

TRANSCRIPT

INTERVIEWEE: Laurie Dries

INTERVIEWER: David Todd

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David Todd [00:00:03] Good afternoon. I'm David Todd, and I have the privilege of being here with Dr. Laurie Dries. And with her permission, we plan on recording this interview for research and education work on behalf of a nonprofit group called the Conservation History Association of Texas. And for a book and a Web site for Texas A&M University Press. And finally, for an archive at the Briscoe Center for American History, which is at the University of Texas at Austin.

David Todd [00:00:30] And I want to stress that she would have all rights to use the recording as she sees fit because it is hers.

David Todd [00:00:37] So with that preamble, I wanted to just make sure that she's comfortable with this situation and is willing to go ahead. So what do you think?

Laurie Dries [00:00:46] Absolutely.

David Todd [00:00:47] Great.

Laurie Dries [00:00:48] Sounds good.

David Todd [00:00:49] Love it. Thank you.

David Todd [00:00:51] So, it is Thursday, October 26, 2023. It's about 2:25 Central Time, where I am, 3 p.m. 325 Eastern Time, where Dr. Dries is located.

David Todd [00:01:05] As I said before, my name is David Todd, and I'm representing the Conservation History Association of Texas, and I am in Austin. We're conducting a remote interview with Dr. Treece, who is based in the Mooresberg, Tennessee area.

David Todd [00:01:24] From 2003 to 2014. Dr. Dries was an environmental scientist and an endangered species biologist with the Watershed Protection Division, or Department, rather, at the City of Austin, and she had extensive responsibilities for the Barton Springs salamander while she was there, including implementing the 10(a) endangered species permit, managing the springs and the salamander, monitoring water quality and hydrologic data, and joining in on public education and outreach on behalf of the Barton Springs salamander and other endangered species that were found at Barton Springs.

David Todd [00:02:03] So, today we'll talk about Dr. Dries' life and career to date, and especially focus on what she's learned about the history of the Barton Springs salamander and its conservation.

David Todd [00:02:14] So, a little introduction there, and maybe we can do a segue to a question.

David Todd [00:02:22] And I was curious if you could tell us about your childhood and early years, and if you might be able to point to any people or events in your young life that might have influenced your interest in animals and wildlife protection.

Laurie Dries [00:02:38] Well, thank you for inviting me to do this. I think it's really important to keep some sort of history of all the people that work on things because memories get lost. So, thank you.

Laurie Dries [00:02:53] You know, I guess I've been around on the planet long enough that I don't remember being a small child and having a particular event. I just loved being outside all the time. I loved nature. We had a family that we were outside all the time. We lived in places where there were parks and trees and gardens. And my grandparents had grown up on farms. So, you know, we would go off and do that. And our parents, me and my brothers, and the parents in the neighborhood where we lived, it was just kind of "send the kids outside all day", "go, amuse yourselves, child!"

Laurie Dries [00:03:34] So, we would do that, just run around all day, you know. And I think that was part of it. We just stayed outside and amused ourselves. And so, I really loved it. I just found it very peaceful and fun.

Laurie Dries [00:03:47] I do remember watching Jack Hanna. I don't know if anybody will remember him, but he's a fellow that worked at one of the zoos, and I don't remember which one, but he used to go on Johnny Carson and he would bring animals on Johnny Carson and he would talk all about the animals. And it was a pretty big deal to get to see him, and see the animals that he had. I believe he also appeared on some other shows because I am very skeptical that my parents let me stay up late enough to watch Johnny Carson when I was small. So, I saw him somewhere. Not positive where, but I loved that very much.

Laurie Dries [00:04:30] And I loved watching Mutual of Omaha's Wild Kingdom with Marlin Perkins. I always thought that was great.

Laurie Dries [00:04:38] So, you know, I guess those two things might have influenced it. And my family, really, we all love that kind of stuff.

David Todd [00:04:49] Do you remember any particular outings that you might have done with your peers or if you had siblings?

Laurie Dries [00:04:58] Going out in the winter: we'd run around all day, get freezing cold, sledding or something, and then go inside, because it would be on a weekend, obviously, and go inside and my mom would make us hot cocoa and then, you know, sit down in front of the TV and watch whatever nature show was on T.V. at the time.

