish and trout, and so that just kind of led me into the career, you know, of doing it.

Tom Miller [00:09:47] And of course, at that time, also, I think one of the interesting things was, you know, you were asking how else I was getting spurred on and there was a "Sea Hunt" series on TV, you know, that was very popular. And then, there was also Jacques Cousteau - had just started his program, the Underwater World of Jacques Cousteau. So, those things were all pointing me to the next step, which is, of course, getting interested in scuba diving.

David Todd [00:10:23] Well, so you mentioned, Jacques Cousteau and Sea Hunt with, I guess, the Bridges.

Tom Miller [00:10:29] Lloyd Bridges? Yeah.

David Todd [00:10:32] Were there any books or other kind of items that were out in the public media that might have been influential for you?

Tom Miller [00:10:41] No, not at that time, you know. There was, you know, we were pre, I think our whole country, wasn't becoming aware of environmental concerns, ecological concerns. It was the awakening back in the '70s, you know, as I was going to college, you know.

Tom Miller [00:11:00] So, there was probably, you know, "The Silent World" that Jacques Cousteau had put out. I had read that. So, there was influence. I really couldn't remember any of them at that time that would have been more involved. But, just, I guess, experiencing what we were seeing on TV was enough to spur it on.

Tom Miller [00:11:29] And plus, having worked in very much of a biological setting, I guess that was what I was planning on when I was going to go to college and, you know, try to work it out.

David Todd [00:11:40] Well, and speaking of college, uh, I understand that you got a B.S. in biology from St. John's University and then went on to get a master's from St. Thomas University, a major in education and science, and did some work in limnology at the University of Minnesota. During those different phases of your sort of formal education, were there any classmates or teachers that might have been influential for you?

Tom Miller [00:12:09] Absolutely. I was really very privileged. St. John's was a small liberal arts college up in north central Minnesota. It had many lakes near and on the property and under Father Gunther Wolfson, who, you know, was a biologist teaching there, and I worked it out with him to do a lot of independent research on comparing lakes.

Tom Miller [00:12:42] So, we had one lake that was highly used for the recreation, the canoeing, the swimming. They had a chapel on an island within this lake and it was a pristine lake.

Tom Miller [00:12:52] But then they also had another lake where the sewage treatment after the effluent would have been put into this lake.

Tom Miller [00:13:01] And so you had a variety of habitats and environment and what I was doing, because I was really interested in microscopic work, I studied the algae, flora and fauna, of both of these places and tried to draw comparisons of more of a pristine state and more of an altered state. And so, I guess began some of the limnology work right, right then, in my last year at college.

Tom Miller [00:13:36] I also had a chance to go, even though I'd been a wrestler. Our college had a 4-1-4 program, where the month of January people would take off. And what a great thing to do to take off out of Minnesota during the month of January! And so, people were visiting all over the world, literally, you know, going on one-month study programs.

Tom Miller [00:13:58] But, being a college wrestler, we were stuck there. But I did take my senior year, I said I'm going to go. And so, with a friend, we did drive down to Florida and that was my first visit to the ocean. I was 21 years old before I saw the ocean. And so, that was quite a trip. And I did a little bit of shell collecting down there and, and did that for my month project.

David Todd [00:14:25] That's great.

David Todd [00:14:28] So, you've worked with both freshwater mussels and then also some oceanside clams or oysters?

Tom Miller [00:14:36] Oh, every type. My personal collection probably runs into the thousands of species. You know, I had the opportunity, you know, I guess, to continue the educational. I found myself the biology major, and back then, it was pretty much the Vietnam War going on. And so, there was a lot of competition to get into the medical schools and the dental schools. And this was out of my reach. The dental school would have been. But I said, "Well, maybe I'll opt out of that one."

Tom Miller [00:15:13] And, for a biologist then, that kind of, if you weren't going to go under research or teach, you know, I needed the teaching credits. And so, that was why enrolled in this St. Thomas program, you know, which was pretty much a night school, but it also offered me a chance to take more graduate courses.

Tom Miller [00:15:35] And I took them at the University of Minnesota, and they had a research station at the headwaters of the Mississippi, Lake Itasca. And so, I can say I've jumped over the Mississippi, and I've paddled on the Mississippi, taken boats on the Mississippi.

Tom Miller [00:15:50] And up there, I had a wonderful professor. Doctor Richard Mariato, who actually ended up moving in close to where my mom lived. And, you know, we visited over the years, and he was always happy to talk to me and see that I was continuing an environmental course, you know. And he was very pleased at that.

Tom Miller [00:16:16] But he did a course that was a survey of northern Minnesota and northern Wisconsin, including into Lake Superior, the Apostle Islands. And so, that was a real introduction to, you know, some survey techniques and camping and being in the field and working with other biologists. So, that was a good course.

Tom Miller [00:16:39] And, with some of the other professors there at the station, using snorkeling, SCUBA skills that I had been acquiring, I was able to do some, frog mapping, surveying some largemouth bass. I would take them, move them, and see if they ever made their way back to their home territory. So, there was some other studies with freshwater that I was getting into.

Tom Miller [00:17:10] You know, I think that the mussels were just kind of a sideline back then. It wasn't something I had really, you know, got into. You know, they were just there. They were just clams. I never really knew them, I think it must have been until I got to Texas, you know, and found out that was the better way to describe them.

David Todd [00:17:30] Well, so you've mentioned that you've had the chance to jump over the Mississippi and I gather, be in the St. Croix ...

Tom Miller [00:17:41] Yes.

David Todd [00:17:41] And I guess some of your exposure has actually been not just with a mask, but with SCUBA gear. And I was wondering if you could talk a little bit about your certification as a SCUBA instructor and your work as a dive teacher, because that must be a pretty unusual world to really get acquainted with and then to share with other people.

Tom Miller [00:18:04] Yes. Oh, absolutely. Yes. A real passion, for sure. Actually, this year is my 50th year that I've been diving. And it was something, like I said, I was always intrigued to do, but it was, even now and back then, there is a cost to that sport. You know, it's a science and a sport. And that's what I always like talking about with people, you know, that, you know, most people can handle the sport, but it's a science that can give you trouble if you don't understand and know what you're doing.

Tom Miller [00:18:40] And so, I was able to get certified and, I had been taught by one of the classic SCUBA diving instructors. He was, you know, if you know anything about the sport, PADI,(P-A-D-I) is a worldwide certifying agency. And this gentleman, Jack the Frogman [Blocker] was, PADI number 29 instructor. So he is one of the originals. He, of course, had learned about it during World War two.

Tom Miller [00:19:13] But unfortunately, that's the way he kind of taught his course, it was about harassment. It was about turning off your air, pulling off your mask, you know, no buddy system - really not too safety-conscious. And, you know, out of our class, I think only three of us got certified. Our checkout dive was 65 feet in a downtown Minneapolis lake. Go down, and now you're going to breathe on the way up, and now you're going to buddy-breathe, and now you're going to, you know...

Tom Miller [00:19:46] So, it was, and after that, so maybe this sport wasn't for me. But, you know, and a few months later, though, luckily I heard an ad on the radio for Jean Francois Aubineau, who had started a group called the Argonauts. And he was an interesting Frenchman who had gone over to the University of Minnesota - Duluth for some special program they had from France and ended up marrying a Minnesota woman.

Tom Miller [00:20:20] And, but he had dove with Cousteau on three different occasions. He had been up - one of their classic things, they had climbed a mountain, so they had climbed the highest mountain, then descended the deepest, into a cavern.

Tom Miller [00:20:35] And so he was all about cavern diving. And he knew extreme safety, extreme, almost military precision. But he also emphasized buddy system. He emphasized a thorough class. He didn't worry about doing a minimum standard, but to make sure that people understood and got through it. And so, I was very happy to work with this man and his program.

Tom Miller [00:21:05] I actually started teaching, after two years working with him. He was always like, am I ready? And am I ready yet? And no, I wasn't, I guess, you know, but after two years, he finally says, "Yes, go ahead, go for your instructor."

Tom Miller [00:21:19] And, so most people up here would have gone to Chicago for their training. I said, "No, I'm going to, I want, I've never been to California. I'm going to go down there." So I was teaching school at the time and during the summer vacation took a month to go down to explore the San Diego area and eventually take their course.

Tom Miller [00:21:44] And then, I traveled the West Coast from California all over, you know, Northern California, Oregon, Washington, even ended up diving in Puget Sound, you know, in some of the coldest water. Of course, it wasn't any colder than diving under the ice like I was used to in Minnesota at times. So it was a good experience.

[00:22:05] And came back and started teaching, like I said, in Minnesota for a while. But then, my agency, I was certified as a "NAUI", National Association of Underwater Instructors. As it came out, PADI became more of a corporate entity. They had a tie-in that got them in trouble eventually with US Diver Equipment. And NAUI was always an association run by individuals as a professional association, teaching a good standard, of course, not trying to minimize it to get more people in, to get more people to buy gear, but to make sure that people understood what they were getting into and were safe in doing so. And so this is the agency that I was into.

Tom Miller [00:22:55] And, they had a monthly magazine. And in it, Windjammer Cruises out of Miami, Florida, had advertised. And so I, I had been working for my father. I was a food broker, at that time and, I said I might want to try this.

Tom Miller [00:23:16] And so I wrote them. But they said, "Oh, no, that job get that filled". And so, okay. That's fine. So I went on with my life.

Tom Miller [00:23:24] A few months later, though, they said, "We have a new opening. Would you be interested?" And, it was going to be in the Bahamas. I said, "Well, yeah, I would be."

Tom Miller [00:23:32] And so, I went down there, thinking I'd be diving in the Bahamas, but instead I was assigned to the ship that had just gone through a huge storm. They had lost a mast. And so, the first month I was in drydock with about 60 other people, and we were chipping paint and painting and working wood and just, you know, working this, this whole ship to get it back.

Tom Miller [00:23:59] It was, uh, the largest passenger-carrying sailing ship in the world. You know, it was 330 feet long. It would carry 140 passengers. And we had about a 40-person crew. And, we sailed the Bahamas. It was, we would be based in Nassau, pick up passengers, go through a bunch of the out islands, end up in Freeport, and then drop them off. And, a day and a half later, we'd pick up a new group, and we'd travel again throughout islands over to Bimini, the Abacos, the Barrier Islands, Exuma, and we would end up back in Nassau.

Tom Miller [00:24:43] So, back and forth, back and forth, for a couple of years in the Bahamas and quite exciting. You know, back at that time, at the time, people were saying, have you ever seen The Love Boat? And I guess it was a TV show back then. I said, "Well, no." Then they would say, "Well, it looks like you're living it." So whatever, you know. But, it was an interesting time.

Tom Miller [00:25:06] And of course, a lot of SCUBA diving. I probably did a couple of thousand dives at that point.

Tom Miller [00:25:13] And, eventually they had also a ship called the Yankee Trader. It had actually been used by National Geographic. They had done a lot of surveying in the South Pacific. And when Windjammer Cruise bought it, they had fixed it up again to do a long cruise, knowing that this was a very solid ship. They used it for their world cruise.

Tom Miller [00:25:42] And they had a real niche back then. If you get your own sailboat, it takes you usually three to four years to get around the world, because you have to wait for the right winds and the trades. And, you know, a lot of factors go into it. Plus, you're going to spend maybe more time. So, and then if you go on the QE2, it's going to be a three-month visit and you might have 20 stops in there and that'll be it. But, this was a ten-month cruise - 150 days in port, 150 days at sea. And, a lot of places. You know, I had bought a brand-new Zodiac, and a brand new engine. And, you know, there eighty passengers, about twenty crew on this boat, 200 feet long. And, it had already made five voyages around the world. So, we were on the, actually what became the last voyage that they made.

Tom Miller [00:26:42] And, the cost of it became prohibitive. I think what they were doing, they were using it kind of as a loss-leader, get a bunch of cash from these people at the start of the year. It only cost \$8,500 to go around the world at that time, you know, if you if you could take the time to take ten months off.

Tom Miller [00:27:02] And, so that was a really interesting time. A lot of places I dove. I mean, it was always me exploring. There wasn't anybody to talk to. And, sometimes I hit it pretty good, sometimes I didn't. Sometimes there were a few facilities. We spent a month in French Polynesia, you know, Tahiti, Bora Bora, Huahine. We went to Samoa and Fiji, New Guinea and the Solomons and, you know, Vanuatu. You know, we ended up in Malaysia, Indonesia. Singapore was the halfway point, and then across the Indian Ocean - Sri Lanka, the Maldives, the Seychelles, the Comoros, the west coast of Madagasca, Kenya.

