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David Todd [00:00:02] All right. Good morning.

David Todd [00:00:03] I am David Todd, and I have the great privilege of being here with Bob Howells.

David Todd [00:00:09] And with his permission, we plan on recording this interview for research and educational work on behalf of a small non-profit, the Conservation History Association of Texas, and for book and a website for Texas A&M University Press, and finally for an archive at the University of Texas, Briscoe Center for American History, here in Austin.

David Todd [00:00:32] And, I wanted to emphasize that he has all rights to use the recording as he sees fit. It is his.

David Todd [00:00:39] And with some of that little short introduction, I wanted to make sure that's okay with you, Mr. Howells.

Bob Howells [00:00:46] Absolutely.

David Todd [00:00:47] Okay, well, let's get started then.

David Todd [00:00:49] It is Monday, January 15th, 2024. It's about 10:15 in the morning, Central Time.

David Todd [00:00:56] My name, as I said, is David Todd. I am representing the Conservation History Association of Texas, and I'm in Austin. We are conducting a remote audio interview with Bob Howells, who is based in the Kerrville area.

David Todd [00:01:12] Mr. Howells is a fisheries biologist, and he has worked for, a nonprofit, the Cleveland Museum of Natural History, for consulting firms, Ichthyological Associates and Biostudies, and a state agency, Texas Parks and Wildlife. While he was at Texas Parks and Wildlife, he served at Heart of the Hills Fisheries Science Center, from 1984 through 2006.

Bob Howells [00:01:37] Mr. Howells is particularly knowledgeable about invasive exotics and freshwater mussels, having written the book, "The Freshwater Mussels of Texas" and "The Guide to Identification of Harmful and Potentially Harmful Fish, Shellfish and Aquatic Plants Prohibited in Texas".

David Todd [00:01:55] He is especially noted, and this is relevant today, as an expert on the Texas inches, an endangered freshwater mussel native to the Rio Grande watershed.

David Todd [00:02:06] Today we'll talk about Mr. Howell's life and career, so far, to-date, and especially focus on what he can tell us about the Texas hornshell and other freshwater mussels in the state.

David Todd [00:02:20] S with that very brief introduction to you, skimming the surface, I was hoping that you can now help us dig in a little bit and perhaps start by telling us about your childhood and early years, and if there might have been some influences for your later interest in the natural world.

Bob Howells [00:02:40] Well, I guess as a youngster, some of the first things I remember is going fishing with my father and grandfather, I thought this was fabulous. This is something I'm interested in.

Bob Howells [00:02:52] One grandmother had an aquarium of guppies in her dining room and I thought that was just amazing.

Bob Howells [00:02:58] As a youngster, I said, I want to be a biologist. I see students in college who don't know what major to declare. I never had a doubt. This was it.

Bob Howells [00:03:10] My father raised rabbits. My grandfather had a pet raccoon.

Bob Howells [00:03:15] Exposure to nature, that sort of thing.

Bob Howells [00:03:18] One of the things my father and I did, again back in the late '50s, starting in the early '60s, was, raise tropical aquarium fish for sale to the local pet stores. I had no idea that years later, how to handle fish eggs and fish larvae would have a lot of professional relevance. I was working with biologists who, despite college degrees, had never been trained to deal with those things. And here, because of something I did as a kid, I knew what to do.

Bob Howells [00:03:50] So it got started very early. There was never any doubt what path to take.

David Todd [00:03:55] Well, you know, I'm curious your experiences with your father and grandfather, your grandmother, all of whom have had this sort of hands-on experience that they were conveying to you for handling animals. Did they ever talk to you about why? And, you know, or was it just unspoken? Here's what we do.

Bob Howells [00:04:16] Well, I think part of it, part of it probably sprang out of the Depression era where everybody had a garden. You raised some rabbits or chickens or something. You went hunting and fishing. Basically, times were terrible. But, at least in our families, nobody was starving to death. And it just kind of perpetuated even long after World War Two, and the Depression had ended. People still tended to carry on some of those behaviors.

David Todd [00:04:48] I see: sort of good habits of being self-sufficient.

Bob Howells [00:04:52] Right.

David Todd [00:04:54] Well, so, maybe you could tell us about any people or events, in your early life, that might have interested you in animals and nature and science and particularly mussels.

Bob Howells [00:05:06] Well, actually, the mussels are kind of interesting because back then, there were no good, good lay-level books on freshwater mussels. They didn't exist. The few technical books, and there were very few, were almost impossible to understand. So, specific to freshwater mussels, that took a while to develop.

Bob Howells [00:05:30] Although work in other mollusks came in. We, at one point, I guess I was probably in the eighth grade, took a trip down to the Outer Banks Islands of North Carolina, and not only collected shells on the beach, but there were shell shops selling seashells and such.

Bob Howells [00:05:49] Actually worked with some commercial fishermen that were netting off the beach there. We'd get up in the morning and go down, and here's this kid in the eighth grade handling pufferfish or helping them drag a big shark back to the water. And again, it was, this is what I want to do.

Bob Howells [00:06:05] When I hit high school, I started in high school biology and they had a science fair. It seemed reasonable: the first science fair project I did was on mollusks, including some freshwater mussels, but really covering all of them, and it went very well.

David Todd [00:06:24] That's great. It sounds like this goes way back in your life.

Bob Howells [00:06:27] Oh, yeah. Actually, some of the specimens from that science fair project have, within the last year, been shipped off to the scientific collection at UT-Austin, at the Texas Memorial Museum. Same specimens from those days long ago.

David Todd [00:06:44] That's great. Well, they'll be shared with maybe more kids in eighth grade who'll be interested.

Bob Howells [00:06:51] Exactly.

David Todd [00:06:51] That's wonderful to pass that on - down the daisy chain.

David Todd [00:06:56] Did you find that there were any classmates or teachers that you might have met in grade school or at Youngstown State University, where you attended college, who, you know, encouraged this same interest in mollusks and animals in general?

Bob Howells [00:07:10] Well, I had a particularly good science teacher in biology, in high school. Then, when I got to college, they had just started a program, a senior graduate class in aquatic ecology. I managed to get in it as a sophomore. I'm not sure I was even supposed to be there. Hit it off well with the professor. Dr. Lauren Schroeder, and the following year, as a junior, I'm winding up teaching the lab for him.

Bob Howells [00:07:42] So, it just opened up whole new horizons of where the science of this could go beyond what I was doing, you know, as an individual, a novice at home.

Bob Howells [00:07:54] And, then working with some of the other professors, I wound up doing, actually, a project with an odd color variety of red-backed salamander for one of the professors and worked with water mites with one of the other professors.

Bob Howells [00:08:13] So, again, the university really opened up a lot of directions that prior to school, you wouldn't be aware of.

Bob Howells [00:08:21] When I started working for the Cleveland Museum of Natural History, in the early 1970s, my boss, Mary Flahive, was in charge of education there. I was actually with the education department. This was wonderful because you wound up rubbing shoulders with big names in the scientific field. I ran audio and lights one night for Jane Goodall. And, you know, other names like Carl Sagan - I would work, ran lights with him and interacted and that sort of thing. So, you meet some of these big guns in the field of science, and that was just wonderful. Everything took off.

David Todd [00:09:05] That's great. It sounds like, you know, during these years, you were plugging into this whole academic world of individuals who are doing research in the field and in labs. That must have been a pretty mind-expanding experience.

Bob Howells [00:09:22] That's a good term. It was very mind-expanding.

David Todd [00:09:26] Well, so some people, um, you know, aren't fortunate enough to actually meet people in person, but they, they rely on books and TV shows and movies. And I was wondering if any of those programs might have helped introduce you to the natural world and to mollusks in general.

Bob Howells [00:09:43] Yeah. Again, probably the first books that got my attention as a youngster were Golden Press's Golden Nature Guides. There was a whole series of them. These were wonderful books. I wish they'd have written more, and I wish they'd have been bigger and had more in them.

Bob Howells [00:10:00] Then a little later ran into the Peterson Field Guide series. There was a particular one by a fellow named Conant on reptiles and amphibians. It was just absolutely amazing. The Peterson series put out a book on seashells, but they did nothing on freshwater mollusks at all. So again, it was just nothing good to get ahold of to help you study these at the time.

Bob Howells [00:10:30] A lot of freshwater mollusks I collected, say in high school, I was out of college before I finally had the literature to be able to identify them.

David Todd [00:10:42] That's amazing. I mean, it sounds like this was a field that really hadn't opened up yet. And you were right there at the outset.

Bob Howells [00:10:50] Yes, yes.

David Todd [00:10:53] Well, and then what about TV shows? Is there anything there that might have been a good introduction for you?

Bob Howells [00:10:59] Well, I'm trying to think. Walt Disney, back in the early days, produced a lot of good nature series that were amazing. And, there was Marlin Perkins, and Wild Kingdom was on. And things like that gave you a little touch into the outdoor world.

There was also, I think it was called, "The American Sportsman", where you would see a lot of hunting and fishing, that sort of thing. That always drew my attention as well.

David Todd [00:11:32] Okay. Well, it's wonderful to see the building blocks of your interest and your career.

David Todd [00:11:39] You know, one of the aspects of your life and research and protection of animals that we're interested in is, of course, the Texas hornshell.

David Todd [00:11:50] And I was hoping that you might be able to just give us a lay, you know, "101" introduction to the Texas hornshell's life history and its ecological niche to help orient us.

Bob Howells [00:12:05] All right. Well, Texas hornshell is a group of freshwater mussels. And these are really quite different from marine mussels that you'd eat - a totally different group of animals. And the family they're in is called Unionidae. And so, a lot of times you'll hear us refer to them as unionids. If you say that, you mean a freshwater mussel.

Bob Howells [00:12:27] Texas hornshell lives in the Rio Grande and its tributaries, as far as we know, exclusively. .

Bob Howells [00:12:37] Marine mussels grow attached to things. Freshwater mussels, different beast, literally dig into the substrate. So, you find them in areas of sand, gravel, mud, that sort of thing. You will not find them in places where there's solid bedrock, or where there's deep shifting sand that moves around, or where the silt is so deep, they sink and smother. You've got to have just the right type of bottom.

Bob Howells [00:13:04] And then often associated with cut banks or boulders, you may find them in pools, in flowing streams, but they're flowing-water animals. You will not find them in impoundments and reservoirs, and there aren't any natural lakes within their range.

Bob Howells [00:13:23] And curiously, there were two odd specimens, one found in the upper Llano and one in the South Concho River, collected by good biologists. And, how in the world those shells got there remains a mystery. There are no populations there, but that is kind of unusual.

Bob Howells [00:13:41] Freshwater mussels, all of them really, are filter feeders. They're Mother nature's biofilters. They sit and pull phytoplankton and zooplankton, organic particles out of the water, literally cleaning it.