Laurie Dries [00:05:14] Of course, at that time there were only four TV channels anyway, so you didn't have a whole big choice. You had to time when that was going to happen. So, we managed to get our fingers and feet frozen at the right time to make the TV show. You know, it was all planning.

Laurie Dries [00:05:33] Anyway, you know, that's mostly what I remember.

David Todd [00:05:37] Did you have any, I think you mentioned that there were gardens near where you grew up. Was any of your childhood spent digging in the dirt and weeding and that kind of thing?

Laurie Dries [00:05:47] Oh, yeah. My dad always had a garden. My grandparents had a huge garden. So, yeah, we'd be playing in it. We'd pick all the vegetables and, you know, eat vegetables of what we had.

Laurie Dries [00:06:00] And the neighbors had a black raspberry patch and red raspberry patch - our next-door neighbors. And so, when we would go back and forth between the houses, we'd run through the patch and pick the berries and eat them. You know, we thought that was really absolutely heaven. I mean, you just couldn't beat it.

Laurie Dries [00:06:20] So, yeah, we did a lot of that: playing in the dirt.

David Todd [00:06:24] Now, were any of the outings overnight? Did you do any camping?

Laurie Dries [00:06:30] I did not do any camping. Oddly, my mom was not a fan of camping. I don't know why, but she wasn't a fan of camping, and my first, literally the first camping trip I ever took was when I went back to school to get an undergrad degree in my thirties. And I was taking entomology from Riley Nelson and we had a weekend field trip. And we went camping and I tried to scramble to figure out, "well, what do I need? I guess I need a tent, a sleeping bag." Called my younger brother, who had gone camping with his buddies when he was younger and got some advice on doing it. But I'd never gone camping before then, ever. Who knew?

David Todd [00:07:19] Well, it's hard to argue with a bed and, you know, shelter. There's nothing wrong with that.

Laurie Dries [00:07:25] Yeah.

David Todd [00:07:26] So, you mentioned your time in entomology. And I was wondering if there were other episodes in your years in school, which were extensive, it sounds like, whether it's grade school or college or grad school that were influential for you in, you know, your work in the animal field and wildlife conservation.

Laurie Dries [00:07:51] Well, I just didn't take the straight route. I didn't take the "I want to go be a scientist or conservation biologist" route. I didn't know, I really didn't know I was going to do that.

Laurie Dries [00:08:06] I went to school as an undergraduate, out of high school. But I was in the communications school, in the radio, television, film school. This was at University of Wisconsin-Madison. But I guess I just didn't want to be in school.

Laurie Dries [00:08:27] Then I ended up, I moved to Texas, and I started pursuing theater and acting. And I always loved film - started doing that. Austin was a great place for that at the time.

Laurie Dries [00:08:40] And I ended up going to New York City and did a summer program at the American Academy of Dramatic Arts. Really nothing to do with biology. And I loved that.

Laurie Dries [00:08:54] And during that time, I don't know, I started getting more, I'd always been interested in nature films. And I was starting to get more and more interested in them and in making them, because I thought at the time, Mutual of Omaha was just a little too human-centric. And that it would be really great to have shows that were a little more accurate.

Laurie Dries [00:09:22] So, that led me away from trying to pursue acting, besides the fact that it's really hard and almost nobody makes any money, that I decided what I really needed was the education in biology, because that's what I lacked. And then I could go back and I could be a nature filmmaker. That's what I thought.

Laurie Dries [00:09:49] So, I went back to Austin. And then I went back to school as an undergrad about the age of 30. And decided to get a biology degree. So, I did.

Laurie Dries [00:10:06] And then, about that time I was trying to decide what I was going to do when I graduated and I had a professor Mike Singer, who taught animal behavior. And one day he said to me, "Well, you know, I think you should go to grad school. You know, I think that'd be good for you."

Laurie Dries [00:10:29] And I said, "Well. Why? I don't like school. I'm older than every student around here. I'm working my way through school. Why? You know, why?"