Tom Miller [00:27:45] Kenya was a fascinating place. Everybody goes there for animal safari. But I had some underwater adventures there. And then South Africa, around the Cape, over to Saint Helena where, you know, Napoleon had ended his days and up the coast to Brazil and then through the Caribbean again. It was something! Easter Island, you know, after the Panama Canal and Ecuador. So it was a good adventure.

David Todd [00:28:13] Wow. Well.

Tom Miller [00:28:15] And then. Yeah. Go ahead.

Tom Miller [00:28:17] No, no. I'm just I'm amazed. I mean, a couple thousand dives and many more probably since then.

David Todd [00:28:25] Oh, yeah.

David Todd [00:28:25] It seems like you're one of these people who's been fortunate enough to spend a lot of time underwater.

Tom Miller [00:28:30] Very much so.

David Todd [00:28:30] And I know we live on the Blue Marble, but many of us, including myself, just really haven't, you know, had the good fortune to be underwater and really get to appreciate that whole biome. And I was wondering, can you sum it up in a neat package what we're missing?

Tom Miller [00:28:51] Well, you know, unless we are able to grow gills and fins, you know, the only way you can do it is snorkeling and SCUBA and the variety of life, you know, the colors. You know, a lot of these colors are rare in nature, terrestrially - blue and such. But underwater, the diversity of life is astounding in the colors. And you go from the simplest corals and jellyfish. You know, there's over 20,000 marine fishes that, you know, probably equal almost all the other virgin is put together. And, then you're looking at, you know, the unique ecological niches, the unique relationships - the commensal and parasites, and of course, all the way up to the larger sharks and mantas and whales and dolphins, I've even being able to dive with a little bit.

Tom Miller [00:29:44] So, there's a great variety of life and uniqueness. And the way it has evolved - I mean, some of these creatures have been living with us for tens of millions of years. They never had to change. You know, they had found a niche and, you know, it was theirs.

Tom Miller [00:30:07] And, you know, I think one of the things, as a somber thought, you know, my instructor, when I first had gone to the ocean said, "When you get there, it'll be the best that it will ever be", you know? And so I would use that phrase a lot with my students - say, "Get to the oceans!" You know, scuba divers - you know, I have to check them out at Canyon Lake or Lake Travis, or Lake Amistad, but, you know, get to the ocean and you'll appreciate it a lot more.

Tom Miller [00:30:40] And, again, it might just be the best you'll ever see. And as we now see, it's accelerating. You know, the coral bleaching and the acidification. And, you know, I'm getting ready to choose spots for my own grandkids. Where am I going to take them snorkeling first? Maybe we're looking at the Florida Keys. That's where I started, you know, where I first saw the ocean. And we've had John Pennekamp Park there since the 1960s.

Tom Miller [00:31:11] So, we have to appreciate these places that have preserved their environments. The Cayman Islands are very aware, and they've got great regulations about how people can harvest or not harvest seafood. And, we have made great strides. Even under President Bush, we created the largest marine park ever, you know, off south of Hawaii.

Tom Miller [00:31:40] And so, people are concerned about, you know, saving it, and a lot of the worldwide is can we preserve 30% of our oceans by 2030, you know, just as we are doing. And so we have to, you know, I guess, look at this. You know, we've seen it. And I've harvested a lot of marine life. There's no question. You know, fish and lobsters and mussels and, you know, a lot of different creatures. I have fed our ship, you know, conch. And, you know, I had one place I could gather hundreds of pounds of lobster. And so I would feed them that.

Tom Miller [00:32:22] So, you know, so but I understand that there are limits and, you know, following seasons.

Tom Miller [00:32:30] So, I guess everybody should experience it, you know. And there are physical problems that could limit you, that you may not be able to SCUBA dive. But just about

everybody can put a mask on like I did 65 years ago and take a peek underneath and see what's happening.

David Todd [00:32:53] That's wonderful. It sounds very enticing.

David Todd [00:32:57] So I understand that that you worked for your dad, in the early days as a food broker, but also worked in a family business that sold sporting goods. Is that correct?

Tom Miller [00:33:09] Yes. Yep. Well, and I guess, continuing the SCUBA enlightenment, after the world cruise, I was invited to go become an instructor in New Guinea. I passed on it. That was the best place I ever saw in my life. It's where the Indian Ocean and Pacific Ocean meet - the greatest variety of fish, corals, the warmest waters. Though now I don't know if that's the case, because we have warming oceans everywhere.

Tom Miller [00:33:38] But, after that, they promised me that they were going to take the ship down to Belize. And so, I hung in there to become a dive master in Belize. And so, after a few months more in the Bahamas, we did get down there. And, the Belize reefs, especially their offshore atolls (there are only four true atolls in the Caribbean - three of them are in Belize). And, being on a ship, we could visit all of them, including some of the better places on their barrier reef.

Tom Miller [00:34:12] So, it's the largest barrier reef in the Caribbean. It is, to me, the best diving of the whole Caribbean as far the variety of wildlife, that you could see.

Tom Miller [00:34:25] And, that's where I met a young lady from Laredo. So that's how I ended up here.

Tom Miller [00:34:33] And, I began to teach courses here in Laredo. And, her parents did have a sporting goods store, and they prided themselves on being one of the very first stores to sell SCUBA equipment. They had started back in the '60s when it was first, you know, really becoming a new thing. In Laredo, most of our sales go to Mexico. And so the demand wasn't really from Laredo, though when I started teaching classes here, we certainly had some gear sales.

Tom Miller [00:35:15] But a lot of it, of course, was based on what they were doing in Mexico. And of course, I get invited to a few more places there. So, I did get down to Veracruz, and Cabo San Lucas and other places in the Baja, you know, to go diving.

Tom Miller [00:35:37] And so, that's how, you know, my wife had gotten involved also. You know, she had been exposed to the SCUBA gear at an early age, too. So, she was also eventually certified as an instructor too.

David Todd [00:35:54] Well, that's nice to be able to share that with her.

David Todd [00:35:57] [I'm going to ask just to take a little break here. I think that your microphone is maybe rubbing against the collar of your shirt, and I'm getting a little bit of noise.]

Tom Miller [00:36:08] [Well, that might be, but I think also the heater just came on.]

David Todd [00:36:14] [Ahh!].

Tom Miller [00:36:14] [And I wonder if that's what you're hearing.]

David Todd [00:36:17] [Well, it was kind of a rhythmic thing, and I think it may have been...]

Tom Miller [00:36:21] [Okay.]

David Todd [00:36:21] [Well, hard to say.]

Tom Miller [00:36:21] [Hopefully that corrected the problem. Or do you still have that background, because I can hear it here?].

David Todd [00:36:31] [I'm not hearing it anymore.]

Tom Miller [00:36:34] [Okay. Okay. Maybe that's what you had had there.].

David Todd [00:36:38] [Yeah. We'll just keep tabs on that.]

Tom Miller [00:36:41] [Okay. Sure.]

David Todd [00:36:42] So, I was curious, because we've seldom talked to people who are in the sporting goods world, and I think there's an interesting parallel and overlap with the conservation world. And I know that, you know, a bunch of - I think about Academy having been such a promoter of Texas Parks and Wildlife and conservation, and I didn't know if your wife's family, you know, was involved in and interested in sort of the natural world.

Tom Miller [00:37:17] And you had mentioned that, you know, the sporting goods tax has now, a lot of it, has been designated to our parks. And of course, we're very aware of because it was hunting, camping, fishing, you know, were the primary goods that we had sold there. And so, there was always, you know, going to be an emphasis on okay, getting your license, you know, and of course, all those fees here returned to hopefully the Texas parks.

Tom Miller [00:37:51] We always had heard that: a lot of the money designated for them wasn't getting there. And maybe now it has more. I know there was another program in our 100th anniversary of Texas state parks this year that there was, you know, we I think as a state, we did pass, you know, that there should be more money allocated to the parks. And so hopefully that'll turn out to be so.

Tom Miller [00:38:15] But, you know, my career ended unfortunately with that family, with that first wife. At that time, '93, that was when I think they started designating the moneys to go to the parks. So, I really wasn't part of that, you know. I don't even know how they even processed it, if it was something that, you know, the sporting goods store had to set aside. I don't know how that worked.

David Todd [00:38:46] Okay. All right. Fair enough.

David Todd [00:38:49] Well, let's talk a little bit more about your new-found home in Laredo, in particular about the Lamar Bruno Vergara Environmental Science Center, which, I think, sort of grew out of the Rio Grande International Study Center, if I'm not mistaken, and some work that you and Dr. Jim Earhart and Dr. Tom Vaughn started in their early 90s.

Tom Miller [00:39:16] Yeah, yeah.

David Todd [00:39:16] And can you talk about the origins of the Center?

Tom Miller [00:39:20] Sure.

Tom Miller [00:39:20] I was happy to get to know both Dr. Jim Earhart and Dr. Tom Vaughan, because they would come to our sporting goods store when I was still working there. And so, I was aware of these two gentlemen, as they were beginning to explore the river. I don't think either one of them had that aquatic background. You know, Jim had been a physiologist. I think he did a lot of work with rats, laboratory rats. And Tom Vaughan is a mammalogist, you know, and working in a little different scene.

Tom Miller [00:39:57] But being here on the Rio Grande and in Laredo, where it's so important, you know, to us, you know, as our only supply of water, it was just natural for them. And as I think I had mentioned too - we're all becoming more aware of our environment and the holistic look that we have to have at this. It's just not one part, you know. We have to look at a big picture, you know, not just Laredo, but up and down the watershed.

Tom Miller [00:40:27] And, of course, you know, we did have some talks, and then I got pretty close to Dr. Vaughan, for his second, his wife's second pregnancy, and my wife's first. We were in Lamaze class together, so I got to know Tom Vaughan a little bit more. And I've known him now for over 40 years, you know? So it's, uh, it's really interesting, in that respect.

Tom Miller [00:40:52] So, I had known these and I think they had mentioned they were getting ready to get an organization together, you know, and we want to emphasize the Rio Grande. And, the name came up. Well, the Rio Grande is at risk. And so, Rio Grande, the International Study Center kind of sounds like "RISK". And so, that's what it is. And so we're here at RGISK right now, in their offices on the Laredo College campus.

Tom Miller [00:41:23] And, they had formed in 1994. And it was here. And of course, Jim had taught. Tom had taught, also here, but had gone over to the brand new university that started - the Texas A&M International, but Doctor Jim was still here.

Tom Miller [00:41:46] And our college campus was one of the original border forts. There was four of them. You know, after the Mexican-American War, Mexico still was hoping that the Nueces could be the border. And the United States says, "No, it's going to be the Rio Grande". And, it had been the area between those two rivers was kind of a no-man's land, before, but now the US was going to claim it. And so putting Fort Brown, in Brownsville, which became Brownsville, Rio Grande barracks, in Rio Grande City, and then our Fort Mackintosh here, and Fort Duncan, up in Eagle Pass.

Tom Miller [00:42:33] And, so we had gone for almost 100 years as a fort. And after World War Two, it was turned over to the local school district. And which created the college because there was a GI Bill now. And so, let's get these soldiers into school.

Tom Miller [00:42:52] And so, we were lucky here then on our campus to have a mile of the river, including this old fort that guarded the Paso de los Indios. And, this was a ford. Before there was any bridges, this was a more safe place to cross, most of the year, you know.

Tom Miller [00:43:16] And a lot of people here on this North Bank had land across. It was one of the very few Mexican cities that had been settled. In fact, wasn't even Mexican. It was a Spanish city. It is old enough - 1755 - to claim you know, part of the, you know, the Camino Real, you know, the royal road that stretched from the border to the Louisiana border.

Tom Miller [00:43:44] And so, it's just a quirk of geography. As the river comes down from the north, it takes a very sharp bend right here and goes east-west. And so, as it did this, it formed two high banks. But before that, you had this crossing point that, you know, was perfect. And of course, that's where the fort was situated so the cannons could guard that crossing point.

Tom Miller [00:44:16] And, that was, you know, something that was done and it made for an interesting piece of land that not much was being done.