Bob Howells [00:13:55] They have distinct male and female sexes. In some species, you can, they're physically different. You can pick up the shell and know, "Ah, this is a female" Texas hornshell, not so much. But there are unique males and females.

Bob Howells [00:14:10] The females have pouches on their gills called marsupia, where they hold their larvae and their eggs. The larvae are called Glochidia, comes from the Greek word for thistle, because some types have little spines on them at that early stage - Texas hornshell doesn't.

Bob Howells [00:14:29] But the Glochidia are parasites on fish. Without the right species of fish, in the right place, at the right time, the mussel can't successfully reproduce. So, what the

Texas hornshell does is it releases, the female releases these Glochidia in literally nets of mucus. And fish, particularly suckers, like carp suckers and redhorse suckers swimming along the bottom, tangle up in these mucus nets and the little Glochidia attach to their faces, and stay there for several weeks until they transform to juveniles.

Bob Howells [00:15:11] Texas hornshells do not crawl around and move much - a few feet, a few yards - not much. But instead their distribution is through the larvae on infected fishes. Wherever the fish swims, that little juvenile may drop off in a new environment and start a new population.

Bob Howells [00:15:32] So, one of the things we've seen with efforts to preserve Texas hornshell populations are you have to protect the fish as well.

David Todd [00:15:45] So, the fish are sort of the vector for these mussels to move around.

Bob Howells [00:15:50] Correct.

David Todd [00:15:50] And maintain their range.

David Todd [00:15:52] Okay.

Bob Howells [00:15:53] Correct.

David Todd [00:15:55] Well, this is fascinating. What a wonderful world you're introducing us to.

David Todd [00:16:01] So, one of the things that I think would be intriguing to understand in this course extends beyond Texas hornshells, but is to understand more about the sort of ancient history, human history of interactions between people and freshwater mussels. It sounds like this goes back a number of years and has a pretty interesting history to it. So, maybe you could tell us more about Spanish history, Native American history with freshwater mussels.

Bob Howells [00:16:34] An interesting thing that happened to me when I started working with freshwater mussels in Texas was archeologists came out of the woodwork going, "Thank goodness we've got somebody who can identify the shells that we're finding". And, so I wound up doing a lot of archeological work on the side as well.

Bob Howells [00:16:53] Yes, Native Americans harvested freshwater mussels for food, for ornaments, for tools, decorations - a variety of reasons. So, you find them at archeological sites.

Bob Howells [00:17:09] Texas hornshell was not one of the major focal species of harvest. Also, its shell is not as thick and heavy as some, so it doesn't preserve or survive into the present from distant past as well.

Bob Howells [00:17:27] But, freshwater mussels of a lot of types do turn up at archeological sites and again, for many reasons.

Bob Howells [00:17:36] Interestingly, freshwater mussels can produce gem-quality pearls. Among the mollusks, there are only two types of mollusk that have glossy nacre, the material

that lines the shell, and can produce an iridescent mother of pearl - one are freshwater mussels, and the other marine pearl oysters. Others, like marine giant clams, may make a pearl, but it's a golf ball-sized chunk of calcium carbonate. It's not a gem-quality pearl.

Bob Howells [00:18:09] The Spanish reaching Texas realized that some of our mussels were producing pearls and literally went into some areas looking for freshwater gem-quality pearls. We've got some, particularly in southwest Texas from the Brazos and Concho on down, that produce some, a significant number of pearls. And so, they actually were an element of exploration motivation during the Spanish colonial period as well.

Bob Howells [00:18:37] Unfortunately, again, Texas hornshell isn't known to produce pearls, and it was never harvested by anybody for that particular reason.

David Todd [00:18:48] Well, it's intriguing, I think that that you had mentioned in some correspondence earlier how valuable pearls were in the, I guess, 17th century, 18th century. It really drove a lot of exploration. Is that right?

Bob Howells [00:19:03] To some extent, yeah. Again, I'm not sure how well it was recorded, but certainly some of the Spanish exploration: the Rio Concho is "river of shells". They were in there looking for what we now call "Concho River pearls".

David Todd [00:19:21] That's fascinating. Something that really was, was so appealing to people that they'd go hundreds of miles, you know, trekking over the wilderness, trying to find them.

David Todd [00:19:35] Well, maybe you can bring us up to, I guess, more recent times, late 19th century and into the 20th century, where there were new uses for shells and for pearls that might have driven some harvest and human interest.

Bob Howells [00:19:50] Actually, what got scientists really focused on freshwater mussels in particular ... well, again, there have always been, around the country, some sites where there were pearl rushes. For example, in 1909, a fellow found a couple of giant pearls in Caddo Lake. And for three or four years, there was an immense ... people came from all over the country to Caddo Lake to look for pearls.

Bob Howells [00:20:18] But those are quirky events, happened here and there. Generally, pearls are so rare, it just, it doesn't endure long.

Bob Howells [00:20:27] But there were two major reasons that happened over history that caused literally the federal government and some state governments to focus on freshwater mussels.

Bob Howells [00:20:37] One is that in the early 1890s, a fellow came in from Germany and realized freshwater mussels would make wonderful buttons. So, he set up button factories in Iowa, Illinois, the upper Mississippi drainage, and massive harvests started. You know, it was so extensive, that tons and tons of shells were being harvested out of the Mississippi and its tributaries, and other areas as well, to make buttons.

Bob Howells [00:21:10] This continued, oh, into the mid-1900s, really, but it pretty much went flat when pollution, overharvest was a problem. And, then plastic buttons were invented and there was no reason to do it.

Bob Howells [00:21:27] But it was so important that the U.S. Bureau of Fisheries, back in 1910, opened a major research station in Fairport, Iowa. Some of the publications they wrote back then (I have some from 1918 1919), we still use as references, they did such a phenomenal amount of good work back then. But it was this harvest shells for buttons that drove it.

Bob Howells [00:21:54] However, a second peak of harvest occurred starting in the 1970s and '80s and really peaked in the early 1990s. And that was that, particularly the Japanese realized that if you wanted to make cultured pearls, what you wanted to implant in the pearl oyster or the freshwater mussel was a ball of North American freshwater mussel shell. You hear people say, "Oh, grains of sand". No one did that. They wanted our freshwater mussel shells, primarily the Japanese, but Australia, Tahiti, some other places.

Bob Howells [00:22:30] A massive harvest developed. And in about 1990, '91, a price war broke out among the shell buyers who buy the shells from the musselers that harvest them. One of the big mussels that we have in Texas, washboard mussel, they were paying upwards of four dollars a pound, and a big specimen can weigh four pounds.

Bob Howells [00:22:56] So again, because the button industry ... Texas was so far from the button manufacturing centers, we were largely overlooked. There was a little bit of harvest in San Saba, San Antonio, down in Mercedes, but it didn't amount to much. Our big mussel populations hadn't been pillaged as badly as the Mississippi.

Bob Howells [00:23:18] So when the use of shells for pearl nuclei came into play, suddenly musselers from all over the country were coming to Texas, and Texas musselers were out. And calls started coming into Texas Parks and Wildlife going, "What's going on here?" And frankly, none of us knew. No one had studied it at all. We were kind of caught flat-footed. And that's really what drew our attention into freshwater mussels here in December of '91, actually.

David Todd [00:23:52] That's really fascinating how these industrial movements, you know, whether it was for shells or for pearl nuclei, can really spur government interest and then academic research, such as what you were getting involved in. I understand that in January of '92, you started some work with Texas hornshells and other freshwater mussels. I was hoping that you could help us understand how that started and where it took you.

Bob Howells [00:24:24] I think what actually started ... a lot of the divers were working, harvesting freshwater mussels. Some would use SCUBA, but a lot of them were using hookah diving equipment, where you have a pump in a boat that runs an air line down to a diver on the bottom. And to this day, I don't know where it happened, but a massive group of out of state musselers set up shop in front of somebody's home on the lake somewhere, and worked all day and all night running this pump and diving and bringing these shells up.

Bob Howells [00:25:01] Questions went into Parks and Wildlife headquarters and nobody knew what was going on.

Bob Howells [00:25:06] And because of my work with exotic species and that, it was, if it's strange, call Heart of the Hills and tell Bob to get busy.

Bob Howells [00:25:14] So, my studies initiated in January 1992, and from then on, it's all kind of history for me.

David Todd [00:25:24] That's great. So, you were the master for unsolved questions and mysteries.

Bob Howells [00:25:32] When you had, if a question came up on largemouth bass or rainbow trout or red drum, biologists would stand in line to do it. But when it was very strange, it was get to Kerrville, talk to Bob, give it to him. So here it was.

David Todd [00:25:48] Well. That's great. It was fortunate, I guess, for these mussels that you started taking a look at what the trends were and the patterns. You know, maybe this would be a good time to talk a little bit about Parks and Wildlife, and I think that you were saying that in the early days, freshwater mussels, not really a high thing on their priority list. Is that fair to say?

Bob Howells [00:26:21] Yeah. Basically, in fact, most freshwater invertebrates, if you're down in the coastal fisheries, you have blue crabs, you have oysters, you have invertebrates. But in freshwater, there were no real invertebrates that supported fisheries that we paid any attention to. We were mostly finfish biologists back in the early days. Again, there wasn't a lot of focal point on this.

Bob Howells [00:26:52] And, initially, when this began, my instructions were, "What's going on with this commercial shell fishery?" So, we were looking primarily at the commercial shell species.

Bob Howells [00:27:05] And in fact, there was really no interest among either the managerial biologists up in Austin or the commissioners back then - Parks and Wildlife Commission - to focus on rare and endangered species.

Bob Howells [00:27:20] And, as this commercial harvest was going on and drawing attention, we were also beginning to realize how incredibly rare some were and how much in decline they were. Turned out, our freshwater mussels are the fastest declining faunal group in North America. Nothing is heading to extinction more rapidly than they are.

David Todd [00:27:47] Well, you know, maybe to lay the context for some of this, it would be good to go back in time. I think you mentioned that the U.S. Bureau of Fisheries was set up in the early 1900s and then, I guess some researchers, Singley and Strecker, came to Texas and did some research as well. Can you help us sort of understand the origins of this early effort to understand more about freshwater mussels?

Bob Howells [00:28:21] Well, one of the things I was confronted with right away and really, any anyone else in the field was, was that there was very little literature available for Texas. There was no Freshwater Mussels of Texas book. It just didn't exist.

Bob Howells [00:28:37] Back in the 1890s, a fellow named Singley had published a list of mussels that he knew had been found in Texas - was just a list. Here it is, a list.

Bob Howells [00:28:50] Then in 1931, a fellow, Strecker, up at Baylor, published a list of the distribution of freshwater mussels. He went through the all the museum records he could find, and his own records, and published a list of: "these are the species from Texas", and "here's

where they've been found." There were a couple of little comments on descriptions on some, but no illustrations, no real descriptions, no biology.