Laurie Dries [00:10:46] And he said, "Well, you don't have a good attitude, but you have the right attitude for grad school."

Laurie Dries [00:10:53] Are you kidding? It was so funny. Well, I said, "Well, okay, can you maybe explain that a little?"

Laurie Dries [00:11:05] And he said, "Well, you question things, all the time. And you really want to know why things work. And you're persistent. And that's why I think you would really like it."

Laurie Dries [00:11:20] So, I decided I would go to graduate school. And I ended up staying in Austin to go to graduate school because at the time I was married and my husband was an Austin musician and so he didn't want to go anywhere else.

Laurie Dries [00:11:33] So, that was how I ended up as a graduate student in biology at University of Texas at Austin.

Laurie Dries [00:11:42] And that was a great place. I mean, there's so many people there that I learned so much from. You and I were chatting before, a little bit, about Clark Hubbs. He was there. I had my office next to him. He was of much encouragement to me in his own way. Just really lovely.

Laurie Dries [00:12:03] And I mentioned Riley Nelson and then all the students that I was with were really helpful, because it's hard.

Laurie Dries [00:12:11] And the professors - Mark Kirkpatrick, I know at one point, I was having a tough time in my personal life and trying to get through these classes. And I don't know, it was one of the first years of grad school and I just went in, "Gosh, I was like, I don't

even know how I can do this paper." And he just kind of sat down with me, and was like, "Okay, well, let's just talk about this and figure it out, you know? You can figure it out." Okay. Thank you. And that that was great.

Laurie Dries [00:12:39] I had graduate students and post-docs that I worked with that were really instrumental - Molly Morris for one, Charlie Baer. They were great. And then I worked with Mike Ryan closely, did a lot of field work with him and worked in his lab.

Laurie Dries [00:12:56] And my supervisors, David Hillis and Jim Bull, were, you know, they did their jobs for sure, were very helpful.

Laurie Dries [00:13:05] And then really the whole cohort of graduate students in the labs when I was around were amazing. You know, we all looked out after each other - Kelly Agnew and Barb Mable and Kris Kicher. Paul Chippindale was in the lab at the time, which turns out to be how I was even acquainted with the Barton Springs salamander at all because of Paul and David Hillis, and the work that they were doing. So, I was acquainted with them before I ever even saw them. It was pretty interesting.

Laurie Dries [00:13:42] So, yeah, then by the time I got about two years into grad school, I decided I really wasn't going to be making films. I was really going to be finishing. And I liked the research. I liked the science. I liked the biology. I really was very interested in animal behavior and behavioral ecology and evolutionary ecology. And those are such wonderful big puzzles that that just took me off far from the film world and into the land of science.

David Todd [00:14:21] Well, before we go into the land of science too far. I am curious to see somebody who's interested in media and and was schooled in Mutual of Omaha, what sort of books or movies or TV shows, might have also been influential for you.

Laurie Dries [00:14:48] Do you remember, or have you seen a movie called "The Bear"? I remember that. It's about a bear, but it's, you know, not "this bear is your pet". Oh, it's the bear. That I remember and I was fascinated by it.

Laurie Dries [00:15:18] And there's another movie called "Koyaanisqatsi". You know, it's. It has no words. It has all of this amazing footage and music and nature. And it's I thought it was a transformative experience watching it.

Laurie Dries [00:15:40] There are a couple of things. Over the years, when I did some fieldwork in Panama, I met some folks from Oxford Scientific Films, and because I still think film is amazing and an amazing place to tell stories, they let me tag around after them while they were working on "Panama Wild", and hold the camera sometimes. And got to mess with that. So I thought that was pretty interesting. So, that's fun.

Laurie Dries [00:16:16] And at that point, they were really you know, that's after cable television then exploded. And so, there are many more production companies and people were trying to make films that were much more representative of what nature is really like and what species, the animals, really experience. And they had behavioral ecologists on their staff and they had all kinds of people. So, they were really trying to hold to the science.

Laurie Dries [00:16:45] And of course David Attenborough came to great prominence then too, so that was a big part of it.

Laurie Dries [00:16:57] It's funny. I can't really think of others right now. Sure I've seen a million.