Tom Miller [00:44:26] And so, the proposal that was being made by the RGISC, by Dr. Earhart and Vaughan and the group that was forming: "Let us lease this from you. Let us lease fifty acres of land, and we're going to create the first nature trail in Laredo."

Tom Miller [00:44:45] And by the way, you know, you have these buildings here, you know, and there had been a farm project and you might have heard it, being from Austin - the Center for Maximum Potential Building Systems. Right.

David Todd [00:45:01] Pliny Fisk.

Tom Miller [00:45:03] Pliny Fisk. Okay. And you might have even interviewed him. Who knows?

David Todd [00:45:08] And Gail Vittori.

Tom Miller [00:45:08] Okay. There you are. And, of course, this was one of their very special projects, and they even had it on the cover of their pamphlets for a long time - the Blueprint Farm. And so, it was bringing together a lot of ideas. You know, we need to create something that could counteract the corporate farm that was happening. Can we grow specialty crops in a smaller area that can still have and retain high value? But yet, you know, can we do it environmentally conscious?

Tom Miller [00:45:48] So hearing about what the Israelis were doing turning desert into green growing areas and how they did it. Well, drip irrigation. And so, well, let's bring this here.

Tom Miller [00:46:02] I don't think at the time they realized that that process had actually been worked on by Texas A&M right here in Texas, but nobody had taken it on.

Tom Miller [00:46:12] The Israelis hopped on it.

Tom Miller [00:46:13] And so, it was getting brought back.

Tom Miller [00:46:16] And so that was one of the catches - the roofs were designed to catch water. So we had rain catchment, which was pretty novel. Although, if you look at downtown Laredo, these 100 year old plus buildings, almost every one of them had a cistern. If you didn't want to drink river water, you caught your own free water. And, otherwise, the barrileros

hauling barrels around by the donkeys was your only option, if you didn't want to go down to the river yourself.

Tom Miller [00:46:45] And so, catching rain was not unusual in Laredo. And, but they brought it. So we were catching, uh, we had probably about 12,000 gallons that we were catching, mostly to use for irrigation. I turned one of the projects into an aquaculture project with some interns.

Tom Miller [00:47:07] But, so these buildings were here. Pliny had designed them with straw bales. This uses a reusable material. They started with our local buffalo grass. It didn't work as well as straw, so we ended up with some straw then, I think.

Tom Miller [00:47:23] We have some of the very first wind turbines in Texas, even though we weren't rated high enough at the time for wind turbines, you know, in the state. And now this state leads the whole nation in wind-generated electricity. But we had some of the first, if not the first, wind turbines down here at this, at this thing.

Tom Miller [00:47:43] So we had a real interesting project going on. And it was great. You know, the college liked it because they didn't have to pay anything.

Tom Miller [00:47:53] But then when the fundings started running out and the costs were now going to be turned over, they said, maybe we don't need this project anymore. In fact, the way the college is growing, maybe we ought to just bulldoze these buildings, and make some parking lots.

Tom Miller [00:48:10] And so, here you had these really historic buildings, you know, straw bales and...

Tom Miller [00:48:17] Well, so RGISC said, well, we'll put that as part of our lease project too. We'll try to make them into a study center. And, so looking around for funding, there was this Lamar Bruni Vergara. If it wasn't for this trust, the youth of Laredo, the education of Laredo, would be in a sad state.

Tom Miller [00:48:47] She was a part of a family who had made some incredible wealth, when it first was coming in - oil and gas. And she never had children herself. And so, her will, uh, much to the chagrin of her nephews, was turned over to a trust for the youth of Laredo - their education, their health and their religion.

Tom Miller [00:49:14] And so, if you come up with a process to, you know, satisfy their requirements (which weren't too stringent as I came to write grants and programs). You know, they were not a hard one to persuade. And so, they were going to give some money. And Jim was talking to the president, Dr. Ramon Dobolin at the time and, and, well maybe 50,000. Oh, no, no, no. We got to have some more than that. So, he put another zero behind that and was able to ask for half a million to convert these buildings to what we would need for a science center. We hadn't quite figured out what it was going to be. But, they approved it, the 500 grand.

Tom Miller [00:50:08] But then the college had to persuade the board to do the same. And, they were a little reluctant to consider it. And when they finally get the final plans from our architects I think it ran two and a half million to do what they thought they needed to have done.

Tom Miller [00:50:35] And so, again, the college sat on it until finally, Lamar Bruni Vergara Trust, said, "If you aren't going to use the money, maybe you better give it back." And so, then it went to a vote, and by a vote of 5 to 4, it passed. And so, they went ahead. But we're only going to match it. So for a million dollars, we converted these small agricultural projects.

Tom Miller [00:51:00] One of the packing sheds became our living lab where we had over sixty aquaria from 1200 gallons to 50 gallons, displaying a variety of fish, amphibians, reptiles, mammals.

Tom Miller [00:51:16] And, off to the side of the buildings, we created ponds - a 25,000-gallon pond for turtles, a 10,000-gallon pond for alligators, an 80,000-gallon pond for fish, a 5000-gallon environmental demonstration pond. And so these were what we worked on.

Tom Miller [00:51:41] The shipping shed became our office. And so, we used these straw bale buildings, and we were able to talk about them. And still we left, in fact, the ceiling off of our office building because the internal structure that Pliny had devised was all self-supporting. And the support were drill stem, recycled drill stem. Rather than selling them for scrap, they were incorporated.

Tom Miller [00:52:10] And, the girder system that were holding up the roofs were really very interesting. And, I would even have architectural students come down from UT who were aware of some of these projects, and I would get visitors early on as we opened to study what had been done and what was changed. And it was interesting.

Tom Miller [00:52:33] And of course, a book was written about this project, and, you know, how some things worked and some things didn't. Some people's dreams - it wasn't quite what they had thought.

Tom Miller [00:52:45] But, we forged on and because there was a Lamar Bruni Vergara, it became the Lamar Bruni Vergara Environmental Science Center. RGISC offices were also still on the college. They were a non-profit. They became the 501(c)(3) non-profit.

Tom Miller [00:53:05] And the college has provided an office ever since to them - thirty years now. We'll be celebrating our 30th anniversary this year for the RGISC organization. I wish Jim Earhart was still with us to celebrate it. I know Tom will be. And, we'll see how it goes.

Tom Miller [00:53:23] But, so right now, the Lamar Bruno Vergara may undergo a name change. As I retired three years ago, of course during Covid, everything changed in education. But I guess through what we had been able to accomplish, my team here and all the interns and work studies and public support and summer camps have proven to the college that that it was certainly something worthwhile. And, we have a new president and, she has decided to do a \$3 million renovation to these buildings.

Tom Miller [00:54:09] So, I went by there today. A lot of it had been ripped up. You know, it's a lot of changes, and we'll keep our fingers crossed that it will fulfill their plans and dreams. We know all about cost overruns and cutting, and that's what I had to live with - you know, certain problems - and I made sure I told the new people, "Okay, you're going to have to have this type of filter, this type of pump, and you're going to have to have this type of cage, and you need to get that alligator pond a little deeper and", you know, and on and on. You learn requirements from the animals.

Tom Miller [00:54:48] And even though they didn't decide right away, I had a great candidate slate for my replacement. They decided not to go through. I was just getting ready, I had wonderful candidates. I had a dozen, you know, master's. I had a couple of PhD. candidates that wanted to be here, and run this thing. But they decided not to do it.

Tom Miller [00:55:10] And so for a while, six-eight months, you know, went by and, you know, I had a good staff, but they needed a little bit more direction. But they did finally get to the person that I had wanted. I had mentored her on her master's thesis in mussel research here on the Rio Grande. And she also had a rehabilitation license. And she loves animals, probably more than I do, you know, as far as taking care of them. And, loves, especially, birds. So, she's going to get an aviary built. So that'll be something new. And, it should open up, grander than ever, we hope, in 2025.

David Todd [00:55:54] What a great contribution to not only Laredo, but to the whole Rio Grande and our understanding of the river itself and the countries and cities share it, and animals, of course.

Tom Miller [00:56:06] Yes, indeed.

David Todd [00:56:07] So you mentioned that here was some mussel study with this incoming director, and I was wondering if this might be a good time to talk about one of your encounters about mussels. I think that in 2001, you managed to hear Bob Howells, who is the author of "Freshwater Mussels of Texas" and a longtime Parks and Wildlife biologist, fisheries biologist, talk. And I was curious if you could talk about that introduction to the world of freshwater mussels, and particularly the Texas hornshell.

Tom Miller [00:56:47] Yes, absolutely. It was an eye-opener, to have and listen to Bob. And of course, I got to know him a little bit. And he was put in a tough spot, you know, like you say, he was a fisheries biologist, ichthyologist by trade, but I don't know exactly that story, how he was designated to become a mussel specialist for the state of Texas.

Tom Miller [00:57:12] And, you know, as I was reviewing some papers back in the '90s, there was a huge demand for mussel shell. It was going over by the tens of thousands of tons, literally, for the Japanese, cultured pearl trade. They had found that a nuclei of our pearly mussels of North America were the perfect composition - exactly the same as a pearl, to grind and form a small nuclei, which you would insert into these marine pearl oysters. And instead of waiting 20, 25 years, you could get a pearl in two to three years.

Tom Miller [00:57:54] And so, as this commercial trade, got regulated in Tennessee and Ohio and Alabama and on the East Coast, people were getting fined. They were poaching mussels in Tennessee or they were they were going into Iowa under the cover of night.

Tom Miller [00:58:19] They were coming to Texas and, "Wow, there's nobody, there's nothing here. You know, there are no regulations."

Tom Miller [00:58:28] And so people were reporting to the state that, you know, they had these clams, they had these mussels, and they'd see these barges, and the collection was going on.

Tom Miller [00:58:42] And so, the state didn't know what they had. They were twenty years behind the rest of the country. By the, by the '70s and '80s, like, you know, a lot of our mussels, the 300 that we have in North America, a good third of them are endangered or threatened, or both, or even extinct now, unfortunately.

Tom Miller [00:59:04] And so, he had this thing that he had to find out. And he had to rely on personnel from the Texas Highway Department as they were building bridges as, you know, some researchers that he had found out were interested out in the East Texas, up in Tyler. And, you know, he himself, had made a hundred surveys down along the Rio Grande from Big Bend.

Tom Miller [00:59:31] He had heard of Brian Lane's work in New Mexico. And, of course, was interested. "Well, we should have these here. Why don't we have, you know, the hornshell."

Tom Miller [00:59:45] And, uh, you know, but in his surveys and 130 that were submitted to him from other public sources, from fifty private sites, they hadn't turned up anything.

Tom Miller [00:59:59] And so, that was really quite a surprise. And in 2001, with the brand new Texas A&M International in Laredo hosting the Texan Academy of Scientists, he was invited to speak.

Tom Miller [01:00:14] And so, naturally, "Well, let me talk about the Rio Grande, and what I was just doing and what I hadn't found". And that was kind of the theme. And, another professor here, Jose Egremy, had found, uh, dead washboard. I had had one of these in my center. I had had shells on display, and never had thought much about them. I mean, I was used to mussels, I mean, mussels are in rivers. Right? And, I hadn't been spurred to action yet.

Tom Miller [01:00:45] And when I'm hearing a person say, "Well, they haven't been discovered." "Well, what about this one?" "Well, where'd you get that?" "Well, right downtown." "Well, let's go."

Tom Miller [01:00:54] And so he came back a couple of times, and he was amazed at the habitat and amazed that some of the shell I had found and he said, "Well, you've got to look for them alive. We want to know if they're alive. You know, these especially what are known as the three endemics - only found in the Rio Grande." Historical records had had 16 mussels in the Rio Grande. And, he would love to find them.

Tom Miller [01:01:29] He had found dead shell in a few places in the Big Bend. They had hints that they were still there. And so, one of the things, and he even mentioned this in his papers, you know, if you, especially in the Rio Grande, the big river, the biggest river of Texas, you know, we share it, but, unless you go in low water conditions, it's going to be very difficult, you know, to find the mussels.

Tom Miller [01:01:58] And being down here, I had this opportunity then. And so, I became much more aware of, you know, the river and how it's regulated by the International Boundary Water Commission, which got its start back in the late 1800s, you know, to, you know, what are we going to do about the border, and how we're going to run navigation on it? And theoretically, we can go in the floodplain on that Mexican side and they can come on our side. But you don't want to do that in practice now.