Bob Howells [00:29:17] Strecker's book is still in use today. It really helped us, you know, get a foot in the door.

Bob Howells [00:29:24] But when it came down to the basic biology, a lot of us were falling back on not only the work done up in Iowa. There's a fellow named Coker and some of his buddies that 1918, 1919, produced major books not only on the commercial fishery but on mussel biology. And we're still citing those.

Bob Howells [00:29:44] When it came to Texas hornshell, back in '73, a fellow had written the taxonomic key to freshwater mussels of North America for the EPA, federal EPA, and he listed Texas hornshell. So, at the start, my knowledge of it was one pen-and-ink drawing in there, and this taxonomic key to help you identify it. That was it. That was pretty much what we knew about it.

Bob Howells [00:30:12] We had to rely on... At that time there was "Freshwater Mussels of Kansas". I believe there was, "Freshwater Mussels of Ohio" had been put together. And basically, we had to look at some of these books from other states where species that had wide distributions were present in Texas as well. Well, we'd use a book from Kansas or Ohio to identify it.

Bob Howells [00:30:43] But we had mussels here that weren't found in other states, and identifying some of those was a real challenge in the early days.

Bob Howells [00:30:50] Fortunately, two things helped me out. There was a fellow, Dr. Ray Neck, who then was with the Houston Museum of Natural History. He had put a few papers together, published in journals, and had some distribution records of his own. Harold Murray had come down from up North, and he was at Trinity University, and Murray had a nice collection, so I could go down and look at identified specimens that he had found in the 1960s here.

Bob Howells [00:31:21] Ultimately, the three of us got together and in 1994 wrote "Freshwater Mussels of Texas". It didn't get published till 1996, but we finally put what we could, what we knew, and what had been published before us, put it into a book and put it out so people would have something to work with.

David Todd [00:31:44] That's so great. I love that there's this effort to to pull together the museum records, the specimens, the brief descriptions, and pen-and-ink drawings and you're putting in the groundwork for a more complete understanding of freshwater mussels, you know, with huge ranges and lots of diversity, but just it sounds like the work hadn't been done yet.

Bob Howells [00:32:11] Well, one of the other things that was going on concurrently, again, is harvest of shells for pearl nuclei, cultured pearl nuclei was still going on throughout the country, especially in the upper Mississippi Valley. And a group up there, a conservation group, started holding mussel symposia every few years where they'd pull all of us that knew anything at all together, and we'd sit down and put our minds together and share this information, and also share specimens. So, we'd not only get to trade specimens of this or that

species, it just helped expand knowledge all the way around, just getting together with people of similar interest and knowledge.

David Todd [00:32:59] So this would have been the Freshwater Mollusks Conservation Society that you're referring to?

Bob Howells [00:33:05] Well, actually that ... it was a different group that really started these meetings. We were asked to put together a national task force to look at the freshwater mussel problems and declines. That task force, once it put its findings together, said, "Should we break up? We've been together all this time working together. Let's form what's called now the Freshwater Mollusk Conservation Society." And we literally in the mid-1990s became a formal scientific organization. And that's still in existence today.

David Todd [00:33:45] Boy. So, I think that some of your early work was trying to, based on all this research that had been done and that you had managed to pull together, I understand that you began drafting mussel licenses and helping with harvest regulations. Can you tell us about that?

Bob Howells [00:34:09] Yes, from that, from the onset, of work with freshwater mussels, again, it was the commercial harvest that drew Parks and Wildlife into it and where I work. So, one of the first things we needed to do ... we had, there was an old freshwater mussel license on the books from so many decades ago nobody knew who had done it or why. It existed, was all. But it was just a license. It didn't differentiate between residents and non-residents, and shell buyers and shell harvesters and that sort of thing.

Bob Howells [00:34:44] So, one of the things I had to do was create new definitions for mussel licenses. This would eventually be passed to the Texas Legislature and licenses are passed there. So, I would draft here's what we need, send it to my superiors in Austin, they would take it to the Legislature. So, we got new licenses passed.

Bob Howells [00:35:07] At the same time, we needed harvest regulations. To do this, one of the things is look at the harvest regulations and types of licenses that were in other states where harvest had been going on for years and style what we'd done there.

Bob Howells [00:35:25] One of the things that we would do, for example, is put minimum harvest sizes on. Before you harvest an animal, you'd like to see it grow up, mature, and reproduce. If you harvest them before they reproduce, pretty soon you don't have anything left to harvest.

Bob Howells [00:35:43] So, with a lot of the commercials, literally all of the commercial shell species, they were found in other states and we could look and see that, for example, washboard mussels were a very popular mussel. They, again, they get about 12 inches long, weigh about 4 pounds. They need to be at least four inches in shell height to reproduce. So, you set a minimum size: you got to be at least four inches. If you're smaller than that, you got to let it go.

Bob Howells [00:36:15] And so we had sizes for all of our commercial shell species. We had the same commercial-interest species everybody else did.

Bob Howells [00:36:24] We also had one called "Tampico pearly mussel" that produces a lot of pearls, one of the ones that was drew attention of the early Spanish explorers. Originally, I

had to kind of guesstimate what its minimum size at maturity was. Turned out, I guessed right, luckily.

Bob Howells [00:36:44] There's another one called bleufer that looks identical, and a lot of the pearl harvesters couldn't tell them apart. So, it needed to have the same minimum size limits so they could grow up and reproduce.

Bob Howells [00:36:56] But when I was doing this, we could see that we had a lot of rare mussels. And again, nobody wanted to talk about listing anything legally as threatened or endangered. So, what I did to offer them two things, two ways of a limited amount of protection, one was (I think I'm getting ahead of myself here, but let me do it quickly). One of them was to put a minimum harvest size for all other mussel species.

Bob Howells [00:37:26] This was a harvest for commercial shells. Here's the size for pearl-producing species. And all others have to be at least two and a half inches in shell height to harvest. And they, the musselers, would judge this by getting a ring of metal or PVC. And if the mussel went through the ring, it was too small, you'd let it go.

Bob Howells [00:37:49] So, we set a minimum size for all the other mussels in Texas, as you had to be at least two and a half inches in height. It turns out that a large number of our rarest species never get that big. Therefore, you could never legally harvest them.

Bob Howells [00:38:05] Additionally, I should have said this earlier: unlike marine bivalves, if you harvest an oyster, you take the meat, you throw the shell away. If you harvest a freshwater mussel, you throw the meat away and you keep the shell.

Bob Howells [00:38:20] So, the regulations had to apply both to dead shells as well as live mussel specimens. So, shells as well.

Bob Howells [00:38:30] The last thing I could do to offer the rare guys some protection, and this was with support of the commercial musselers, was to establish areas on rivers and some reservoirs around the state, no-mussel-harvest sanctuaries. From this bridge downstream to that bridge, no one can harvest mussels at all.

Bob Howells [00:38:51] The logic was if you leave them alone to grow and reproduce, they'll infect fish and the little mussels will spread throughout the system. You don't need a hatchery to do it. They'll take care of themselves, if you can protect a population.

Bob Howells [00:39:06] The musselers actually supported that.

Bob Howells [00:39:08] Well, some of these no-harvest sanctuaries supported some of our very rare species too. And that process has continued over the years as well.

David Todd [00:39:20] Boy, that is so interesting. So, it sounds like these rarer freshwater mussels were sort of protected by default because you just refer to them as "all other mussels".

Bob Howells [00:39:35] Right.

David Todd [00:39:35] And then set this impossibly low minimum harvest size.

Bob Howells [00:39:43] Exactly.

David Todd [00:39:43] I love that. It's very, very sneaky.

Bob Howells [00:39:46] About a year after the regulations had been passed, someone called from a natural history museum and said, "Do you realize most of these rare guys never get big enough to harvest?" And I pretended to be quite surprised.

David Todd [00:40:04] Very crafty.

David Todd [00:40:06] Well, so, I think that some of your early research work, in the 1990s, cited other scientists - Mather and Bergman - as starting to understand that these Texas hornshell were, in fact rare, as you suspected. And I was wondering about if you could help us understand how you started to realize these creatures were really quite rare and unusual.

Bob Howells [00:40:35] Yeah. It turned out that Charles Mather and Joe Bergman were students together at Texas A&M back in the 1970s, and they developed an interest in freshwater mussels then. So, they would periodically (Mather wound up teaching at the University of Science and Arts in Oklahoma; Joe Bergman was running his own private consulting firm), but they continued as buddies and friends to go and survey freshwater mussels around the state and really other places in the country as well.

Bob Howells [00:41:10] I, to this day, don't remember how I met the two of them, but we managed to get connected and finally met each other in person up in Lamar County, where one of our very rarest freshwater mussels had been found. There were only two in Texas. Mather found one and Bergman found the other one. And so, we'd been friends ever since, and again working through this Freshwater Mollusk Conservation Society and that sort of thing.

Bob Howells [00:41:41] We sat down with their databases, mine and all of the historical published records. And in 1997, at one of these symposia, we put out a paper discussing the status, as best we knew it, of all of our rarest mussels, including Texas hornshell. I, at that point hadn't, I think I had one that had come in before that in the first year out there. Otherwise, I hadn't seen it. And I think Joe Bergmann had only found it in the Devils River. So, we knew it was pretty rare.

Bob Howells [00:42:13] And, we'd stayed connected ever since. They just had a phenomenal amount of good information that hadn't been published, and we were able to put it together and finally get some information in print for other folks.

David Todd [00:42:28] Well. And I think that you mentioned this earlier when we talked about the regulation and licensing for freshwater mussels, and that there was a reluctance, I guess, at the agency, at Texas Parks and Wildlife, to look at the conservation status of rare species, that there was more of a focus on those species that could be harvested commercially, which I guess were the more popular, common species. Can you talk a little bit about that sort of attitude at the time?

Bob Howells [00:43:03] Yeah. Again, the focus was more on commercial and sport fishes, and much less on rare and endangered species. It really took a while. It really, in all honesty, wasn't until about the time I retired in 2006 that things started to shift a little bit and they started to pay a little bit more attention.

Bob Howells [00:43:35] One of the things that did happen was that I'd been contacted by a fellow Brian Lang with New Mexico Game and Fish. And Brian literally came down here on his own dime from New Mexico, and we took him out and showed him how we did survey work, how we harvested, what we did in the laboratory.

Bob Howells [00:43:57] He went back and immediately found a population of rare Texas hornshells in New Mexico. Brian then went out and drummed up some federal money to support studies for him and for Texas Parks and Wildlife, for me, to survey the Rio Grande drainage, looking for these Texas hornshells and other species as well.