David Todd [00:17:04] No, this is great to hear because it's difficult to tell these stories through the viewpoint of the animal and make it less human-centric. And I hadn't thought about that there was this period of time where, you know, there was a lot of effort to be more objective and more scientifically based.

Laurie Dries [00:17:30] Yeah.

David Todd [00:17:31] You were there, watching that change.

Laurie Dries [00:17:33] Yeah, the opportunity was there with the expansion of television channels. So, there were places to do it.

Laurie Dries [00:17:41] And it's, I don't know if this is the case still, but while I was in school, at the University of Texas and before that at University of Wisconsin-Madison, there was almost a wall between a school of communication and the science schools. So, you know, there wasn't a place that I knew of, accessible to me, where you could go and get a university college degree that allowed you to take science classes in the science department and be taking film classes in the film department. You know, there was a lot of competition for those spots, seats in the classrooms, and I think that was pretty unheard of.

Laurie Dries [00:18:32] And to David Hillis' credit, while I was a student with him, we talked about this quite a bit and he talked with one of the professors in the in the film school at U.T. about whether it would be possible for me to do a master's in film while I was getting my Ph.D. in science. And they could have worked it out. I would have been that, you know, that odd student. But I, I did not have, frankly, the time that I could do it because I was working.

Laurie Dries [00:19:05] But at least, you know, someone was making inroads at that time. And it may be that there are programs like that now. I haven't really looked, but I hope so.

David Todd [00:19:17] Yeah. I mean, it's wonderful to be that bridge between science and the ability to tell stories about science. And so, I'm glad that you helped, you know, span those two worlds.

David Todd [00:19:33] Well, so while we're talking about different kinds of worlds, I thought it was interesting that you got your Ph.D., and I guess most folks who would go to that length would probably return to academia. But you decided not to. And I'm wondering why you decided to work outside of academia.

Laurie Dries [00:19:59] Yeah, I did do two years, two different post-doc research projects after getting my degree and in the process of that, I realized I never felt that comfortable in academia. It just wasn't the kind of environment that I liked enough to excel in. And I, like, I'm kind of driven to try to excel. Doesn't mean I always do, but I just couldn't see that as something I was going to be able to do.

Laurie Dries [00:20:38] And I saw the professors around me, and the longer they were there, the less time they spent in the field, the less time they spent doing their own research, the more they were under stress to publish that next paper and find that smallest publishable unit.

Laurie Dries [00:20:51] And I am very interested in the whole messy world of ecology, and you just can't find things out that quickly when there are 25 pieces of a puzzle you're trying to put together.

Laurie Dries [00:21:07] And I thought, I don't know. I just can't, I can't see myself doing it.

Laurie Dries [00:21:14] And I enjoy talking and teaching in a more informal environment, and talking to people of all ages and different backgrounds. I get to learn things from them too, and I like field trips and I like to work in the field.

Laurie Dries [00:21:32] So, I thought, "Well, let's try to take all of this academic research and apply it somewhere in a really messy situation."

Laurie Dries [00:21:44] So, I started looking around for other things and I was very lucky that a job at the City of Austin came open and my friend from school, from college, Dee Ann Chamberlain, was working for the City of Austin, still does. She said to me "I know you're coming to the end of a post-doc. You know, this job is open. Do you want to apply for it?"

Laurie Dries [00:22:16] So, she encouraged me to apply, and I did. And I got the job.

Laurie Dries [00:22:22] Right after I got the job, Molly Morris and I had applied for a large grant to keep studying swordtail fishes. And right after I got this job at the City of Austin, we got the grant. And so, I had to decide, do I want to continue and work with her on being funded through this grant in a post-doc, or do I want to take this job with the City? And I chose to take the job with the City, and she hired another postdoc to do it.

Laurie Dries [00:22:59] Life's funny. It'll take you places you never thought it was gonna.

David Todd [00:23:06] Yeah, it's can be real roller coaster.

David Todd [00:23:10] So, as you went to work at the City of Austin, you've got all these skills, academic skills, but I gather you also had a conservation philosophy that was part of your luggage. And I'm wondering what, how you describe it.