Tom Miller [01:02:33] But these were the challenges. And so, but also, in the treaties that they had signed with Mexico, they allowed for the building of four more dams on this main stem. Everybody had gotten kind of taken aback at what New Mexico had done.

Tom Miller [01:02:56] You know, with the Rio Grande up there, they had huge agricultural interests, and I think it happened in Texas, too. Back in the late 1800s, you had the advent of humongous steam engines capable of running pumps to pump vast amounts of water out of rivers and to put it into irrigation ditches and create new agricultural lands. So, this was the rampage going on.

Tom Miller [01:03:28] And, you know, up in New Mexico, they had basically sucked the river dry at times.

Tom Miller [01:03:35] So, their solution was, well, we'll just dig the river deeper, you know. And then, a private citizen said, "Well, I'll just dam the river, and I'll sell the water." And he was selling bonds in Europe. It was going to go through. It was going to become as big as the Suez Canal as far as a project, because the world was taking note.

Tom Miller [01:03:56] And, he almost got it through. But the state took over, and, you know, the Elephant Butte dam was then built. And it was the second largest concrete structure in the world at the time, a humongous dam, capable of stopping four years' worth of melt from the Rocky Mountains where the Rio Grande started.

Tom Miller [01:04:23] And so with that being done, now, Mexico - "Well, what about our water in Texas? What about our water?"

Tom Miller [01:04:34] You know, so now we had to figure out how we're going to share this, and that kind of brought it to the fore.

Tom Miller [01:04:43] And so, and it took a lot of negotiations, state-to-state - eventually the three states of the United States, the five states of Mexico that share this watershed, because really, the Conchos of Mexico is, by volume, the largest tributary of the Rio Grande. And it's where Laredo and the whole Valley get 80% of their water, is from Mexico, the Concho.

Tom Miller [01:05:12] So, we had to get these discussions going. And so, and of course, even today, I think the state of Texas still has a problem with the allotment that New Mexico has given over the years. And so and there's cases being involved still.

Tom Miller [01:05:31] But the treaty said, "Okay, we're going to have to share this water."

Tom Miller [01:05:35] And they came up with this, you know. And, you know, in 1944, during World War Two, this was still on the agenda during this crisis that we have to have, we've got to figure this out. Otherwise, what are we going to do with water for both nations?

Tom Miller [01:05:54] And so, a treaty was signed. Okay, now, four more dams, but we have to share. And so, your Conchos, your tributary, at a minimum, you're going to have to give 300,000 acre feet, and we'll give you the 300 acre feet from the Colorado River. All these rivers were brought into that same treaty, the Rio Grande, the Colorado and the Tijuana River. All these border rivers were in the same treaty of sharing and allotting water to each other nations. And so it was very important to us.

Tom Miller [01:06:33] Well, as soon as the treaty was signed ... "Well, where do we want this first dam?" And, of course, then, you know, southern Texas and northern Mexico were garden areas already from the late 1800s. They had these huge water districts. So they're also very concerned. Well, now we can expand even more with a reservoir holding the water. And so full steam ahead on the creation of the Falcon Reservoir.

Tom Miller [01:07:02] Probably one of the worst places to put a reservoir when you consider the South Texas heat, when you consider the area, the geography that they put this dam in. Yes, there was the Falcon Breaks there. But it's still, you know, it doesn't have a lot of arroyos in the shade, you know.

Tom Miller [01:07:24] But yet that was what both countries wanted. And so, Falcon went ahead. And in fact, one of the very first people to guide here at my Center had been one of the engineers involved in making that. He was an elderly man, but he gave me all the plans of how they, what they went through.

Tom Miller [01:07:45] And of course, as we know, when they finally got it done, they thought it would take years to fill. And in 1953, we had just gone through the tremendous droughts. You know, all of Texas - those droughts of the early '50s were the worst in record, in historic times. And it spurred on all of the reservoir building in the state of Texas.

Tom Miller [01:08:10] And of course, for mussels, it was a death knell as every one of these reservoirs got built and because they were silted in.

Tom Miller [01:08:20] So, the Falcon Reservoir was then done.

Tom Miller [01:08:25] But of course, what happened: 1954 was the greatest flood in historic times. So, instead of taking years, it filled in a month or two as 65 feet of water roared down the river, took out the Eagle Pass bridges, hit the Laredo railroad bridge, took it out, hit the highway bridge, took it out. Flooded the downtown, including the old cathedral. I mean, it was an incredible flood. And filled that, you know, Falcon.

Tom Miller [01:08:59] And of course, they had already moved Zapata, given everybody new land. But, in Guerrero they had to get out and leave a lot behind, you know. And I, some of my people that I taught SCUBA diving in Mexico (I used to advertise in Nuevo Laredo), they wanted to go dive old Guerrero underwater. But of course, in low water it appears anyway. But we also sold metal detectors to go and search it too, the old town.

Tom Miller [01:09:28] But, so they, they eventually said, "No, we gotta do this better."

Tom Miller [01:09:33] And so, the next reservoir was planned where it should have been - Lake Amistad, second largest reservoir in Texas. It takes the Pecos, it takes the Devil's, it takes the main stem and is truly the best lake I've ever dove in as far as visibility and bringing students to, when it's in good shape, you know. And I would take a lot of people up there.

Tom Miller [01:09:56] And of course, I saw mussels up there, you know. I said, "Okay, we've got clams up here too. That's good." You know, Tampico pearly is what I eventually found that they were.

Tom Miller [01:10:06] But, so through those situations, I become pretty familiar with the river, you know, and diving it. And I did commercial diving, locating cables that they were

doing seismic testing in Falcon. And I'd have to go down and untangle them from the mesquite trees. And, of course, that body of water is so polluted that my whole body would be covered with a rash, and I'd bathe in Betadine at the end of these days of diving down there.

Tom Miller [01:10:45] I didn't know at the time. Now I do, that Nuevo Laredo was dumping 20 to 30 million gallons of sewage a day down there. There was no treatment for that large city.

Tom Miller [01:10:58] But, anyway, so we're getting ready to talk about hornshell.

David Todd [01:11:05] ["Why don't we take just a moment to pause there.]

Tom Miller [01:11:09] [Okay.]

David Todd [01:11:09] [You may want to get a drink of water]

Tom Miller [01:11:10] [I will.]

David Todd [01:11:10] [And then also, I wanted to ask you. I'm hearing a woman's voice. Do you have a neighbor maybe?]

Tom Miller [01:11:19] [Let me go ahead and take a look at that.]

David Todd [01:11:21] [Okay. Thank you.].

Tom Miller [01:11:42] [I think that'll be better.]

David Todd [01:11:45] [Okay. All right. She had a small voice, but it was persistent.]

Tom Miller [01:11:51] [You were hearing it. Yeah. I'm sorry. They are going in and out a little bit. You know, this is their office, and I'm privileged to be here.]

David Todd [01:11:58] [I understand. I'm glad that they're being cooperative. It's nice of them.]

David Todd [01:12:04] So, you were talking about this really wonderful 30,000-foot view of the river and all the water supply demands on it, and the reservoir construction and then I guess this effect that that's had on a lot of the creatures that live in the river, including mussels. And I think this was all sort of context for Mr. Howell's talk in 2001. I was wondering if you could talk about some of your explorations. I think he was encouraging for you to start looking for mussels, including the Texas hornshell, and I understand that you found some of the first live ones in Texas. Is that right?

Tom Miller [01:12:50] For many species. Yeah, absolutely.

Tom Miller [01:12:53] After the talk, of course, now, so, man, this is what I had done growing up. This is right up my alley. I got to get into this. And so, yes, with his encouragement, he found a little bit of funding, you know, but a lot of it I just wanted to do. And then, of course, being down here with low water conditions, what I found is that, you know, you check the flow from Lake Amistad.

Tom Miller [01:13:25] Lake Amistad, you have two water masters, the Mexican and the American, and they release water upon demand from the municipalities and from the irrigators. And so, what I found is that, you know, you can't really say there's any average. We don't really have a river. We have a pipeline between the two reservoirs.

Tom Miller [01:13:47] But why we, Webb County, is really the center for the diversity of mussels of the Rio Grande? There's no other place that has greater diversity than what we have right here. And why we have it is we do have, after Amistad, you do have, Del Rio, and then you have Eagle Pass, and then you have El Indio, where they built a weir, which hold back a lot of the sediment, organic, you know, anthropomorphic or not. It holds it back.

Tom Miller [01:14:34] And so, from that point to Laredo, almost 100 miles, you've got a pretty darn pristine river. Dr. Vaughan and I canoed it. You know, the first 30 miles was a lot of boulders. The next 30 miles was a lot of rapids and riffles. And the last 30 miles above Laredo was a lot of large islands.

Tom Miller [01:15:01] And, so, you know, and we did find mussels there. But before that, you know, just checking out our local area, and I would report every year to Bob, and he would do a little species report. You know, just looking at that, from 2002 to 2003, I found 28 live hornshells. And of course, this had really excited him, to no end.

Tom Miller [01:15:33] But there was no pattern of where I'd find them. I was mainly going up and down the rivers, looking for sandbars, looking for exposed rocks where I would notice shell being collected. So, at that point, I had probably found about a dozen species of mussels indicated by their shells. I had found a lot of them live - the washboard, which is one of the heaviest of all river mussels, literally as big as a washboard. It can get to be, you know, over a foot in length. And, heavy shell: it was highly under demand for the pearl industry.

Tom Miller [01:16:20] He didn't expect me to find them. They're usually in deeper stretches of rivers, as they get closer to the coast. And to find one this far away, he was astounded that we had found live washboard up here.

Tom Miller [01:16:36] The hornshell: he was thrilled at. I finally and you know when some other work, some other researchers, had found the truncilla, the Mexican fawnsfoot, in riffles. That's what I started concentrating on. I finally found the first one of the Mexican fawnsfoot, the *Truncilla cognata*. But that was the only one. And so that one still was a mystery.

Tom Miller [01:17:02] And the hornshell turned out, I think, it was almost exactly 20 years ago that, I was canoeing, I was kayaking, and there's an area about twelve miles north of Laredo. It used to be called the Laredo Breaks. It's where actually, we get a real change of habitat, geography. There's high cliffs there. They've been eroded away, leaving very sheer sides, 80-, 90-foot drops.

Tom Miller [01:17:38] And, but below the shelf, you get the river scouring these long, like someone running their fingernails across a river bottom in the rock, and creating these gullies that then catch boulders or slabs of fall from the cliff side.

Tom Miller [01:17:59] And I had noticed a large aggregate of egrets - snowy egrets, great egrets. And they were obviously feeding on something. And so, when I went over there to see what they were doing, I noticed all these hornshells, precisely, always poked in one particular spot. And, the bird were getting them out. Well, they got to be here.

Tom Miller [01:18:28] And so, I think the first rock I lifted up there might have been a dozen hornshell right there. And in that area, that became really our main study area over the years where eventually we marked over 700 of the mussels there.

Tom Miller [01:18:45] We need to go back and monitor them. It's been about eight years now that we checked that population in situ.

Tom Miller [01:18:51] But, so that was one of the first.

Tom Miller [01:18:54] So now, knowing a little bit about this mussel's tendency to look for refugia in undercut banks, in crevices, and in the rocks underneath the boulders or rock slabs. This is where we will find them.

Tom Miller [01:19:13] And, you know, we found them everywhere in our stretch, from Laredo up to probably the Columbia Bridge and then beyond, where we were able to get in. A lot of, of course, the land in Texas, as you know, is privately owned. And you may or may not have access to it is, but it is, I would say in the numbers that I found, it was probably the most common mussel that I found in our area. But I knew where to look for them.

Tom Miller [01:19:47] The other ones, the other mussels, tended to go into a substrate that could be including a little bit of gravel, a little bit of clay. You know, they would find just that suitable bottom to be able to be dropped off in and grow.

Tom Miller [01:20:05] And I don't know if you have looked at that, but the mussels, and this is what has made them so fascinating is their biology. How did they evolve? And they evolved with the breakup of Pangea. They were some of the first creatures to go into these new freshwater waterways, you know. But how did they get up rivers? They don't, they can't crawl that fast.

Tom Miller [01:20:29] Well, they had evolved to use a larval form called a glochidium that attaches to fish. And some of these mussels are particular to one fish. Some are generalist: they can attach to a dozen or more fish and they'll hang on, get a blood meal, some glochidia. And there are different types of glochidia. Some are strong enough to hang on to fins. Some have to attach to the gills of these fishes and get their blood meal for half a dozen weeks or so and then drop off.