Bob Howells [00:44:22] So, it was kind of his foot in the door that finally got people starting to say, "All right, well, we'll take some federal money and we'll look at some of the rare species as well."

Bob Howells [00:44:34] And certainly there are a number of other very rare mussels in the Rio Grande that, you know, we encountered doing the survey work as well.

Bob Howells [00:44:42] Fortunately, due to Brian's work and some of his other colleagues up in New Mexico, they were able to do a lot of really good work in a population in the Black River, one of the tributaries of the Pecos up there, and, just discover a whole lot about Texas hornshell. We hadn't at that point found enough live ones down here to know much about.

Bob Howells [00:45:10] We did however ... One of the unfortunate things about my surveys of the Rio Grande was I'd been approached by one of the government agencies going, "Hey, we need to do some work down in Webb County. If you loan us your dive gear, we'll survey that area for you. We know how." "Okay, fine."

Bob Howells [00:45:32] They came back saying there are no mussels in Webb County. There aren't any there. And unfortunately, when I put my summary reports together, that's exactly what I said. Didn't find any there.

Bob Howells [00:45:44] I was doing a presentation at a Texas Academy of Sciences meeting in Laredo, said, "Doesn't look like there are any mussels here." Walked out the door. I am in Laredo, in Webb County. And one of the professors, one of the instructors from Laredo Community College, Jose Egremy, handed me a Texas washboard shell and said, "Do you know what this is?" "Yes, I do. Where did you find it?" "Right down the road a few blocks from here."

Bob Howells [00:46:13] We immediately went. We had another fellow, Tom Miller. We got him from Laredo Community College. And the three of us went down. We found Texas hornshell. We found Mexican fawnfoot, washboards. There were a whole array of mussels there that my friends previously had missed.

Bob Howells [00:46:31] So, the three of us had to get together and publish some corrections going, "Nope. There's really some mussels here."

Bob Howells [00:46:38] We were also able to take that area in Laredo - there's a little park where we originally found them south of the bridges there - and turn it into a sanctuary, no-harvest sanctuary, protecting the mussels that were there from any deliberate harvest without a scientific permit.

David Todd [00:46:58] Well, you're introducing us to some new characters in this play.

Bob Howells [00:47:03] Yes.

David Todd [00:47:03] I think you mentioned Tom Miller. And I understand that he was part, along with you and some professors at Stephen F. Austin, in research that followed up on that, some of those early learnings about where the Texas hornshell were actually found. And maybe you can talk to us about those efforts in the first decade of the 21st century.

Bob Howells [00:47:31] You know, one of the things that happened - I guess it was 2004 - when Parks and Wildlife, through some reason beyond my understanding, obtained some funding for us to hire, subcontract, work out to universities or private consultants and such to do some further survey work.

Bob Howells [00:47:55] Now, during the years I worked from 1992 to 2006. I published annual reports of everything I discovered that year. And for a number of years in the early '90s, I put out a newsletter, the Info Mussel Newsletter. That was originally intended to go to the Freshwater Fishery Department management office. Again, they knew nothing about mussels. We were trying to keep them up to date. We wound up sending out 100 copies every month all over the country.

Bob Howells [00:48:30] In any event, when we finally got permission to start farming out some work to other groups, we had some folks over at Stephen F. Austin. We had Tom Miller down at Laredo Community College that had some mussel knowledge. And basically, I was able to charge them to go out and do additional survey work and, in many cases, not only survey new sites, but go back to the places I had been and reexamine them. Are there still mussels there five years or ten years later?

Bob Howells [00:49:02] And in 2006, just before I retired, I was able to publish a summary of all of this. And Tom Miller and actually Laredo Community College, Steven F. Austin and others have also gotten grants, and the mussel work has just expanded since then.

Bob Howells [00:49:24] And again, the commercial fishery has largely died away. So, the interest now is in the conservation status. I don't think there are, last time I heard there were more than three or four commercial mussel licenses being sold. And those are for folks looking for Concho River pearls. The commercial industry is pretty much dead. It's all now conservation status focus.

David Todd [00:49:53] I see. Okay.

David Todd [00:49:55] Well, so it sounds like this is a little bit like, to put it in layman's terms, like an Easter egg hunt, and it's not easy to find them. Can you tell us about the sort of telltale signs of what would be good habitat, a likely place, to find a Texas hornshell mollusk?

Bob Howells [00:50:16] Well, again, Texas hornshells are confined to the Rio Grande and its tributaries, in Texas, New Mexico and in Mexico. Again, it prefers bottoms that are mixed sand, firmer muds and light gravels. A lot of times, it and again, it requires flowing waters. You're not going to find it in large reservoirs, for example. If you came and impounded a river and turned it into a reservoir, you would probably lose that species if it was present there.

Bob Howells [00:50:56] One of the things is it's often easier to tell folks where you don't find them. You don't find them in areas where you have deep shifting sand, with the sand blowing around like sand dunes underwater. They can't live there.

Bob Howells [00:51:11] You don't find them in hard bedrock. You don't find them in scoured cobble. You don't find them in areas where water levels fluctuate. You won't find them where areas that completely dry out go bone dry for weeks or months at a time. They simply cannot endure that.

Bob Howells [00:51:31] Obviously, you need a certain amount of reasonably good water quality. Freshwater mussels can sometimes close up and let some tainted water flow by for a brief period. But only so long.

Bob Howells [00:51:45] So those are the kinds of things. Areas that are badly scoured are not good habitat either.

Bob Howells [00:51:54] And again, they need to be areas where the types of fish they need as hosts can be found. In this case, fortunately, [gray] redhorse suckers and quillback carpsuckers [correction: river carpsucker] are fairly abundant throughout the state and throughout the Rio Grande. So, while they use other fish as well, those are two of the main ones. And fortunately, those fish hosts are fairly abundant too.

David Todd [00:52:22] Well. That's helpful. This is good to get these clues for something that's, I guess, been elusive and not as heavily studied over the years.

David Todd [00:52:32] So, I gather that the bulk of their range is in the Rio Grande. And, of course, that's an international river, with major tributaries in Mexico. And, I was wondering how you factor that in. I mean, it's probably a whole different approach to studying and surveying mussels in Mexico than in the US.

Bob Howells [00:52:56] Well, yeah. I haven't personally been able to get in during my years of working, been able to get into Mexico at all. Fortunately, a lot of the biological technicians that work with me also work with the other biologists at Heart of the Hills, particularly Dr. Gary Garrett, who had work going on with some endangered fishes in Mexico. So, for example, when he'd take people on trips through the upper Rio Grande or in the upper Rio Conchos into Mexico, they were looking for fishes for him, but they were also watching out for mussels for me as well. So, we did get a little bit of Mexican information in that way. But, generally, I wasn't able to get into Mexico.

Bob Howells [00:53:41] Now since my retirement, Dr. Ned Strenth at Angelo State University, actually was the fellow that found the hornshell on the South Concho River, has developed an interest in mussels, and Ned has a lot of good contacts in Mexico and has done surveys there. And he's found Texas hornshells in at least two different systems in Mexico.

Bob Howells [00:54:09] But getting the permits, the authorizations, just getting in and out, is, as I understand it, incredibly challenging. And, it's a whole different world from trying to do survey work in Texas.

David Todd [00:54:23] I've been fortunate to talk to some biologists who work on ocelots. And, they've told me that a lot of their research, their survey work in Mexico, their reintroduction efforts, have really been affected by just the violence, the cartel activity down

there. And I was curious if that has been an issue for understanding more about mussels, freshwater mussels, including Texas hornshell down south of the border.

Bob Howells [00:54:52] Even in in the mid-2000s, 2004, '5, '6, like that, when we were still surveying the Rio Grande, just the border waters, another biologist and I tried to go in at Del Rio, a boat ramp just upstream of Del Rio and work up to below Amistad dam. And the day before we were supposed to go there, there was a shootout on the boat ramp, and some drug dealers were actually killed there.

Bob Howells [00:55:24] So, we had to contact Border Patrol. And the Border Patrol showed up in an armored airboat with guys with flak jackets on carrying assault rifles and said, "Tell us where you want to go. We'll take you anywhere."

Bob Howells [00:55:37] And the Border Patrol escorted us on our surveys of the area. And this was, again, back years ago. With the way things have degraded at the border, with problems with immigration, it has got to be a whole lot worse. You can see rolls of razor wire. Can you imagine a biologist trying to get in to check out the mussels there? Yeah, good luck.

David Todd [00:56:07] So this is something that I think you've touched on periodically as we've had this nice conversation: that study lagged on mussels. And, I was wondering if you can give us some sort of context and background on why that might have been, because, you know, there's decades and decades of research on all sorts of living organisms in the state, but it sounds like, maybe until you and some of your colleagues came along in the 1990s, it really hadn't come up to the same sort of level of interest as some of these commercial and sport fisheries.

Bob Howells [00:56:47] Well, again, I think, I doubt there is any state or government agency that has all the money, people, time and equipment it needs to do everything it wants to do. So you need to focus on where the greatest attention is. And, you know, I have no idea how many, say in 1992, when I began, how many fishing licenses Texas sold. I would have to guess probably a couple of million. Back then, we had less than 500 commercial mussel licenses at the peak of it. So, obviously the greater attention is going to go to sport fisheries. It's going to go out on the coast to commercial fisheries as well. Not a lot of commercial fishing in freshwater.

Bob Howells [00:57:36] But one of the other things that was happening about that period, in the late 1980s, competitive bass tournament fishing really took off, and it drove a lot of attention. Largemouth bass are the major game fish in the fresh waters of Texas.

Bob Howells [00:57:55] Well, now you have organized groups pursuing this particular fish, and they've got a lot of financing, a lot of influence, and they really didn't have a lot, of lot of, patience with us spending time and effort on anything that wasn't a black bass.

Bob Howells [00:58:15] In fact, I got involved with those in the late 1980s. They decided we needed to tighten up our regulations on tilapia. Two species of tilapia were legal for use in Texas, out of about 100 or so at the time. Just as the they decided tilapia needed to be prohibited, fish farmers started raising tilapia for commercial production.

Bob Howells [00:58:41] And so we had two major groups in direct conflict, with Parks and Wildlife in the middle. And, it was such heated developments that literally some of our

biologists got death threats. And when we had a public meeting, we had to have armed game wardens and Texas Rangers there. It was that heated over tilapia.

Bob Howells [00:59:04] But again, it shows just some of the influence that was afoot, and why the biologists and commissioners at the time had other interests. You can understand.

Bob Howells [00:59:14] However, just after I retired, two things kind of happened that kind of helped direct attention towards some of the rare species.

Bob Howells [00:59:27] One, I was contacted by a group called Wild Earth Guardians, an environmental group, and they wanted me to turn out some brief reports on a group of some of the rarest mussels. As I recall, I don't think they'd listed Texas hornshell, but they had a number of other species.