Laurie Dries [00:23:30] Yeah, the simplest description of my conservation philosophy is there's a cost to doing nothing. If you step back and you do nothing, there's a cost. Tend to think of, "Well, if I don't do something, you know, it'll all be okay and it'll stay that way." Well, no, it won't. So, if you don't step up and try to do something, then something is not going to get done, so there's no potential for something to get better.

Laurie Dries [00:24:00] So, you got to try. You've got to make the effort.

Laurie Dries [00:24:04] So, that was a big part of it, really. And I was not trying to build a 25-year career at the City of Austin. I was focused more short-term, which is I want to try to do this thing and work with these species and see if I can do some good here. And they were either what I thought was, "Well, I'll work for the City for five years, the species, they'll probably be extinct, but I will have tried. I'll go do another postdoc."

Laurie Dries [00:24:45] So I thought, you know, and it turned out not to be that way, because it turns out certainly Barton Springs salamander, and I hope Austin blind salamander, is more

resilient than that. So, I got surprised by it and I'm really very, I was very happily surprised. And it made me much more optimistic. And it turned out to be a much longer job tenure at the City of Austin than I expected.

David Todd [00:25:16] Well, I like your attitude. I think there are probably some folks that would be worried that an intervention might make things worse. And, you know, rather than take the watch apart and then realize, "I can't put it back together again". You seemed willing to dive in and work on this.

David Todd [00:25:39] And I was wondering, given that this is a real challenge to work with endangered species, I wondered what you think the hardest part of conservation of endangered species might be.

Laurie Dries [00:25:53] Well, I think that goes, to follow up on what you just said about being afraid to do some harm. And I think it's very, very easy when there are so few individuals left of a species, and especially for things that are kind of cryptic where you don't see them very often, so you don't even know exactly how many there are at any one point in time, it's really easy to worry about harming those individuals in some way.

Laurie Dries [00:26:31] And easy to forget that if the population is going to persist, those individuals need to reproduce. And they'll die. You just want them to reproduce before they die. Even if they're not endangered, they're still going to die. So, you need more generations.

Laurie Dries [00:26:52] And so, if you're worried about a small amount of harm to an animal, and it hasn't reproduced and doesn't reproduce in its lifetime, it's not helping you to be worried about that small amount of harm. It's not helping the species.

Laurie Dries [00:27:07] So, it's like you've got to sort of step back from wanting to love those individuals, and back up and go, "Okay. We need to have multiple generations, and they need to get more resilient with every generation." And just try to be as judicious as you can, and do the least harm while you're fostering the persistence of the population and the species. So you're walking sometimes a fine line.

David Todd [00:27:41] I think I get it. So, you don't want to get to the point of naming these individuals. Got to keep in mind the generations and the next era.

Laurie Dries [00:27:52] Yeah.

David Todd [00:27:54] So, you mentioned that that part of the challenge for dealing with these particular Barton Springs salamanders is that they are cryptic and you don't know just how many are out there. And there are few, to be sure, but how many, may be unclear.

David Todd [00:28:13] I was wondering how you first encountered them. I know that you spent a good deal of time SCUBA diving and snorkeling and trying to chase them down. Can you tell us how that first started?

Laurie Dries [00:28:27] Yeah. Part of the whole program for managing and conserving Barton Springs salamanders, and Austin blind salamanders, because there are two species that live in Barton Springs. And it's really - I'm going to go on a little bit of a tangent, but I'll get back.

Laurie Dries [00:28:46] So, with these Eurycea salamanders, there are species in central Texas. There are species that live mostly at the surface or just below the surface waters of the stream. And there are species that live deeper in the aquifer, that are very subterranean.

Laurie Dries [00:29:06] And there are pairs of species. So, in Barton Springs, Barton Springs salamanders live near the surface and they will move up and down. And they can follow the water down farther into the aquifer.

Laurie Dries [00:29:20] And you imagine it's sort of stratified: below them are Austin blind salamanders, truly blind salamanders that are adapted to the underground, very dark environment.