Tom Miller [01:21:07] If they drop off in the right habitat, they may make it. If they don't, they get sloughed off again.

Tom Miller [01:21:13] And so they're incredibly prolific. Some of them, brood a couple of times a year, some brood at an optimum time, what used to be spring flows. You know, our river used to have a spring flow, the spring flooding. And so, mussels still don't know that we changed it. And, you know, so some are limited by that.

Tom Miller [01:21:36] And so up in the upper Midwest, in the St. Croix, for instance, where they're taking out a dam, they want to create this regular spring flow again for all creatures that live there. And so, there're the pulses of the river, you know. We have to get back to them.

Tom Miller [01:21:54] But, so, you know, we find that the hornshell may attach to a dozen, but there's only maybe three that it will attach to. And in our area it seems to be the red

shiner, more, that will carry them. It makes a lot of sense whenever we're digging around, these minnows are coming around, looking at what you're doing, maybe grabbing a piece of algae or something that floats up.

Tom Miller [01:22:26] And so, this is what I guess the mussels will use for their vector. You know, for an ichthyologist to have their fish called a vector is not really, you know, pleasant, but that's what we call them sometimes, just to bug them.

Tom Miller [01:22:43] Anyway, so, you know, knowing the habitat, then, getting some research and then, of course, after Howell's work, you know, other groups became much more interested in the mussel fauna.

Tom Miller [01:22:57] And, I guess in the next phase, after doing this for six or seven years on my own and one of the big trips was with (and Bob Howells was one of the ones, I reckon he couldn't make it - his health didn't allow him), but the USGS service wanted to survey the Lower Canyons. They hadn't done it for a while.

Tom Miller [01:23:23] And so it was a collection of biologists. We had plant specialists, we had fish specialists. I was brought on as a mussel specialist, you know, I was knowing the Rio Grande. And so, for me up there, I was looking for this Salina mucket. And, I found the first ones alive that, again in decades.

Tom Miller [01:23:46] Again, I found it haphazardly. I thought I had maybe found it. And I would continue to look mid-water in sandy areas, not silty areas, you know, but we found eventually that it prefers a refugia type habitat too. It likes crevices a lot, similar to the hornshell.

Tom Miller [01:24:05] And which makes sense up there, up in the Big Bend and Lower Canyons country. You've got these huge canyons and sheer walls that crack and fracture. And so they provide a lot of habitat for these mussels.

David Todd [01:24:24] So, I think you're giving us a picture of the kind of geology and hydrology that support these mussels. And I thought it might be good also to give a little bit of context about the human sort of environment. I think that there's a long history of freshwater mussels and human use and I was wondering if you could talk about some of the Native American shell middens and some of the interest that some of the Spanish explorers and settlers, I guess, had in, in not just Texas hornshells, but freshwater mussels in general in Texas.

Tom Miller [01:25:05] Yeah. And, you know, that story goes even right to our colonial times on the East Coast where people were finding mussels with pearls. And, in the late 1700s, early 1800s, there was a pearl craze, out east. You know, of course, pearls at that time, in the 1600s, they're the most valuable substance on Earth, you know? So, you know, it was natural that the Spanish would be aware and, you know, if somebody was wearing pearls, a Native American - "Well, where did you get those pearls?"

Tom Miller [01:25:45] And, you know, it was interesting how, you know, the Rio Grande was the mighty Rio Grande. And, uh, it wasn't really settled. We had a lot of nomadic-type natives here, in and out, never permanent structures - coming in for when the harvest was right, the river was low.

Tom Miller [01:26:07] But, you know, the tributary or the part of the Rio Grande up in New Mexico, of course, was a jumping-off point. El Paso, you know, 1599, you know, they were already starting to set up their missions in the 1600s in New Mexico, because those natives weren't nomadic. They were settled Puebloan type. And, they had agriculture and some of them were influenced by being converted to Christianity.

Tom Miller [01:26:44] And, they, of course, were aware and had been trading with some of the more nomadic Native Americans in our Texas region. And, "Where did you get those?" "Well, we got them to the east."

Tom Miller [01:26:59] And so, there's records that I was looking at again, I think 1650 there was certainly an expedition led by I can't remember their names right now, but into and they got as far as what they eventually called the Concho River, up in West Texas, not the Conchos in Mexico, but the Concho. And so, you know, shells, you know, that was what they were looking for. And so, there was an awareness of that.

Tom Miller [01:27:33] And also, were the natives themselves looking for it? In Webb County, I've looked at five different shell middens and every single midden and every single shell that I've looked at here was what they call the, "Tampico pearly". And, of all the mussels, you might be lucky enough to find a pearl in 1 in 1000. But in the Tampico pearly, you might be lucky enough to find 1 in 100.

Tom Miller [01:28:02] And, the Tampico pearly, also, is influenced by the water quality where it is. And so, you may get a nacre, the inside pearly layer, colored. You might have pink. You might have rose. You might have a bluish sheen to it. And so these pearls would take on this.

Tom Miller [01:28:25] In recent time there're people up in that area still trying to farm this mussel for their freshwater pearls.

Tom Miller [01:28:34] So, were they eating them? Yeah, I think they probably were. But why just this Tampico pearly mussel? You know, they must have known that they could find the pearls here.

Tom Miller [01:28:48] Personally, I've tried to eat river mussels in many different ways, and I've never found them very appetizing. You know, we did, in our some of our Mexico adventures, one of the groups down there were seeing us collect all these mussels, and let's make some ceviche. So we ate some ceviche. It was okay, you know. With enough lime and cilantro it probably works out.

Tom Miller [01:29:13] But, yeah, there was use by the Native Americans.

Tom Miller [01:29:20] Again, after the Civil War, steam engines were coming around. A German had found out a process to grind mussel shell into buttons to perforate them, to cut them and now, boy, rather than bone or wood, now you get these beautiful pearly buttons.

Tom Miller [01:29:42] And so there is a rage. I mean, it was an absolute craze. They couldn't keep up with the demand in Europe. Europe never had the mussel fauna like North America. So, when this person came, and he eventually kept on going west until he got to Iowa, Muscatine, Iowa, you know, and that area, you know, or Illinois, Missouri, Iowa, all come

together in the Missouri, and the Columbia. You know, all these rivers had a great mussel fauna. And so, tons and tons were being processed for buttons.

Tom Miller [01:30:18] And they even sent out scouts knowing that, you know, they were running out of a good size. And some of them came down to the Rio Grande Valley and, you know, "Hey, we got the Tampico pearly mussel. Yeah. We can hole these."

Tom Miller [01:30:38] And in some of the historic pictures I see, there is some hornshell. There were some of them, which is hard for me to believe because most of the mussels that I have experience with, from all the stretches that I have, have been of a certain size, you could say less than four inches, less than 100mm.

Tom Miller [01:31:01] But yet there were some larger than that.

Tom Miller [01:31:04] And so, and that's what they found up in New Mexico, a very stable population. For at least 15 years, they have been doing mark-recapture, and find the same mussels after 15 years. So, we know that they grow old. Up in Minnesota and Saint Croix, they found a population of over 100-year old mussels because they figured their fish host had been cut off. And so they get to be pretty old.

Tom Miller [01:31:33] But they did go down there. They did form a button factory, and it went from the '20s and then really, by the 1950s, almost all these button factories throughout the upper Midwest, even the one there in the Valley, all closed down because now we got plastic. You know, we don't need these pearly buttons anymore. Too costly. And so, that ended that.

Tom Miller [01:31:59] But then, like I'd mentioned earlier, there is a demand for shell for the nuclei of the pearl industry. And that's where, you know, Howells had to investigate to see how we can regulate, you know, the mussel harvest.

David Todd [01:32:17] That's fascinating. You know, people are looking for possible raw materials from, you know, everything from necklaces and earrings to buttons on their lapels.

David Todd [01:32:31] Well and while we're talking about the hornshell, and our understanding of it, can you talk just a little bit about its, the ecological niche that it serves? I think you talked about its life history and how it might be associated with some fish that would help it distribute. But what is its role, do you think? How does it fit in?

Tom Miller [01:32:57] Mussels, and as are most marine or freshwater bivalves, they're filter feeders. They have developed, siphons, in-current and ex-current siphons, in which they can take in water and then run it through their digestive system. So, they're remarkable: they have nervous systems, digestive systems, muscular systems, you know, even some marine have a way to detect light. And, you know, so they do have these systems to check out.

Tom Miller [01:33:33] And so, as they digest, you know, what? Detritus, bacteria, algae, you know, small zooplankton. So they, you know, some of them have to have a particular diet or not. Some don't have to have it. Some enhance their siphons by also using their foot.

Tom Miller [01:34:03] Most mussels have a foot. Some are more developed than others, and can move fairly fast. As a river's going down, it behooves you to move with the water as it goes down. And you'll see these mussels making big circles. Some are more straight line, some

make it, some don't. And that's how I found a lot of them. When the river would go down, I'd look for trails. I'd find them abandoned on the edges.

Tom Miller [01:34:29] I never forget finding a bunch of the huge washboard. And I probably put sixty, seventy of them back into deeper water because these are very old and huge mussels.

Tom Miller [01:34:45] But, so for mussels in general, one of their main roles, is as, they are a water indicator. They can tell us a lot about what the quality of that water is. And certainly, like I've found, the birds loved to eat them. I know raccoons eat them. River otters eat them. Man has certainly eaten them, and we've use them for other things.

Tom Miller [01:35:10] But, what we found in particular with the hornshell, and this is what was always interesting to me. We have these major creek systems, in our Webb county area, that will run eighteen miles north or more. And, the Santa Isabel, the Sombbreroito, the Chacon and the Zacata Creek. Some of these rivers were actually being investigated back in the 1930s for mussels, whether they were looking for potential button material, whether they were just pure research.

Tom Miller [01:35:50] But, yeah, some of these were being found, and I suspect a lot of these were spring fed, you know. And as we have reduced our water table, not so much anymore, but some are still deep enough. And that's where, often times, where I would find good habitat. They would bring down maybe the right nutrient, maybe they would erode away the banks to form the right habitat.

Tom Miller [01:36:19] But we've stopped that, you know. We've dammed up a lot of these creeks and especially in our Laredo, and I'm sure throughout Texas, it's the same case.

Tom Miller [01:36:31] And, for Laredo, the Zacate Creek, which was downtown, well, that was an ideal place to, of course, put our sewage plant. And, likewise for our sister city, just a little bit downriver from ours. They had theirs.

Tom Miller [01:36:46] And now, there is no sewage treatment, if you just dump it into the river. There is primary sewage treatment where you might put it into a lagoon and let some biological processes break it down, bacteria and such. And then there's a secondary, tertiary treatment which is chlorinating before you put it back into the river to make sure that all the bacteria and viruses are killed before you introduce it. But even then, the chlorination may take out some of the mussels, too.

Tom Miller [01:37:20] But we found that, you know, through that, and Nuevo Laredo with their, it was why the Rio Grande has such a hard knock - you know, 20 to 30 million gallons of raw sewage every day. You know, it was just ... And this was so on the whole Mexican side.

Tom Miller [01:37:41] Through the NAFTA trade agreement, they created the NORAD Bank to help finance the solution to some of these problems. We did get them to build a sewage plant.

Tom Miller [01:37:55] But as far as the mussels go, they disappeared after our sewage plant. There is no hornshell from downtown Laredo to the end of the river in Brownsville. And apparently they were down there, too. And they were certainly upriver.

Tom Miller [01:38:13] And so not all mussels fall, I think, susceptible to the anthropomorphic sewage that we put in. Some can handle that type of load. I did find half a dozen species, just at the beginning of the Falcon reservoir in San Ignacio, Texas. After about 50 miles, that water finally gets diluted enough to maybe create the habitat again, the water quality again. But then you have the reservoir. And so you have this one little area right by San Ignacio that you had mussels.

Tom Miller [01:38:52] And after Falcon, now Falcon really stops the flow of the Rio Grande. So everything is changed below Falcon Dam. You've got introduced aquatic species - you know, the hydrilla and so many others, the cane.

Tom Miller [01:39:07] And you had the cold water leaving the bottom of the dam. And that also can affect the temperature there. You know, there is an ideal temperature.