Bob Howells [00:59:48] The reason they wanted that information was that U.S. Fish and Wildlife had been very resistant to adding threatened and endangered species to their federal lists. A plant or an animal can be ecologically, biologically endangered and have no protection at all. It's not until it's listed by a state or federal government as threatened or endangered that it has any protection.

Bob Howells [01:00:13] What Wild Earth Guardians planned on doing was bringing suit against Fish and Wildlife to force them to start adding things to the endangered list.

Bob Howells [01:00:21] So I turned out that list for Wild Earth Guardians.

Bob Howells [01:00:26] I don't know if that helped encourage Fish and Wildlife to move along, but, ultimately, they did.

Bob Howells [01:00:34] About that same time, I was approached by a Texas group, the Save our Springs Alliance, who wanted me to produce reports again on a group of, I don't think, of about fifteen or so particularly rare Texas freshwater mussels. And again, I put together all the information I had and said, "Here's the best that I know of these right now." And they had those texts available for anybody was interested in some of our rare animals.

Bob Howells [01:01:05] And then about that same time, U.S. Fish and Wildlife began working. Again, other universities like Texas A&M, began to get federal funding and state funding for freshwater mussel activities. And things just flourished from there on.

David Todd [01:01:24] Well, and it sounds like the context for this was the increasing rarity of a lot of freshwater mussels. And I guess Texas hornshell were just one example of that. Why do you think Texas hornshell were always rare, and then maybe particularly focus on why they become yet more rare with time?

Bob Howells [01:01:50] That's an interesting point. It's interesting to note that, and we look at American bison or passenger pigeons that were once phenomenally abundant. Not everything is. Some things are just, in their very nature, rare. It's just how they are. Texas hornshell is one of those mussels that just has never been super abundant. We've seen mussels that formed beds so dense that if you ran barefoot, you'd hurt yourself. Texas hornshell just wasn't up to doing that. It just wasn't in its nature to be to be that abundant.

Bob Howells [01:02:28] Considering it uses very common fish for hosts, it's kind of puzzling, but it's one that never had been all that abundant.

Bob Howells [01:02:38] But within the Rio Grande, you think of the changes that we've seen over the past 200 years - absolutely phenomenal. Among other things, like I said, there were no real lakes in the area, but there have been any number of dams and impoundments built. We've got oil and gas drilling. We've seen, particularly in recent years, major problems with floods, major problems of dewatering, some areas going almost completely dry from time to time.

Bob Howells [01:03:12] We've seen in the Pecos, for example, salinities have risen so high that in most of the area, at best, you'll find little old weathered shell fragments to indicate that mussels might have been there 150 years ago, but there's nobody home anymore. The salinity is simply too high.

Bob Howells [01:03:33] The demand for water, particularly in the western parts of Texas, New Mexico, the western states in general, is so high that it's impacting the amount of flow down the rivers and the animals that live there.

Bob Howells [01:03:49] Interestingly, again the shells, the fisheries for buttons, for pearls, they were focused on certain shells that are thick, heavy, very, very hard. Even if somebody had looked in an area where Texas hornshell had occurred, they wouldn't have picked it up. They'd have left it alone. It was just not a species of interest to them. So, these big, massive harvests that occurred in the historic past had no influence on Texas hornshell. They just didn't matter.

David Todd [01:04:21] So, it sounds like some of the, the factors affecting Texas hornshells might have included these dams that have been placed in the Rio Grande. And you explained how, you know, they need flowing water. So, I understand that.

David Todd [01:04:41] I'm curious though - the salinity aspect - are there tolerances that these Texas hornshell can put up with for salinity? Or how is that a factor?

Bob Howells [01:04:57] I am sure there almost certainly are. One of the interesting problems we run into with very rare species ... Actually, when I was brought to Texas, one of the first jobs I had was we were looking at thermal tolerances in various species of fish. When it is too hot, when's it's too cold? What do you need?

Bob Howells [01:05:21] When it comes to working with very rare animals, it's kind of hard to do some of the laboratory work. You just don't have enough specimens to take them into the laboratory and subject them to those tests and potentially kill them. Well, I know what temperature will kill it! But now it's simply too rare to work with. So, you need to gain your observations from quirks that happen in the field.

Bob Howells [01:05:49] I know we were over at one stream in East Texas where they removed all the trees, just stripped the area bare on a sand-bottom stream. And when the sun came out, literally even the Asian clams were cooking, it was so hot - fIeld observations like that.

Bob Howells [01:06:07] Now, I do know that with temperature studies, there has been a little bit of work done in New Mexico with Texas hornshell. So, they're getting a little bit of handle

there. Same with salinity. It's questionable you're ever going to have enough Texas hornshell specimens to justify using them in tests to get really good data. Again, you have to probably work from field observations where when the salinity reaches this level, we don't find mussels anymore.

Bob Howells [01:06:45] But unfortunately that is a problem with some of the rarest species.

David Todd [01:06:51] Yeah, I guess these creatures are so rare and valuable, you can't afford to do any of those, what, the LD-50 studies.

Bob Howells [01:07:02] Yes, exactly.

David Todd [01:07:04] I think that there are some thermal aspects, I think you mentioned, but is hypoxia a problem for Texas hornshells, do you think?

Bob Howells [01:07:18] I don't ... Probably. Again, the warmer water gets, the less oxygen it holds. So, you get into situations where, just with the global warming we've seen these last couple summers, populations in very shallow waters, and when the temperature is up, it's quite likely there's not a lot of rain and the flow is down, temperature in that water is going to come up and oxygen levels will drop.

Bob Howells [01:07:47] Not to mention there are just, you know, any number of human activities: discharging of sewage, for example, which can really knock oxygen levels very low. So yes, low oxygen is a problem.

Bob Howells [01:08:02] One of the little bit of advantages that, again, many of these freshwater mussels have is that they can, many of them are able to literally close up their shells. There are a couple of species that have been known to go literally months in areas in wet mud that is dried out. When it floods, they're fine.

Bob Howells [01:08:23] I doubt Texas hornshells are that tolerant. There are a couple that are, but most are not.

Bob Howells [01:08:28] But nonetheless, they can close up. If you had an accidental discharge of sewage and the oxygen levels were knocked down for 12 or 14 hours till the flow moved it downstream, some of them just might be able to survive that, and be able to just close up, go into an anaerobic type of respiration and just sit tight for a bit.

Bob Howells [01:08:50] But there's a limit to what they can take and how often they can take it.

David Todd [01:08:56] Okay.

David Todd [01:08:58] This may be relevant to the current weather conditions, where you are and where I am. Do you think that cold snaps, you know, extended freezes, can have an impact on some of these Texas hornshells?

Bob Howells [01:09:15] With what we're looking at now... I meant to look this morning and see what the temperature was out in the Del Rio area. I imagine they're getting pretty, pretty icy too. It is very likely that some of these deep freezes that we've seen, if they hit the areas where these animals are, again, they're in water, they're in the buried into the sediments in

the bottom. So, they're going to take a little bit more cold. But again, there is a limit. So, yes, as we're seeing global weather changes cause these cold Arctic fronts to swing south, some of those populations very well might be negatively impacted by this cold.

David Todd [01:09:55] Okay.

David Todd [01:09:58] So, you touched on earlier the impoundment of, you know, the main stem and some of the tributaries of the Rio Grande as having, causing problems for the Texas hornshell. What about, I guess less dramatic construction. I think there have been weirs proposed for Laredo, there have been boat ramps, bridge expansions. Do you think that they those can pose a risk for Texas hornshells?

Bob Howells [01:10:32] Yeah. Absolutely. Aside from the increased activity you've got, the construction activity itself can be a problem. We have seen places, and there's an example in North Carolina, where they had to put a bridge across a small river with one of our most endangered mussels, and they literally were able to do that reaching out from the banks and not getting in the water and that sort of thing. They did it without harming any mussels at all.

Bob Howells [01:11:02] It's difficult to do. Most construction people are not willing to spend the time and money, and it is a problem.

Bob Howells [01:11:10] Again, things like weirs or boat ramps: the construction itself can be a problem if there are mussels right in the area. Once it's built, sometimes, it all depends on a site-specific consideration. I've seen cases where we've done surveys and other mussels are doing just fine, right adjacent to some concrete boat ramp. I'm sure when they poured the concrete, they probably were killed out in the area, but they were able to re-invade, come back. But it's a low-activity boat ramp.

Bob Howells [01:11:47] You get a ramp with major activity: hundreds of boats in and out all day long. Yeah, probably, that's not going to be very good for the mussels. The activity, the leak of fuel and oils and you name it, just, it could be a problem.

Bob Howells [01:12:04] I see there's a proposal out right now to expand the bridges in Laredo. Any bridge expansion is going right through a freshwater mussel sanctuary with Texas hornshell in it. Now, do I believe that they'll forego building a bridge because of that? No, I don't. I suspect that bridge is going to get built anyway. I hope they do the best they can to mitigate impacts. But I'm old, and I'll believe it when I see it.

David Todd [01:12:37] You have a bit of experience and skepticism.

Bob Howells [01:12:38] Sadly.

David Todd [01:12:39] Well, now, speaking of the Laredo area, I think that there have been some folks who have pointed out the untreated sewage disposal from the Nuevo Laredo side of the border and side of the river as maybe having posed a real problem for Texas hornshell, and other mussels. Is that something you see concern about?

Bob Howells [01:13:05] I know they're discharging and they're discharging upstream from the site we found the first ones. Yeah, again, it could very well be a consideration.

Bob Howells [01:13:17] One of the things, something I did with that environmental consulting firm years ago was watching discharge plumes: where does that discharge go when it hits the main water body? And, you know, that's a consideration to look at. If it hugged the Mexican side, most of the mussels, to my knowledge, are on the Texas side. So, if it hugged the Mexican side of the river, they might be able to escape with a certain amount of undesirable sewage going downriver. If it spreads out across the whole width of the river, then, then, yeah, that's a problem. And again, the amount of flow and all relates. So that's certainly something to look at, and it'd be much better if it wasn't happening, but it is what it is.

David Todd [01:14:05] Well that's interesting. I guess these, these mussels are largely stationary. So, they, they're very subject to things they can't evade or, you know, run away from.

Bob Howells [01:14:16] Right.

David Todd [01:14:18] Are there any other risks that we should mention that, that you have concern about that might, endanger these Texas hornshell?

Bob Howells [01:14:27] Oh, golly. I'm trying to think. Believe it or not, one of the things that we've run into: when I first designated the freshwater mussel sanctuaries, I was thinking in terms of fishermen, commercial harvesters, that sort of thing. But, there are folks that collect rare shells and specifically go looking for them. I've gotten calls: "Tell me where I can find this rare species. I just want to go look at it." Sure you do.