Laurie Dries [00:29:39] And those species are not genetically the most closely related to each other in Barton Springs. And it's the same thing in San Marcos. San Marcos salamander and Eurycea rathbuni. I can't think of its common name. It's the same kind of thing.

Laurie Dries [00:29:57] And so, you have animals that can move up and down, but you have an idea that you should see Barton Springs salamanders more frequently than you would see an Austin blind salamander. Just simply because Austin blind doesn't come up to the surface as often.

Laurie Dries [00:30:17] So, that ties into it's hard to know at any one point in time exactly how many animals there are.

Laurie Dries [00:30:23] However, part of managing a species is to get an idea of abundance. It's not the same thing as population size. Abundance, it's what you see. It's a measure, kind of an estimate, of what you think population size might be.

Laurie Dries [00:30:38] Well, we were responsible, the whole team, for going out and counting salamanders in each of the four springs, where they live, once a month. So, we spent a lot of time in the water snorkeling or SCUBA diving, basically picking up rocks, looking for salamanders, making an assessment of how big is that salamander? So, we would know if they were juveniles or adults, because you can't know if something's reproducing, if you don't make a note of whether it's a juvenile or an adult and then count them.

Laurie Dries [00:31:16] And we have particular ways of counting that help avoid double-counting the same animal. There are ways to do things.

Laurie Dries [00:31:25] But that's what we would do. And so, that pretty much was my introduction to seeing the salamanders is being in the water and counting them. Pretty much once a week we'd be in the water somewhere, snorkeling or SCUBA diving. Sometimes more than that. And sometimes more than that if we were just working on habitat - like after a flood and you'd want to clean habitat of sediment or something.

Laurie Dries [00:31:48] So, I've seen many, many salamanders. I've seen a whole variety of coloration. And we would try to take pictures of them. And so, we had a, you know, so we'd have some idea what that population is like.

Laurie Dries [00:32:06] I think they're amazing creatures. The first time I saw one swimming into the mouth of one of the spring openings in Barton Springs pool. And if anybody's been swimming in there, you know how strongly that water can flow. It'll just push us right

downstream if you're right in front of the mouth of that. Being underwater, counting salamanders with my hand on a boulder to hold myself in place so the water doesn't flush me downstream, and picking up the rock and watching the salamander swim directly into the flow.

Laurie Dries [00:32:42] In a way, I'd say, "Are you kidding me? That's amazing. You can just swim right into that flow! How do you do that?"

Laurie Dries [00:32:49] To think of something that tiny, phenomenally strong and it's not aerodynamic, but it's aerodynamic in water. I can't think of what the word is for that. And I remember just being amazed and sitting there going, "Wow. That's incredible."

Laurie Dries [00:33:09] That's probably the most notable time I went, "Wow." Oh, yeah. They're amazing.

David Todd [00:33:18] So this is happening, I guess, about maybe 15, 20 years ago that you were first, snorkeling and SCUBA diving, looking for them?

Laurie Dries [00:33:31] Are we counting? Well, right. That would be 2003.

David Todd [00:33:40] Okay.

Laurie Dries [00:33:40] Yeah.

David Todd [00:33:41] About 20 years ago.

David Todd [00:33:43] So, tell me what you might know about the first discovery that I understood that some people noticed them in the 1940s, but they really weren't described until maybe '93. And can you talk about any of that, that sort of origin story of Barton Springs salamanders as people know them.

Laurie Dries [00:34:04] Yeah, I think, what I know about it from looking at museum records and just old newspaper records, if you can find them, and then people who were around them fishing (salamanders are really great, you know, bass bait).

Laurie Dries [00:34:25] You know, if bass could turn rocks over, they would have a smorgasbord of salamanders. But bass have a hard time flipping the boulders over. Anyway, people saw them and used them a lot. So, there are a lot of anecdotal stories of seeing all kinds of salamanders in Barton Creek, in the Springs. But nobody described them formally.

Laurie Dries [00:34:52] I don't know what, precisely, what prompted the additional attention on Barton Springs salamanders in the nineties. I suspect it had something to do with how the management of Barton Springs pool had changed, and they were finding salamanders that were harmed or stranded or dead, at the same time that Paul Chippindale was very interested in all of the Euryceas salamanders in central Texas, because there are many species. It's a hotspot for these kinds of Eurycea salamanders.