Tom Miller [01:39:17] And then, of course, you have a lot more population, a lot more dumping. And it wasn't just Mexico. It was also the U.S. Side. When we started doing studies, we found a couple of blackwater sites in Laredo that hadn't been attended to.

Tom Miller [01:39:33] And so, you know, you have to look at the whole picture too.

Tom Miller [01:39:38] So, for the hornshell, we investigated those areas. We went into some pretty nasty areas and we would find hornshell in situ, dead, and not so long ago. You know, so maybe within the last few decades, you know.

Tom Miller [01:39:59] We found the same thing up in the Pecos River. The Pecos River, because of all the agricultural system that they have going on up there, the mussels have suffered with the increased salinity that the nutrients and the fertilizers have added. And, of course, still going through just the lines on it that it is too.

Tom Miller [01:40:24] So, when we were there, we found maybe the last of the hornshells alive. We found three in, you know, dozens of sites and dozens of habitats. And they were, we figured they would be close to the springs, but not even some of the springs we investigated, the downriver side did not have mussels. One did, and that was the only one that we found. We found one, I think three live hornshells and no other, no other living mussels. So river quality certainly.

Tom Miller [01:40:59] We can look at above Laredo. Eagle Pass in one of their, you know, projects during the Depression, you know, where you have a bunch of, WPA projects. They diverted most of the river out of the riverbed and put it through their grand irrigation ditch that they start above the town. If you know anything about the area up there, it is the caldera of a huge ancient volcano. So it is an extremely rich land. And so why not increase the productivity of it by diverting the river?

Tom Miller [01:41:38] And it's a, it's an amazing event. When we did research on the water up there, the river's in general very shallow. That's why you see all the immigrants going up there. They can walk across the river all the time, and that water is in poor quality.

Tom Miller [01:41:54] We would be diving or snorkeling into it. And you think your hands are dirty, but you're covered, coming up with hundreds of leeches on your hand, baby leeches. And of course, these affect. These are one of the parasites that could affect mussel populations.

Tom Miller [01:42:11] We did eventually find a couple of another endemic species, the Mexican fawnfoot up there, but no hornshell. We didn't find the hornshell till we got to Del Rio and above in the lower canyons, and just at the very southern end of Big Bend.

Tom Miller [01:42:31] And that brings into the other problem. So you've got quality water, but then you got the quantity. And, Big Bend was always known. I mean, it was one of the last explored areas of our country. It didn't get fully paddled until I think it was an army engineer went through in the late 1800s finally, you know, and went through all those canyons. And, I mean, it must have been a tremendous, you know, incredible wild river, wild water up there.

Tom Miller [01:43:04] But the mussels were thriving, and they had found their refuges, you know, the cracks in the boulders that were up in that area. But, you know, all that water was mainly coming from the Conchos. It was still coming to it at a certain time up until, you know, 1910 from the upper Rio Grande in the Rocky Mountains. But then it was cut off to just the Conchos. And then as NAFTA created these agricultural opportunities, you know, seven reservoirs are now on the Conchos.

Tom Miller [01:43:38] And so the flow ... for 50 years, Mexico gave us more than they ever had to. But for the last 20 years they've had a hard time giving it to us.

Tom Miller [01:43:47] And so that water level slowly has gone down. I know in my first time to Big Bend, I expected to raft the river. But instead, the guy had to paddle us through, you know. And as we went back later on with the researchers, what I personally found, I would investigate above where the river is, and I would find these ancient and huge hornshells, you know, that had been, you know, left without water.

Tom Miller [01:44:20] And so, you know, you've got to have the water for mussels to thrive. And with our demand, people ask me what's going to be the problem in the future. I feel it's water demand. Are we going to be able to have enough for us and the flora and fauna that are living in these rivers? So those are concerns.

David Todd [01:44:41] Well, it sounds like you've set up the whole stage set for what is affecting these mussels. And it sounds like water flow, quantity, is an issue. Water quality is an issue. I think I've read that the temperature and whether something has enough dissolved oxygen can be an issue as well. Can you talk a little bit about that?

Tom Miller [01:45:11] Yes. Most of my surveying and most of my work with the collaborators were, of course, in the field, the collection and the discovery. A lot of that, those tolerances, have certainly been investigated for many mussel species.

Tom Miller [01:45:29] The salinity, like I say, is very much a factor up in the Pecos, limiting mussels, maybe totally eliminating them.

Tom Miller [01:45:40] The oxygen levels - you know, when we look at springs and they're going to be bubbling, and the more, the more water flows over rocks or riffles or rapids, the more it has a chance to get in contact with the air and get oxygenated. The reservoirs are certainly going to be compromised. They don't have the aeration. You have depth.

Tom Miller [01:46:06] And then, of course, you got the silting and you back them up. I mean, Falcon itself, it's a 50-mile reservoir, you know, and so you've got silt coming in and smothering these mussels.

Tom Miller [01:46:21] But yes, and so where that plays an effect, I think is in one of the ones that's going to be declared this year, the Mexican fawnfoot. It lives, its preferred habitat is riffles, you know. It may end up in the bank, but that highly oxygenated and moving water, it's adapted to it.

Tom Miller [01:46:41] The hornshell can be found there, but it needs, it's in these refugia, in the crevices under boulders. They need some sediment and some clay to hold them there. And, of course, in the flows, where, you know, you can have a 65-foot wall of water coming on down, or you can be reduced to where in Laredo, we had no water three times in the 1950s. In 1953, there was zero water in the river for a month.

Tom Miller [01:47:19] So, all of our mussel fauna here dates from that era, you know, where it regained, there was fish in there that still were carrying glochidia. They were able to recolonize again. You know, there was maybe a few puddles, but one of the people that again, where we have the greatest population of hornshell, the ranch owner says, "Yeah, we used to drive our jalopies from our ranch down the riverbed to downtown. We didn't have to go on any roads."

Tom Miller [01:47:50] You know, it's amazing to think of that. You know, that these mussels still survive. You know, the droughts the '50s. And I'm sure.

Tom Miller [01:47:59] So, what did we do? Now, we built reservoirs and we smother what was remaining.

Tom Miller [01:48:03] You know, there's challenges.

David Todd [01:48:10] So, something else I've read about and you'd know so much more about is that there's some sort of hydrologic issues with construction near or in the river. I think you've mentioned these major dams at Falcon and Amistad. I hear that there is a weir proposed near Laredo, and then there have been suggestions of boat ramps for the Border Patrol. What sort of effect do you think those might have if they're built?

Tom Miller [01:48:39] You know, I think what was probably one of my most motivating factors was, you know, we do have an endangered species. And if this mussel is that rare, and if nobody else has found it, and it needs to be studied, and maybe it is a candidate for endangered species, then we have known in the past that these are special creatures. It takes a long time to get there. But if they are, then now we recognize that we do have to do something to at least maintain, to not harm to, you know, what can we do to get it back.

Tom Miller [01:49:24] And so, I was, you know, looking at that. And so, when Laredo was coming up with a weir idea. There have been many proposals. It's not, it just hasn't been one time. It's been proposed as long as I've been in Laredo. There have been different proposals for forty years. You know, some are closer to downtown. Because then wouldn't that be great if we have a bigger river here for recreation, but also more of a hindrance for people to cross.

Tom Miller [01:49:52] You know, different sorts of things.

Tom Miller [01:49:56] I mean, they got they got armed patrols down at Falcon now.

Tom Miller [01:49:59] But, you know, so this was a help to me, you know, okay, maybe it will be declared endangered and the weir could be stopped. You know, I wouldn't agree with it.

Tom Miller [01:50:13] For the most part, the more they got into it, the planning, the cost became more and more prohibitive. And so, I don't know if we're going to see more proposals. They certainly do.

Tom Miller [01:50:28] And, a whole new factor, and we can get into this a little later, is Border Patrol. You know, if Homeland Security wants it, they may just get it done. I don't know. I mean, there's some things happening right now. Yes, and you're talking about boat ramps. I have worked on salvaging mussels from the potential destruction as they improve boat ramps, as they put boat ramps in.

Tom Miller [01:51:00] We go ahead because they're bringing in air boats. I mean, this is how they do the river, and, they need a certain flat area with a ramp. And so, I mean, we got to the point where we had to do a cofferdam around it, but before we did that, of course, you're going to destroy mussels. So, you know, we would check out the shore. We would check out the shore. But, unfortunately, one time, it was in right where Nuevo Laredo is just a few hundred meters upstream, dumping the worst of the pollution. So, we didn't want to be in the water. So, they eventually had to hire a commercial diver - full-suit, full-face, communication. And we kind of directed it where we thought of it.

Tom Miller [01:51:44] And sure enough, he found some, you know. And so, they were there, and we moved them. We transplanted those endangered mussels.

Tom Miller [01:51:52] One thing, if I was still in the game, I would be trying to find out what running these airboats up and down the river twice a day. And these things create such a wake. And I can see the damage to the banks. And they're worried about Falcon Lake silting in and they're proposing tens of millions to dredge it out. There's no point in it. They're creating so much.

Tom Miller [01:52:25] And then, you know, it used to be when we were building our trail, U.S. Fish and Wildlife, even though it was an invasive species, Arundo cane, you can't cut it. You know, it's habitat for our jaguarundis, and our ocelots that can pass through here.

Tom Miller [01:52:44] And, you know, they've taken it all out, you know, for twenty miles, from one end of Laredo to the other on the river, that cane is gone. That cane was holding a huge bank of silt, which is all going to erode, you know. In fact, one of the older Border Patrol said, "Yeah, you know, that one big island we got downtown? That wasn't there when I came into the Service forty years ago." Oh, yeah, that's the cane. And this trapped the silt. And now you've taken the cane. Guess what's going to happen?

Tom Miller [01:53:17] They're changing the whole environment, as we speak. You know, I'm even wondering, you know, a few times I've kind of gone up to my old site where we had the marked mussels, and I flipped a few rocks to see. I've only found two or three with a number on, and that's not good, you know.

Tom Miller [01:53:36] So, the recruitment ...

Tom Miller [01:53:37] The dams are some of the worst things that could happen.

Tom Miller [01:53:44] They just did an elaboration on a railroad bridge. Laredo's expected to boom even more. We're 16,000 trucks a day now. Now, we're going to get 30,000. We just built a double railroad. They couldn't find another route. Nobody would allow them to go through Laredo again. So, they had to piggyback the railroad bridge. And, so, they had to look for, again, the mussels during the pilings there.

Tom Miller [01:54:15] They still may do another dam. The current project, costing a couple million, is an international park on both downtowns and ideally, they won't do any damage, you know, by putting in amphitheaters and... You know, but it's right there on top of mussels, I can tell you. You know, so we'll find out how it all works out.

Tom Miller [01:54:44] And we get calls, and I get calls,. Not many people have had experience handling this endangered species. Very few are licensed to handle it. I'm not. I'm under Dr. Charles Randklev's license. He gets calls and, in fact, I just had a call a couple weeks ago from a person who was doing work on the Border Patrol ramp north of town that they use.

Tom Miller [01:55:10] So, we'll have to see, but they are aware of it, you know, and now we're going to get two more species listed, and their habitat is really only Webb county.

David Todd [01:55:26] Well, I'm glad you mentioned this listing issue because I think you've given us the background to the problems that face the Texas hornshell and other mussels. And I'm very curious if you can walk us through the process of trying to recognize the risks that the Texas hornshell faced and then finally getting it listed, because I think it took almost 30 years. Is that right, starting in the late '80s.

Tom Miller [01:56:00] Very, very, very unusual. You know, when you get a proposal, you want to finish it within a 3- to 5-year timeframe, when it's proposed for listing. Unfortunately there wasn't, there hadn't been the research in Texas like we had talked about. But up in New Mexico, Dr. Brian Lane had, you know, I don't know if it was him in particular, but he was certainly made aware of the population in the Black River.

Tom Miller [01:56:31] And they, you know, I've got his file right here. It's probably, I don't know, half a dozen, ten papers, over 100 pages. And he did everything that you would want to do to be ready to list a creature that needed it.

Tom Miller [01:56:50] And because it was only found in a 17-kilometer stretch of the Black River, it was ready to be listed. You know, he had marked and recaptured. You know, they eventually continued that for fifteen years. He had done salinity studies. He had done glochidia studies. I mean, there was just volumes. And so, yes, it was ready to be listed in 1989.