Bob Howells [01:14:59] If you go to the internet, you can find shell dealers from around the world selling freshwater mussel shells from Texas. Well, they must have gotten them illegally somehow. That's a consideration.

Bob Howells [01:15:12] One of the things that has happened, though, is that once Texas, or probably Fish and Wildlife, the federal government as well, grants you a scientific collecting permit (now, Texas hornshell, you'd need a federal permit here now), but, if it was a state-listed species, basically, I don't see a lot of effort to restrict what you do. Here's a permit that says you can collect 20 or 30 of them, whatever. Where you do it or how many people do it. And I'd seen in one of our little sanctuaries in Gillespie County near here, was hit pretty hard about ten years ago, really hammered rather hard.

Bob Howells [01:15:54] And I don't know who, but I suspect it was biologists looking for female mussels to do reproductive studies on. And there wasn't anybody coordinating where all of the biologists were working or getting their specimens. And it was a tiny little population got hit pretty hard. I suspect it was biologists that were responsible. So, the biologists themselves need to do some, some soul-searching and think about whether they're having any impact, just doing the very work they do.

David Todd [01:16:28] That's interesting, folks, that probably have great interest and care for these species, but maybe extend things too far.

David Todd [01:16:39] So, one of the things I think it's been really interesting about your role is not only if you've been doing research, but you've made big efforts to share what you've found. And, I was hoping that you could talk about some of the outreach that you've done - the books, reports, newsletters, manuals that you've written and distributed. Tell us about the experience doing that, and the sort of response that you might have gotten.

Bob Howells [01:17:09] Well, I guess the very first thing that probably comes to mind would be the Freshwater Mussels of Texas book. Again, we'd largely put that together in 1994. That was a long time ago, and by the time it was published in '96, we'd learned a great deal more. Even before the presses rolled, we'd done a genetic study that one of the species was actually two species. A guy that found it back in the 1800s was correct in it being a special species. You find it in the back of the book because we added it right before the presses rolled.

Bob Howells [01:17:45] But that book went out to help other people. Since then, 2013, 2014, I put together a field guide trying to update. Plus, now with computer technology, we could, we could have colored maps, color photographs of the specimens, that sort of thing. And put that book out. Unfortunately, even that book is now grossly out of date. It needs to be done again.

Bob Howells [01:18:14] I mentioned the mussel newsletter that we put out in the 1990s, and we finally terminated doing that. But again, that was to help people know what was going on.

Bob Howells [01:18:25] One of the things that popped up in the late 1990s was a mussel watch program that Parks and Wildlife came up with, with a couple of other individuals in another department up in Austin. And the idea was to train folks to go out and help survey the mussels.

Bob Howells [01:18:49] Unfortunately, the outreach there didn't quite pan out. I don't know how many students I had doing that - 150, 200 whatever - but literally it would take me four or five days to prepare a class. And literally only two of the people ultimately served to provide a large amount of good quality data. The return on effort wasn't quite what I would have hoped.

Bob Howells [01:19:19] One of the other problems I find is that freshwater mussel survey work out in the field can be incredibly dangerous. Again, while I was working, I'm aware of at least two commercial musselers - one sheller, one pearl hunter - that died in Texas waters while they were out collecting shells. And, you know, if the experienced professionals are dying, you really got to watch what you're asking, you know, trained amateurs to do. There are risks associated with it. I would often tell the folks in class, you don't get in any water over your head if you don't have a knife on you. There are trot lines that can hang you up everywhere. There are dangers out there.

Bob Howells [01:20:09] Especially people will say, "Oh, gee, Bob, what's the bottom of that river look like?" I have no idea. I can only tell you what it felt like, because you can't see anything down there.

Bob Howells [01:20:20] So, there are some problems with some of the outreach situations.

Bob Howells [01:20:26] Nonetheless, you know, both while I was working and since I've retired, I've held classes to try and train people. A lot of engineering and biological consulting firms wanted to have mussel-trained people, so they would know if a project of theirs was having an environmental impact, that they didn't need me to tell them: they could do the work themselves.

Bob Howells [01:20:49] So, I've had training classes like that.

Bob Howells [01:20:52] And, I also got together with folks from Texas A&M University, U.T.-Tyler and, and Joe Bergmann, and we had symposia out at Texas Tech in Junction, and again here in Kerrville, where we would try to train folks and even take them out on field trips to show them some hands-on experience. Again, these are biologists that are actually doing the work.

David Todd [01:21:22] I think that you've also met with some Master Naturalist classes, and I guess you have some views about iNaturalist and just citizen science in general. Can you tell us a little bit about that, as somebody who has been doing this professionally?

Bob Howells [01:21:44] I've talked to a number of Master Naturalist groups, both about freshwater mussels, about exotic species as well - done that. And even a group ... there are volunteers like that that work with archeologists on archeological digs. And a lot of the freshwater mussels, I can remember one of the archeological classes going through that, spending about an hour. And this is what you need to be able to identify this chunk of a shell you've just dug up. And almost across the board they looked and said, "That's too much to do. We can't do all that." Well, that's what it takes to get it right. I'm sorry. It's just, it's fairly complex. You need to look at a variety of things and understand them at the same time.

Bob Howells [01:22:37] Yeah. I don't know if Master Naturalists have been directly involved with field work with mussels. I have talked to them about that.

Bob Howells [01:22:46] The iNaturalist program on the internet, I've been disappointed with it.

Bob Howells [01:22:56] Again, I find the internet itself as a massive wealth of misinformation, and iNaturalist is a great source of misidentifications from motivated people who mean real well and miss a few of the fine points.

Bob Howells [01:23:13] One of the problems with the internet, too, is, again, while I was putting out a newsletter, I was putting out these annual reports, they were generally going to other biologists or specialists in the field. Once things hit the internet, you don't know who's going to read it. And there are some very rare species - freshwater mussels, some land snails, wild orchids, cactus. You tell somebody where a particularly rare population is, and you can bet some rare species collector will go and take them.

Bob Howells [01:23:56] I know there's a group working with one rare orchid in Florida. They will not tell you where it's at. It's out in the Everglades somewhere, but we're not going to tell you.

Bob Howells [01:24:05] And unfortunately, one of the things that happens with some of the, again, the iNaturalist-type groups is folks will put things on the internet and say, "Look at the wonderful rare species I've found." But not everybody else is a good fellow. And they very well may go take that specimen, and put it in their collection.

David Todd [01:24:26] You can't have great confidence in people's good nature and good intentions.

Bob Howells [01:24:33] Not all of them.

David Todd [01:24:33] So, you know, it's interesting. Talking to you about outreach, I think that this is not something that you've come to recently. I understand that in the early 1970s, you worked at the Cleveland Museum of Natural History, and I was wondering if you could just talk about public outreach in general, in terms of its tie to conservation.

Bob Howells [01:24:57] I think the biggest thing, relative to public outreach, is not so much to necessarily expect somebody to have hands-on work in every single area. Some of them are just not built for non-professionals to do. I wouldn't expect somebody to take a class on DNA analysis and then run out and start running DNA gels. You know, you need to know something.

Bob Howells [01:25:24] But what you do need to do is get the information out: tell them that it's even happening. Again, 1992, when we began, I promise you, there was nobody at Parks and Wildlife headquarters that had any idea how rare some of our mussels were. And these are professional fishery biologists.

Bob Howells [01:25:45] And when it comes to the public, outreach to get the information out and tell them about it. Tell them: for example, we're talking about our Texas hornshell here. Their larvae are parasites on fish. That mussel can't live unless that fish is there too. You have to have both. I think that's pretty amazing that that interaction is there, and it's absolutely necessary.

Bob Howells [01:26:14] So a lot of the communication and outreach, just telling people things they didn't know, showing them that's right there in front of them that they had no idea. I really love to go talk to groups and surprise them with things that they had no idea.

Bob Howells [01:26:33] Again, the washboard mussel shells: when I hold up a mussel that's almost a foot long and go, "That came out of the Guadalupe River here. Oh, and did you know we have a shrimp in the Guadalupe River? A freshwater prawn that can be eighteen inches long?" "Wow, I didn't know that." "It's true. We do.".

David Todd [01:26:54] You know, that's so fascinating, that there are, I guess, different ways that information can be used. I mean, one, where you could go and if you were very experienced, do DNA analysis. But that's, that's a high level.

Bob Howells [01:27:07] Right.

David Todd [01:27:08] But then there's this maybe lower bar that maybe you're mentioning here where it's just understanding the marvel and, you know, awe that people can have about the natural world, or understanding how they should vote, you know, and give their charitable dollars to try to help experts, you know, really pursue protection. Right.

David Todd [01:27:33] Well, we've covered a lot of ground and I feel like some of the discussions that we're going to have about Texas hornshell protection, you've already told me about.

Bob Howells [01:27:48] Yes, we have.

David Todd [01:27:49] And, I'm just looking through my notes here and your responses that you were nice to share, and I am wondering if we might skip down to what some of the maybe

promising steps you might recommend for protecting and restoring those Texas hornshell mussels? Is that something you might be able to tell us about?

Bob Howells [01:28:19] I think one of the one of the biggest steps, again, as I've said, a plant or an animal might be biologically threatened or endangered, and never get listed as legally threatened or endangered. But simply listing it as legally threatened or endangered and then providing information about it, is a massive step towards protecting it.

Bob Howells [01:28:45] People will come to me and say, "Texas hornshell. I've never seen one. Why should I care?"

Bob Howells [01:28:52] And one of the things I come back to is, in nature, diversity means stability. The more complex any ecosystem is, the more stable it is, the more interactive. You don't want a food chain; you want a food web. You want things interacting in all sorts of different ways, giving it more stability and making it more immune to the nasty things we do to it.

Bob Howells [01:29:19] Just getting that information out is critical. Like I say, in fact, something we slid by on our freshwater mussel sanctuaries, one of the curious things that happened since I retired, initially again, we've got a hornshell population in Webb County in its protected sanctuary. However, when I first wrote, or drafted regulations and the licenses, we used to actually put the sanctuary list in our mussel regulations that got handed out.

Bob Howells [01:29:53] Nowadays, they don't tell you where the sanctuaries are. Somebody has decided we should not spread that information around. I cannot imagine what the logic is, but, basically they generally don't tell you where they are.

Bob Howells [01:30:09] It'd be like having a hunting season, but I won't tell you what the dates are. It's not going to work.

Bob Howells [01:30:13] Well, the mussels down in Laredo are in a sanctuary. It would be nice if people know that, particularly now that we're looking at maybe expanding bridges there. That gives us something to think about. Are we going to put the bridges in? How are we going to do it? What can we do to mitigate impact, now that we know something special is literally right here?

Bob Howells [01:30:40] Some information needs to be spread around. Not all of it does necessarily.

David Todd [01:30:46] I guess it's a two-edged sword there.

Bob Howells [01:30:48] Yes.

David Todd [01:30:48] I mean, in one case, you want to share the information because it may help avoid harm. But then others, like you pointed out, when you have collectors, who might go to those sanctuaries and then take some of these special creatures away.

David Todd [01:31:06] That's a hard call. I can see that.

Bob Howells [01:31:07] Yes, yes.

David Todd [01:31:09] Well, let's talk about some sort of general topics here.

David Todd [01:31:13] You know, aside from the Texas hornshell, I understand that there are populations of a number of freshwater mussels that are not doing well in Texas. Can you help us understand why there's this sort of wide spectrum of these creatures that are facing problems?

Bob Howells [01:31:33] Yeah, we've got quite a number of species - East Texas, West Texas, Rio Grande - that are very, very rare and are in big trouble. And particularly the last few years where we've seen incredible droughts - whole rivers drying up and dewatering, reservoirs down to ten and fifteen per cent. Even for species that adapt well to reservoirs (and some do), that's a little tough.

Bob Howells [01:32:03] I can't imagine what some of the population surveys look like now, but it would probably be a little bit frustrating.

Bob Howells [01:32:14] But we're seeing massive climate change - warmer summers. Even when I was working, I would tell people we were looking at patterns of fewer small and light rain showers, punctuated by long periods of drought with heavy, damaging, scouring storms. The climate is changing. It was back then, and it's even worse now.

Bob Howells [01:32:40] Plus, again, until recently, we haven't been looking at freshwater mussels, or really many other freshwater invertebrates, in Texas. So, if you built a road or you had to put a low water crossing in or build a dam, impact just wasn't a big deal. No one gave it a great deal of consideration.

Bob Howells [01:33:01] Hopefully we're looking at things in a little broader sense now than we used to.

Bob Howells [01:33:09] A lot of construction activity can occur. Mitigation can be done. You just need to do it. It may take time, may cost a little more. But, a lot of times you can avoid having some of the massive impacts we've seen in the past.

David Todd [01:33:25] So, just to touch on one thing you brought up there, about how, I guess historically, or at least until recent years, there wasn't as high a level of interest and focus on freshwater mussels and other invertebrates. And I'm wondering if it's just this problem of the sort of charismatic species and that, you know, there are creatures like bison or bald eagles that naturally grab even lay people's interest. But then mussels are a more subtle creature that maybe folks don't appreciate as much. Is that a problem?

Bob Howells [01:34:05] That's it exactly. Yeah. Everybody loves giant pandas. But do you love a Texas fatmucket? And most folks are going, "What the devil is that?" And it's a wonderful little shell that lives in central Texas, found nowhere else in the world. It has a striped shell, with these bright ray patterns on it. And the females have soft tissue that they poke outside the shell that looks exactly like a fish. It has a lateral line, fins, eye spots, and she sits and wiggles it and a fish comes roaring in, thinking it's getting a meal, and gets blasted with a face full of parasitic larvae.

Bob Howells [01:34:45] That is cool. People need to appreciate what's going on that's right under their feet that they hadn't even seen.

Bob Howells [01:34:54] But yeah, charismatic species, unfortunately, tend to draw a lot more money than some that are particularly ugly, that are buried in the mud.

Bob Howells [01:35:04] It's interesting, something I hadn't mentioned earlier. One of the first guys in in the U.S. here to really start working with mussels and start crying about their demise was a guy named Dave Stansbery of Ohio State University. Dave died a few years ago, but, he was in the '50s and '60s and '70s going, "Mussels are vanishing. We got to do something."

Bob Howells [01:35:32] And he was asked to be a keynote speaker at one of the last Freshwater Mollusk Conservation Society meetings. And he gave the speech. And one person stood up and said, "Dave, you were the last person to see some of these mussels alive. How does that make you feel?" And he said, "I feel better now." And the guy said, "What do you mean you feel better?" He said, "No, I feel better now." And he's talking to 200 people sitting in the audience.

Bob Howells [01:36:04] So things have changed from what they used to be.

David Todd [01:36:11] I get his point that he had managed, along with people like yourself, to share that concern and expose more people to try to, you know, ring the fire bell. Yeah.

David Todd [01:36:28] So, let's talk about something that you've been thinking about for a long time. I think back in the 1950s, you had an early interest in exotic species that were invasive, and that seems like a harbinger of things that have become really significant in the years since then. Could you talk a little bit about the history and effect of some of these invasive mollusks that have come to Texas? I think there's apple snails that you worked on, and quagga and zebra mussels.

Bob Howells [01:37:08] Yeah. Again, probably the work with exotic species was what brought me here more than problems with freshwater mussels. They weren't even thinking about that back in the early 1980s. And again, having worked with some of these exotics as a child ... I was raising apple snails and selling them to the pet stores back then. Basically, anything you could raise - if you were in a northern state - anything you could raise locally, you could sell to a pet store somewhere. Beats having to air fly it from Miami.

Bob Howells [01:37:49] So, when apple snails first showed up in at Texas (actually, my friend Ray Neck identified one of the first populations, but it didn't go anywhere), suddenly they turned up in a rice canal. And some of these guys eat a lot of rice. A call came in quick. You got to get down to Southeast Texas. We got these big snails. Suddenly it was a very big deal. And much like the freshwater mussels, groups rose to look at the problems of these apple snails.

Bob Howells [01:38:19] Apple snails haven't and won't have much of an effect on freshwater mussels other than eating aquatic vegetation and maybe influencing a little erosion, but they can have massive damage on rice crops. They come out of South America [correction: and] Central America. One of the channeled apple snails that showed up here in Texas, was introduced, for example, into the Philippines, Taiwan, China. The Philippines used to be a major rice exporter. They're now an importer. The apple snails eat so much they can't raise enough to meet their own demands.

Bob Howells [01:39:00] And we wound up with them in a rice canal here in Texas. And so, you know, I was called in and fortunately, you know, luckily, the way rice is grown in Texas, they haven't had a lot of major negative impact on the rice farmers here.

Bob Howells [01:39:17] However, there are several types of channeled apple snails. Ours is called "spotted apple snail". Got significantly bigger than the ones in the Philippines or Korea or Japan. And I'd have people from Japan give me a call and say, "How come your snails are so big?" And naturally, I would say "Even our invasive exotics in Texas are bigger."

Bob Howells [01:39:42] Well, why aren't they a problem? Well...

Bob Howells [01:39:46] So, you know, the apple snails are one of those, something from childhood that comes back around to surprise you.

Bob Howells [01:39:54] The zebra mussels, again, we knew they were coming long before they got here. And when we put them on the prohibited list here, one of the interesting things: some of the other states would say zebra mussel, and they'd list Dreissena polymorpha as illegal. You can't have it. When we listed them here, I had them list only the genus. So, we're prohibiting all mussels of the genus Dreissena. All of the zebra mussels and their relatives are illegal. This was neat because a couple of years later, when quagga mussel turned up, it was already illegal in Texas.

Bob Howells [01:40:31] Now, unfortunately, they're so tiny when they start attaching - literally under a millimeter - and trying to find them in every nook and cranny of a boat, it's pretty difficult. And it was only a matter of time before they came.

Bob Howells [01:40:50] In fact, I've got a flyer running around that I made on zebra mussel identification. Some folks have seen it. The zebra mussel in the flyer was the very first one found in Texas, and turned up on Ross Perot's dock. I'm sure, he had nothing whatsoever to do with it, but that's where it was.

Bob Howells [01:41:09] But unfortunately, zebra mussels, quagga mussels are a lot like, a lot like common carp. Common carp are horrible things. We never should have introduced them. Actually, again, an interesting little fact. For ten years in the 1800s, Texas had no Fish and Game Commission. It was abolished because we'd introduced common carp. The locals were so angry, they abolished the Fish Commission for about a decade, before they reestablished it.

David Todd [01:41:45] They were punishing the state for introducing common carp.

Bob Howells [01:41:48] Yes, yes. Abolish the entire commission. Finally, they reestablished it.

Bob Howells [01:41:54] But common carp is here to stay. You cannot get rid of that. There's nothing you can do. You've got to manage and adapt with it. And unfortunately, it's kind of that way with zebra mussels as well. It's nice to be able to keep them out of waters they haven't already invaded and make an effort there, but once you've got them, you've got to control them. Eliminating them, at this point, is probably not possible.

David Todd [01:42:23] So I've heard some kind of revisionist talk about exotics and invasives and say, "Oh, you know, they must be serving some useful role. More is better." I guess there are lots of alibis there. What is your thought about whether exotics add some sort of fillip that we don't maybe respect them for?

Bob Howells [01:42:49] Well, I go back to diversity means stability. One of the problems ... Most of the exotics that get introduced never make it, die out, that's that. However, some of the ones that do are generalists that can adapt to all sorts of different environments, different foods, different temperatures. The more of a generalist you are, the better your chances.

Bob Howells [01:43:14] And unfortunately, what we see with a lot of exotic introductions are massive spikes in abundance that are environmentally horribly harmful to many of the native species. Sometimes literally eliminating them completely. And then that exotic dies back to a more tolerable level, that it then maintains over an extended period of time.

Bob Howells [01:43:40] But, a lot of times you have lost a lot when that original spike occurs. We saw that ... There was a giant ram's horn snail that was introduced, a relative of the apple snail, was introduced into the headwaters of the San Marcos and into New Braunfels. And that's pretty much what it did. It had a massive population explosion for some years, eating up all this wonderful vegetation. And then it crashed. And over in San Marcos, they're pretty rare. You got to look hard to find one now.

Bob Howells [01:44:16] Luckily, I don't think they drove anything to extinction. But in some cases, they do.

Bob Howells [01:44:22] Zebra mussels have pretty much eliminated most of the freshwater mussels from the west end of Lake Erie. They've just covered them, smothered them, and they're gone.

Bob Howells [01:44:34] And so that spike is a problem.

Bob Howells [01:44:37] I think it's wonderful to make excuses and go, "We're stuck with them. We may as well deal with it.".

Bob Howells [01:44:46] The longer you can keep some of the bad guys at bay, the better.

Bob Howells [01:44:51] I know when the channeled apple snails first arrived in Texas... Ironically, the bad guys we've got come out of South America, Argentina, and such. They carry a parasite, rat lungworm, that originated from China. And they can carry that parasite to humans. The original invasion in Texas, only the apple snails were here. We didn't have that parasite. Nobody had to worry about getting a rat lungworm infection. It settles in the human brain and can give you a headache, or it might kill you or anything in between.

Bob Howells [01:45:33] I've just recently heard that they've discovered rat lungworm has now made it to Texas. If we didn't have the apple snails, we might not be dealing with that parasite here.