Tom Miller [01:57:15] Well, Howell was being made aware. And like he said, he hadn't found the hornshell, you know, and I don't know why it was delayed beyond that period. You know, I don't think he had found anything in Big Bend. He had discovered historical records for, you know, the Rio Grande and for Mexico. But to a one, they still hadn't found a live one. They still didn't know if they were extant.

Tom Miller [01:57:51] And, about a year later, yes, we now we know they are alive. And, so now the process had to start again. Oh, wow, a new population. So, you know, I feel really bad for Brian. He eventually came down and we did some work up on the Devil's River, and he was

saying, "Well, this is very similar to his Black River - pristine, spring-fed river." You know, they had mussels.

Tom Miller [01:58:17] And up there, it's a very unique population that we eventually found - not in the regular refugia. That doesn't exist that much in the Devils, although I found the first one up there underneath a boulder. But we found them in kind of a ripple area. But the Devils River being such a spring-fed river, maintaining flows, at least a minimum flow, in spite of all the demand going on up there. The ripples are much more established. They're more mineralized. They can lock in, they're aren't going to be moved, you know. And so, they have been able to colonize a couple of those areas.

Tom Miller [01:59:01] And, so, you know, he had been down in that. We didn't know the full extent of the river. Based on the historical, it seemed like it was up the Pecos, it was up past Big Bend. It was certainly almost to the ocean, you know, in the lower Rio Grande. So it opened up a little bit more investigative progress needed.

Tom Miller [01:59:26] And the first ones, like I had mentioned, Alexander Karatayev and Lyubov Burlakova, were very much involved up at Stephen F. Austin in the East mussel fauna. They did get a contract to come down and investigate the Rio Grande fauna. And so, I was with them for four or five years. We even rented our own airboat. We put the Border Patrol's boat to shame. They found an alligator hunter up in East Texas who had a commercial thing going, and they rented him, and so we covered a lot of territory on our airboat.

Tom Miller [02:00:08] And now, with that, we knew the habitat. We saw the rocky cliff refugia-type area. We'd check it. "Oh. They're there. Okay, check it off." Move on to the next. And so, we were establishing where the live populations were.

Tom Miller [02:00:24] And so, you know, when we brought Brian and Dr. David Berg from Ohio, we couldn't find it in the Devils. It was all these pros, we still hadn't found that ripple habitat yet, you know. And so, you still get surprises.

Tom Miller [02:00:47] We did try to go below Laredo. Like I said, we found them, but they were all dead. And, below Falcon, a lot of the border trouble was starting then, and it wasn't a safe area to do research, and so we didn't know for sure. We eventually tried it, and I went down there on my own a couple of times and checked some nearshore. Never found anything. Yeah, I doubt if they're there, but maybe. You know, it's hard to say. I don't think so.

Tom Miller [02:01:23] So, you know, once we had that with, with Lyubov and Sasha, plus I, they were pretty much amazed at my volume of data that I had accumulated on my surveys of the shore and where I had found live. And, you know, we were able to pinpoint. And then with that, combined with mine, the first real paper, you know, that we wrote came out, describing that the population is reduced. You know, they're just not there. I think we estimated 25% of the area left and might still have some. And so that was another push towards it.

Tom Miller [02:02:08] Still not quite. Now we need to know, like you were talking about, now we need some laboratory studies. And because if it gets listed, you also got to have the recovery plan in mind. And, Dr. Charles Randklev, Texas A&M Research Institute. Within the next research, I was able to, privileged to collaborate with. Luba and Sasha were wonderful. I worked with them. They're up in New York now. He's director of the Great Lakes Research Station out of Buffalo.

Tom Miller [02:02:43] And, they're still doing some. But I went up there. I did a little work on one of their rivers and worked with them a little bit more.

Tom Miller [02:02:51] And Charles invited me to a few places, too. And I've done some work in East Texas. You know, it's an interesting group, these mussel heads, you know, that you become associated with. But Charles and with his group, he's always leading proteges to bring them into the field and get them started.

Tom Miller [02:03:16] And, of course, a lot more genetic work is being done. And this is kind of, I think, threw in a lot of the monkey wrenches, too, is that do we know what we're studying? You know, at one time, Cummings up in Illinois has tried to do a worldwide survey of mussels. And at one time, there was over 5000 names out there. They've reduced it to less than a thousand, you know, and so because you get to a new river and they have the habitat, maybe they got a little bit elongated, maybe they got squatter because of the conditions - less current, you know. So there's the river morphs, you know, that you can get into.

Tom Miller [02:04:03] And so, people naming them all through the 1800s. I mean, that was a great time of discovery and naming, naming things, you know. And, so we had to work through that. In 2011, we put out a nice poster, I think, 15, the most 15 threatened mussels in Texas. Well, there's eight or nine of them that have changed, you know - their genus, certainly, some even species and, you know, and now we're, you know, so we've lumped, we've split. And, you know, this one is similar to the ones in Arkansas. What is the one in Arkansas? Okay. So it's not endangered in Texas, you know.

Tom Miller [02:04:42] So, there's been a lot, you know. The genetics is a whole brand new field throughout the world in every kind of biological aspect. And in mussels, it's certainly affected us too. But the hornshell is unique, you know, at least we thought. But there were records for Mexico, and that led us to the last adventures in my mussel saga, you know. But, after that, then now we have it, you know, we were more thorough. Not, you know, like with when we surveyed so many with Lyubov and Sasha, you know, we were just checking for hornshell.

Tom Miller [02:05:24] With Charles now, we want to get the whole fauna. And so every spot that we went to, we checked for all types of mussels, in all types of habitat. And, you know, we were able to accumulate the data necessary for these next two also, to become listed - the Mexican fawnsfoot and the Salina mucket.

Tom Miller [02:05:43] But, so, it took that.

Tom Miller [02:05:45] So finally then and we had the conferences in New Mexico and in Texas, you know, get the public input, you know. Will it affect me? How will it affect me? I think that's why the hornshell went through - the first one in Texas. Nobody owned it. You know, it's international, to its detriment too, you know. And so, it's not going to seal off anybody's ranch. It's not going to, you know, make them feel uncomfortable that they have an endangered species. Although we still weren't allowed in some ranches because you never tell them you're investigating for endangered species. You tell them we're looking for mussels. You know, you got to watch sometimes what you're saying. And, you know, so that was, that was part of it.

Tom Miller [02:06:34] But 2018, it was clear that the hornshell needed listing. And so it was. It became the candidate at that point. The other two, I think, you know, I haven't read the official word, but they should be also listed by now.

Tom Miller [02:06:52] The recovery plan is a touch and go part of it. How can we recover this? This mussel has been literally in this Rio Grande drainage for millions of years. You know, one of the genetic studies separated the Black River mussels from the Devils River mussels by hundreds of thousands of years, based on, you know, of course, the mutation factor that that you can find indicated in the genome. Which is, you know, it's fascinating stuff. It was beyond what I had been able to study. But I love reading about it and seeing how these things are done. In order to do research now you have to have that type of background. And that's where the leaders of this whole process are going.

Tom Miller [02:07:41] I might go to the seminar of the Freshwater Mollusk Conservation Society of America, and they, you know, they're looking at not only river mussels, but also the snails. And we, you know, in some of our cases, especially in springs, you have such endemics, you know, that are found in such a small area. It's just amazing, you know, how they have survived, you know, but only because they're in a special habitat. And, you know, like, that's the future.

David Todd [02:08:15] Well, and so, I think you've indicated some of the problems facing the Texas hornshell. And I guess the flip side is that if maybe you can turn around some of those problems, and maybe that's part of the recovery plan, but I, I wonder if you could maybe lay out a little bit more about how these Texas hornshell can be protected and restored.

Tom Miller [02:08:40] There wasn't really much we could do. Like I say, where they are found, those are the only places where they're found. And so, those are the only suitable places that they are. So, it's not like we can recover a part of a river yet. In fact, this is what we're trying to do. We're monitoring the population up in the Devils River every six months, you know, going and doing the recount. We haven't done enough of the work. We do have some environmental monitors monitoring - river flow monitoring, oxygen monitoring, salinity, you know.

Tom Miller [02:09:18] Will these factors change? All we can do is, "Hey, wait a minute. We got a population here, you know." So we got to hold on to what we got.

Tom Miller [02:09:27] The only thing that I could offer when we were talking about recovery plans was that we did find, you know, dead, and, maybe, you know, not so long dead, below Laredo. I mean, the habitat is there. You know, I believe it was the the anthropomorphic change that the additional sewage has put in. We built them, so we reduced it to two million gallons a day. They, just in the last year, with these incentives, and also, again, because we're trying to do some more work in Laredo, they're going to hopefully correct the remaining problems with the Nuevo Laredo sewage system. Maybe we will get all treated sewage. You know, it could be a pipe dream. But if that happens, then I would say, yes, we can do some recovery.

Tom Miller [02:10:26] Up in Minnesota, and in in a lot of areas out east, they're so far ahead, which will benefit us eventually. But they have identified, you know, seventy endangered species of mussels, and a lot of them are in propagation labs, and they are creating hundreds, if not thousands of glochidia that they're raising to a juvenile stage and even beyond, to be released into these riverways.

Tom Miller [02:10:54] So if the river is still, like the St. Croix, we can, even though there had been a dam, maybe we can remove it. You know, they are looking at this. Or maybe we reintroduce a fish. We have some fishes that, one of the ones that I know in New Mexico they've looked at - the blue sucker. We had them here in the Rio Grande, but they are not here. They're only above Lake Amistad. Why aren't they here?

Tom Miller [02:11:22] I found hundreds and hundreds of Salina mucket dead shells here. Long dead. Why aren't they here? Why can't we reintroduce that here? Are we missing the fish?

Tom Miller [02:11:32] And so, we have to look at it in a lot of ways for a recovery. Are the fishes there? Is a habitat there?

Tom Miller [02:11:40] You know, we can propagate mussels. We even looked at that at the end of our listing program. Do we turn my Center into a propagation lab? I was looking at the possibilities. In fact, I tried to. They just got a nice grant up in Minnesota on the Mississippi River to do some propagation work.

Tom Miller [02:12:04] So, there are there are ways to bring them back. We've found that we can do that. We just have to find a suitable habitat to reintroduce them.

David Todd [02:12:17] Well, you know, it's interesting how I think you've just been focusing on the Texas hornshell while we've been visiting, but I think you mentioned in passing that there are lots of mussels out there. Many of them are rare or threatened. And I was wondering why you think this large group of organisms, many of which are millions of years old, are struggling?

Tom Miller [02:12:47] We go back to those basic two things. We have the quantity of water and the quality. But you know, some people's solutions to water shortages are build more reservoirs, and we cannot do that. I think overall we've proven that they lose more water than they're ever going to save. Yet they might save it in that drought time. And that's what I guess concerns people. But it's wasteful. It's a waste of water, you know, in some ways to put a reservoir in. Plus, it's incredibly harming to the natural environment, including these mussels.

Tom Miller [02:13:30] So, we're going to face some great water demands in the very near future. We became very concerned. We don't even know about fracking. It had been going on for two or three years in our area, and it wasn't until a spill of some of their waste material, brought back up, spilled on a downtown street that we, "Oh, you're bringing it from North Webb County down to a well in South Webb and Zapata county to get rid of it in a disposal well. And so what's going on?"

Tom Miller [02:14:10] And we find that they're using four acre feet of water in fracking these wells - a tremendous amount of water. And then they're you know, it's all privileged information. But there's 70,000 pounds of chemicals that they're adding into the hundreds of thousands of pounds of sand into this water use under high pressure and great temperatures. And then that's coming on up.

Tom Miller [02:14:36] And, you know, where are they getting the water? You know, it got so bad that IBWC, International Boundary Water Commission, were asking me if I would see any new pumping facilities on the river, let them know. Of course, I think there's other ways of

doing it now. You know, you've got a lot of Border Patrol helicopters, and we got drones now. But yes, I did tell them about a couple new pumping stations north of town.

Tom Miller [02:15:03] You know, do they have the rights? I mean, some and of course, these landowners do. They can use the water. They if they have water rights, they can use it for whatever they want. Some people got into selling water. So, that's going to be a real factor, I think, as we continue to do some of this.

David Todd [02:15:24] When you think about these mussels, do you see them as having a value as a kind of canary in the traditional coal mine, or do you think that they are just, you know, interesting and valuable in their own right? Or do you see them as being an indicator of larger changes?

Tom Miller [02:15:45] All of the above. I mean, yes, they certainly, after that 100-mile segment, Webb County is the main area for mussel diversity of the whole Rio Grande. There is no better place. And that's all because the water quality coming in had remained pretty good. After Laredo, not so good. So they can tell us that. You know, as far as are we getting good quality water? Yes.

Tom Miller [02:16:16] You know, they have belonged.

Tom Miller [02:16:21] And then, of course, we have to find a value for things, unfortunately.

Tom Miller [02:16:26] But yes, as far as biomass, when you consider the biomass of their shell and the animal, they can be the largest component of many rivers and streams. This is what, especially out east, where the greatest mussel of the fauna maybe of the world exists - off of the Appalachians. These 300 million year old river systems that have developed through the eroding of the Appalachian Mountains have created tremendous variety of habitats, you know.

Tom Miller [02:16:57] And, they will indicate evolutionary trends. They can teach us a lot about how things, like I say, they started in Pangea. They were brought, we have identified the marine mollusks that they probably evolved from. They got a little bit more used to the change of salinity.

Tom Miller [02:17:24] You know, the mystery of how the fish became the carrier that is just to me is ...

Tom Miller [02:17:29] And then the lures that they create, you know. They're fascinating creatures in their own right. They have created lures that look like worms, that look like swimming fishes. One even has one that look like a crayfish. You know, they can do mantle formations that are just incredible to attract the fish host.

Tom Miller [02:17:51] How long did it take, you know, to get there? Incredible examples of evolutionary commensalism. Fascinating. So they have they have that value.

Tom Miller [02:18:04] They will always be valuable for pearls, you know, and their substance. I mean, you see some of them, especially the ones coming out of China, another great. And maybe right now I was just reading where they first started evolving might have been in the Mekong and in the rivers of China just before, 180 million years ago, just as Pangea was now starting to break up. These geneticists who are studying, you know, have

look at the Unionids. And when you look at the Unionids of which most of our mussels belong, there's over 600 species. That's the greatest diversity of any mollusk, you know, are these unionids. So, I mean, they have taken a long time to evolve, and they were there at the start of freshwater systems.

Tom Miller [02:19:02] So they have a great value we'd be missing, an inheritance that is just incredibly valuable.

Tom Miller [02:19:11] So they're fascinating to study.

Tom Miller [02:19:14] Yes, they have value.

Tom Miller [02:19:15] They have biomass.

Tom Miller [02:19:17] I mean some people are looking at their filtration. If we would have them as a filter. But do we need to pay for filtering our water? Can they be worthwhile in that way? So there are people looking at this aspect. How much are we gaining from them filtering the water for us, you know? So, there is a value possibly in that way of looking at it.

Tom Miller [02:19:43] So, there'll be other things.

David Todd [02:19:46] Well, you know, they clearly have lots of value in many diverse ways. But they are such a different creature from ourselves, our eyes and ears, and nose and legs. And, you know, they are very foreign. But I'm curious if you feel like there's some kinship there. You know, we, people are supposedly given the rights to the soul. Do you think that a Texas hornshell has a soul?

Tom Miller [02:20:20] You know, like I said earlier, I was marked by a mussel, you know? So, I've carried a scar. Maybe I was meant to study this hornshell. Why did those teenage students not send me that mussel, you know? Why did I get motivated? You know, why did I end up here at a special time when, you know, when they couldn't find them? You know, why was I the one? U.

Tom Miller [02:20:50] So, yes, there's got to be something there, you know? And, of course, I collected so many dead ones, you know, and they're in my gardens. They're in my flowerpots.

Tom Miller [02:21:04] And, you know, now they're endangered. So, boy, now I can't even handle them myself, you know.

Tom Miller [02:21:13] So. Yeah, there is I guess a reason why I had to start off that way and why I ended up in Laredo the way I did.

Tom Miller [02:21:21] And, you know, it was a wonderful thing, you know, not only having the challenge of the Nature Center and all that that gave me, you know, when everybody came through and they were so excited to see the alligators and all the other animals and fish and of course, a lot got a good talk on mussels, too, you know, and I had examples of them here, and I had aquariums of them. You know, so, there's a lot of people have become aware of it.

Tom Miller [02:21:51] So yeah, there was there is something sympathetic with these mussels.

David Todd [02:21:58] It's nice to have that connection.

Tom Miller [02:22:01] Well, it sounds like your connections are pretty broad. I mean, you just mentioned alligators and fish, and I know that you've raised bobcats and javelinas and raccoons and coatis and turtles and snakes and I wonder what it is that interests you in this whole living world and what sort of feeling you get from being a steward of them.

Tom Miller [02:22:25] Yeah. So very fortunate. Like I say, why I became a biologist anyway was where I first started working, and I saw that happen when I was able to run some intern programs, up to 16 interns a semester. And I would take them on, you know, we'd go camping every semester somewhere on the Rio Grande - Seminole Canyon, Devils River, Boca Chica. I mean, I we camped right where they're launching rockets from. That was one of my best sites to go down to the river mouth, you know, and do some research down there with them.

Tom Miller [02:23:04] And it turned some of them. They became biologists, you know. And I got teachers in the high schools here. I've got, you know, like I say, I've mentored master's programs. I've worked with some Ph.D. students, you know. They've seen and, of course, even the young ones have seen our animals here.

Tom Miller [02:23:30] We don't have anything in Laredo. You know, it's hard. You know, we have to be licensed by the state to put these creatures on display. We have to note their habitat. We have to know if they're feeling comfortable or not. And, you know, if they are or not. You know, I have to check. You know, these animals that we had got special privileges. They got vet visits. They had a good regular diet.

Tom Miller [02:24:04] We've got a javelina right now that's over 20 years old. He was my pet. He still had his umbilical cord when the game warden brought him in and said, "You want this little animal? I said, "Man! He looks like he's a baby." He was at my house for six months. We had to give him bottles, you know, every so often. And you look at them. He'll snort at me. But once he smells me, he still recognizes me. You know, it's pretty interesting. I used to take him out for hikes. Used to call him back, you know.

Tom Miller [02:24:40] ...Our bobcat

Tom Miller [02:24:40] I mean, so I've been very privileged to work very intimately with some of these creatures. And, you know, that out in the wild, they have their personalities, they have, you know, their likes and dislikes, and every one is a different creature, you know.

Tom Miller [02:24:56] So we have to understand that we share this world with them.

[02:25:02] You know, it's hard.

Tom Miller [02:25:05] I've been a long time, uh, donor to the Nature Conservancy. They've made me a kind of a legacy member. You know, so I get I have my own concierge, you know. And we visited during our research a lot of the Nature Conservancy spots. In the Devils River, they have a great place. And on the Pecos River, they've got some wonderful places.

Tom Miller [02:25:27] And, you know, because if we're talking about animals and their habitat in Texas, you've got to, you know, put up or shut up, you know. So put that money up, you know. And that's what they do. They buy these place. If it's worth having, they buy it.

Tom Miller [02:25:45] And, you know, then they persuade - you know, up in the Devils River area, they've got, I don't know, 65,000 acres that they've got environmental easements on. They got that place where they actually bought right above the best waterfall in Texas, the Dolan Falls, is theirs, you know.

Tom Miller [02:26:04] So, you know, things like that. You know, you've got to be aware of.

Tom Miller [02:26:10] Sierra Club - fighting for, you know, the rights of all of us. And sometimes, you know, we have to, uh, look at how we preserve systems. You know, and I think we've come to that.

Tom Miller [02:26:24] So, you know, I've been lucky. I've been lucky.

Tom Miller [02:26:32] I guess right now, you know, I'm doing a lot of birdwatching, and we have a bird festival here in Laredo. And I lead kayak trips, you know, to go birding on that. And that's a special thing. And I know I'll be doing this a lot more.

Tom Miller [02:26:51] You know, I used to do a lot of canoeing up in the Boundary Waters on the Canadian border in Minnesota. And, we used to see moose, and I would hear wolves. My brothers have seen bears. I haven't, but, you know, you have unique places that need preservation. And, you know, there's so much.

Tom Miller [02:27:12] But birding, I think, you know, I've turned a lot of people on. This is the, I think, a first start, the easy start. And now we know that three billion birds have been lost in North America since the '70s. And I look at glass, you know, and we look at habitats. You know, we're preserving all these habitats. You know, if we do something good for the river, we're doing some good for birds, too.

Tom Miller [02:27:37] You know, there's so many things. You know, we have to look at it as a whole.

David Todd [02:27:43] Yeah. You seem like you have that very special sort of holistic view where, you know, things down to something very small, but you see that whole connected system.

David Todd [02:27:54] Well, let me just ask one last question. We have covered lots of ground. Thank you. I'm wondering if there's anything that you feel like we've missed, that we've somehow skipped over that you wanted to mention before we wrap up?

Tom Miller [02:28:10] Well, you know, you had mentioned up in New Mexico, there's an organization up there, and it was interesting. I did a little bit of research on them. Oh, what are they called?

David Todd [02:28:26] CEHMM?

Tom Miller [02:28:29] And I looked at it, and I want to discuss this further with my group here, the Rio Grande International Study Center. But I think one of the big differences ... They're ... I've been asked to do the Rio Grande cooter. You know, they got the Texas hornshell, the Rio Grande silvery minnow. You know, these are creatures up there.

Tom Miller [02:28:56] And I think through their efforts, they have raised the awareness of their endangered mussel that they now have. It is the only mussel in New Mexico that's extant. And so, it seems like they have really built upon that. They've built a lot of services and they, they've been able to understand.

Tom Miller [02:29:21] We have the Christmas bird count, the Audubon Christmas bird count. And I was out in Love Creek, the Nature Conservancy there. And I was able to talk to a person who's transferred his love into wildlife management. And the state has allowed ranchers to get wildlife exemptions. And so I was exploring this with him. And this is, I think, what we have to do more in Texas. This is the only way we can preserve our wildlife in Texas. You know, Nature Conservancy is buying. The state of Texas has allowed some exemptions to go through. Each county has their own wrinkle on that. So he's got to work with a different agency.

Tom Miller [02:30:03] But it was fascinating to talk to him and how much land they have preserved in the county that I'm now moving to - the Bandera county, that western part is full of a lot of easements, that he's worked on.

Tom Miller [02:30:19] And, their Love Creek, Nature Conservancy - is very close to a large Maple State Park. And so we're in a really interesting area. I'm looking forward to some challenges in helping people work on these things out in that new area.

Tom Miller [02:30:40] I also, of course, will always have my fingers down here in Laredo to see if we can keep things going on the right track. There's going to be so many more challenges ahead as this town grows. And, we have this additional factor. In New Mexico, you know, you have a state. We are international here. And so, the mussels in our Rio Grande, they are, you know, subjected to two countries' feelings about them and regulations about them.

Tom Miller [02:31:13] In our last, you know, work because back in 1907 and 1911, Hinkley discovered, you know, mussels in Mexico. I think probably back then, he was looking for more sources for buttons, but he was, I guess, hopping railroads, he'd get on and off railroads and go jump in rivers. And he found the first mussels that are documented historically, including what he was calling the Popenaias, the hornshell.

Tom Miller [02:31:42] And a young man in the '70s went back, Daniel Bresee and he also found. And so when we went down there, to see, "Well, what is this? If we're going to declare it endangered, we better find out in Mexico if it's still there."

Tom Miller [02:32:01] And what we found was, no, it wasn't. So the Texas hornshell, in fact, we found two that could be called Popenaias and the one, brand new to science, we're going to name it for Dan Beresheet. So, uh, that's what's going to happen with that, with that mussel. So, you know, that was pretty interesting.

Tom Miller [02:32:24] So, now we know hornshell is in the Rio Grande. We got to take care of it here.

David Todd [02:32:31] Well, thank you for taking care of your home, whether it be in Laredo or Bandera or up in the Big Bend or up on the St. Croix.

Tom Miller [02:32:41] Yeah, I'll be up there too. And when I go back, I still snorkel that same spot and they're still there.

David Todd [02:32:49] That's good. Well enjoy yourself.

David Todd [02:32:51] Thank you so much for your time today. Really enjoyed visiting with you and learned a lot.

Tom Miller [02:32:56] Thank you so much too, David. I appreciate you doing this project. It's been really nice and I wish you continued success.

David Todd [02:33:04] Thank you. Thank you. Well, you too. Take care.

Tom Miller [02:33:07] Good. All right. Thank you know.

David Todd [02:33:09] Bye now.