David Todd [01:45:44] I guess part of the risk is just unforeseen consequences.

Bob Howells [01:45:49] Exactly.

David Todd [01:45:49] Yeah.

David Todd [01:45:52] So, I was curious if you could talk about attitude about mussels and the other wildlife that you've studied. I mean, maybe you can just help us understand why they've been important to you, and they've held your interest for decades.

Bob Howells [01:46:10] Yeah, it's interesting. We have a nature center here where a couple of times a year I go do talks. But I always go in and preview them for the director going, "You need to look at this, because what excites me may not excite everybody else." Yeah, I appreciate that. But, again, I love the diversity of nature. I hate to see it lost. And we are losing so much diversity.

Bob Howells [01:46:36] When I was a youngster, I was able to go into a local Woolworth's store. I bought horn toads. I bought a Texas tortoise. I bought an Asterias cactus [clarification: sea urchin cactus]. All of these things are on threatened or endangered lists. Now, your kids can't have them anymore. They're on the brink of blinking out. You don't get to have them.

Bob Howells [01:47:04] Some fish I worked with with the environmental consulting firm, back in the early '70s - blueback herring were so abundant in New Jersey when you did a net haul, they would be third or fourth in abundance. You'd get tired of counting them all and letting them go.

Bob Howells [01:47:21] There are so few running up rivers to spawn right now that New Jersey's prohibited all harvest of them.

Bob Howells [01:47:27] Things that were so abundant for me, and I think perhaps most noteworthy, when I was a child, my father took me out fishing on a breakwater, a jetty out into Lake Erie. Blue pike were running that night. We had a Coleman lantern. For as far as that lantern would shine, there were thousands and thousands and thousands of blue pike. They were interested in spawning. They weren't interested in anything we had. We didn't catch a one.

Bob Howells [01:47:54] But can you imagine a kid seeing this? The lake is just solid fish. It was amazing.

Bob Howells [01:47:59] They're now extinct.

Bob Howells [01:48:01] There were so many, that Brown Derby restaurants had a blue pike fish fry every Friday.

Bob Howells [01:48:06] They are extinct. Your kids will never get to taste one. I hate to see them gone.

David Todd [01:48:14] Yeah. It's a big hole. What a gap.

Bob Howells [01:48:22] So I think that one of the things that you pointed out, maybe is that folks are not looking at the blue pike, but they are looking at their phones. Do you think that that's part of the problem that you see?

Bob Howells [01:48:41] Yeah, I actually had a college professor come through here about two years ago into my office at home, and he brought three graduate students, graduate students. They walked in and looked at my library. "Wow. So many books." Yeah, we used to read those once. And well, we look it up on the internet.

Bob Howells [01:49:03] Well, any time you think everything on the internet is there. I'll tell you some things. You can look them up and see if you can find them. You won't. You'd better find one of these books off my shelves.

Bob Howells [01:49:15] Not everything is on the internet. And not everything there is correct.

Bob Howells [01:49:23] I think those phones kind of take us away from the natural world and appreciating what is really out there. People will say, "Why don't you go for a relaxing walk in the woods?" I can't. I see too many things that upset me.

David Todd [01:49:42] So you've been a fisheries biologist for decades. I think it's, from somebody who's not one, my perspective from looking in is that it is a very interesting combination of science, policy, passion, maybe some idealism. What has been your takeaway from this work over the years?

Bob Howells [01:50:12] Well, I think the folks that go into the field are folks that like fishing, like the aquatic environment, like swimming, diving, just like nature.

Bob Howells [01:50:25] If they thought they were going to go into it and get very wealthy quickly and retire early, they're mistaken. It's not going to happen. I only knew one wealthy biologist, and he married it. He didn't earn it. So.

Bob Howells [01:50:41] Yeah, you got to have the motivation and the interest to do it.

Bob Howells [01:50:45] The other thing that I find, and again, one old boss of mine once described me as an old-time naturalist that was born about 100 years too late. And he's probably right, because I see a lot of biologists becoming biochemists, and much more chemistry than biology.

Bob Howells [01:51:07] I talked to one colleague one time about a freshwater mussel I'd sent her tissue samples to do electrophoretic analysis on. And said, "We got this same tissue out of one from the Ohio River that you have in Texas". And I said, "Well, what did the shell look like?" And she had no idea. "I didn't look at the shell. I just had the tissue in the laboratory."

Bob Howells [01:51:31] You need to look at the whole critter. It's not just the chemicals that make up its genes. There's a lot more to it than that.

David Todd [01:51:51] So, I think that there are also some points that you've shared with me before. And one is that, it sounds like angling, which I guess is always been kind of the industry that fishery biologists have instructed and maybe supported, is declining, and how does that affect the discipline of being a fisheries biologist?

Bob Howells [01:52:20] Oh, wow. Wow, again, we're becoming a more urban and less rural population in general. So, things like hunting and fishing are declining. Hunting, I suspect, is declining even more rapidly. I saw some internet headline the other day. One of the northern states: too many deer, not enough hunters.

Bob Howells [01:52:46] And, just stop and think about, if you look back forty years ago, I bet you could find any number of Parks and Wildlife biologists who augmented their income by fur trapping. I don't think very many people fur trap anymore.

Bob Howells [01:53:05] Hunting is slowly fading, as areas to hunt, species to hunt, decline. And again, as we're becoming more urban, we're less interested in it.

Bob Howells [01:53:16] I'll look at that cute panda on the telephone screen, but, I don't want to really go out in the field and see one, likewise with a deer or something.

Bob Howells [01:53:26] So I do think the world is changing. I think that, if you're going into the fishery biology field, you need to recognize that biochemistry is a much greater part of it than it used to be, and it's going to continue to be.

Bob Howells [01:53:42] But, I don't know how many fishing license Parks and Wildlife sells, but I bet the number's down. Again, we're much more urban, much less rural, much less natural than we used to be.

David Todd [01:53:57] I guess the place we're born and the time we're born really has an effect on what we find interesting and valuable to do with their time.

Bob Howells [01:54:06] I agree as well.

David Todd [01:54:12] I noted that you found it discouraging some of the trends in fisheries. And I'm wondering if you could talk a little bit about that and maybe as just a favor, offer some silver lining that might be encouraging to younger folks who might be coming into the fisheries field and, you know, be searching for the oomph that you had to pursue this over the years.

Bob Howells [01:54:48] Well, I'm trying to think. One of the things that I find distressing and again, I have myself worked with biochemically what they call electrophoresis. I have not done DNA work personally, so I'm not in a position to be able to really criticize, "Oh, I don't like the way you did that." I don't know enough.

Bob Howells [01:55:13] But I'm seeing some folks... one of the easiest ways to eliminate a rare species is to simply look and say, "That's not a rare species. That's just a weird, strange form of something very common and widely distributed. So, we don't need to worry about it." It's gone.

Bob Howells [01:55:31] On the flip side, the same biochemists that are doing that are finding what we call cryptic species. They're finding species that were hidden.

Bob Howells [01:55:42] I mentioned earlier a mussel we call the Texas fatmucket. Turns out, if you look in my books, I'd tell you they're in the Colorado drainage and Guadalupe drainage.

Bob Howells [01:56:01] But, they've just discovered recently that the ones in the Guadalupe, they look almost identical. You can't physically tell them apart, but the ones in the Guadalupe are a distinct species. We had no idea. So, they were actually able to discover a number of new species that were right in front of us, including one that, ironically, got named after me.

Bob Howells [01:56:29] Your top honor is to have a species named for you. There's a mussel we had originally called the "squawfoot". It's widely distributed all the way from New England to Texas, everywhere in between. It's another one: it's never common. Just never is. You see one here, two there, never a lot. And I gave the distribution maps for Texas.

Bob Howells [01:56:52] Well, they looked and found, and lo and behold, the one in the Colorado drainage is a distinct species. So it's now Strophitus howellsi. But the name squawfoot was, was apparently, politically incorrect. So that mussel was changed to be the creeper. So unfortunately, the mussel name for me is now the Hill Country creeper. True story.

David Todd [01:57:21] Well, it seems to go back to this point about how you've loved diversity, and that maybe that's going to be the challenge for this upcoming generation is to see distinctions and differences that we were just unaware of.

Bob Howells [01:57:39] Exactly. They're going to be finding, things that I didn't even see. I could even suggest a few places to go looking. You know, some of the field guys: "You might look at this. It looks a little different. Get your DNA kit out, and see what you can find. You may have a unique species there."

Bob Howells [01:57:58] So, there's that. And then there's still the constant, ongoing fight not only to protect them, but to understand them better.

Bob Howells [01:58:06] You know, we talked about thermal tolerances and things like that. You could see a situation perhaps where you'd reared, produced enough laboratory-raised animals, you could actually do studies, perhaps. There are many things yet to be done. It's not all been done by a long shot.

David Todd [01:58:26] More to come.

Bob Howells [01:58:27] More to come.

David Todd [01:58:28] Well, you've been very kind to spend time with us, and tell us all these interesting stories and give us these insights.

David Todd [01:58:37] Is there anything you'd like to add that we might have skipped over, that I neglected to explore with you?

Bob Howells [01:58:44] Oh, I don't know. I don't think so. We've gone a lot of places. Anything you need to ask?

David Todd [01:58:54] So, what are you studying these days?

Bob Howells [01:58:59] Believe it or not. To keep my mind from rotting here in retirement, ironically, seven weeks after I retired in '06, I had a major heart attack, and that's kind of slowed up the program. So, I don't get very far from the house anymore.

Bob Howells [01:59:17] The couple of things I have done is to take the massive shell collection I have here, and it's being transferred up to the Texas Memorial Museum. So, everything I had will ultimately be available for everyone else to study up there.

Bob Howells [01:59:32] But to keep myself busy, I've always had a fascination with, believe it or not, cactus and succulents. And I'm raising all sorts of different aloes here, and I've got over 100 different kinds, including some hybrid aloes that are developed here. You know, one of a kind. Nobody else has one like this, that sort of thing. So, the house is full of aloes, and it's particularly full of aloes with the cold snap right now, where I had to bring things in to keep them from freezing.

David Todd [02:00:05] Very good. Well, the adventure continues.

Bob Howells [02:00:09] The adventure continues.

David Todd [02:00:11] I hope you stay warm and your aloes stay healthy. And, again, thank you so much for doing this.

Bob Howells [02:00:19] All right. I hope this worked out for you.

David Todd [02:00:20] It could not have been better. I just really wanted to say thank you.

Bob Howells [02:00:25] All right, well, thank you for having me.

David Todd [02:00:27] You bet. All right, you take care.

Bob Howells [02:00:29] That's it then?

David Todd [02:00:30] We're all done. Thank you.

Bob Howells [02:00:32] All right, thank you.

David Todd [02:00:33] All right. Bye now.