Laurie Dries [00:35:34] So that kind of all came together at the same time that allozymes, a way to analyze proteins in DNA, became easier in labs. So, Paul started using tissue and extracting proteins and extracting the allozymes to distinguish among all of these species in this central Texas area.

Laurie Dries [00:36:10] They look similar on first blush. Right? Just a simple glance. A lot of them look very similar, so it is hard to be certain that something was a different species.

Laurie Dries [00:36:23] And if it goes around, up and down in the aquifer, well, maybe it's following the aquifer to San Marcos. Maybe San Marcos salamander is the same as Barton Springs salamander.

Laurie Dries [00:36:34] So, one of the ways to figure that out is to, you know, look at things at the molecular level, along with looking at the morphology. And so, there are morphological differences that one can find when you look at the bones and measure all the structures in specimens. You can't really do that with the live animals. They don't really sit there for that, you know.

Laurie Dries [00:36:56] So, that all came about. And David Hillis and Paul Chippindale and others described Barton Springs salamanders, and continue to describe many of the salamanders in the whole central Texas area.

Laurie Dries [00:37:09] Which coincided with a lot more attention on how rare they are and were.

Laurie Dries [00:37:19] When you describe a species, you go and collect some specimens because you have a specimen that's sort of your avatar, so to speak. They get pickled: you know, they die. So, you know, you want to be, if you're finding a whole bunch of them, you don't worry about it. And then if you collect several and choose one and then you have it in your museum, because museum collections are important many years down the road when you want to compare things. They're important.

Laurie Dries [00:37:49] But if there aren't very many, you kind of know you shouldn't collect 200, if you're only finding 20 at a time.

Laurie Dries [00:37:58] And it makes it more clear that they're rare.

Laurie Dries [00:38:01] I think that brought a lot more attention to the changes in habitat that threatened Barton Springs salamanders and Austin blind salamanders and many of the others.

David Todd [00:38:13] So, you've told us a little bit about where these Barton Spring salamanders are found. And I was wondering if you could fill in a little bit more of the picture and help us understand the kind of basic life history and the ecological niche that these salamanders might fill.

Laurie Dries [00:38:31] Sure. Barton Springs salamanders, as I was mentioning, are associated with the surface. So, they have eyes and they do have very sophisticated sensory systems - lateral line systems. They also have an amazing way of detecting sound vibration because they can detect that through their jaws that go up into what are essentially their ear structures.

Laurie Dries [00:39:01] They have gills their whole life, so they don't metamorphose like many other salamanders do. They are in the water their whole lives. So instead of losing gills as they become reproductively mature, Barton Springs, and Austin blind salamanders, become

reproductively mature, but they keep their gills and they never leave the water. They have to live in the water. They can't live on land. So that's pretty interesting.

Laurie Dries [00:39:29] They don't develop lungs, but they can breathe through their skin because the dissolved gases in water can diffuse through their skin as well as in their gills. So to me, that's pretty fascinating.

Laurie Dries [00:39:43] They live multiple years. They can reproduce well if conditions are good, but they can also delay reproduction when conditions are poor. So, it's not always guaranteed that they're going to reproduce at this time every year, and it's not necessarily seasonal. So, there are some species that always reproduce in the spring, right, or always reproduce in the fall. That's not the case here. It seems more that it's tied to how much water is flowing in the system, that that might be what the trigger is to the reproduction.

Laurie Dries [00:40:23] They are predators of other animals, creatures. They are not herbivores. They eat mostly aquatic insects and flatworms.

Laurie Dries [00:40:36] They will eat each other, given the chance. We know it has happened when we've had them, say, in a little net box because we were going to measure them or something. We'd have that sitting in a spring, and come back and find out that one of them's gone. And it's not because they escaped. You kind of know. That's pretty fascinating for them.

Laurie Dries [00:41:08] Gosh, I've seen females that probably have 20 eggs. Eggs are pretty big, for a salamander. You can see them right through their belly.

Laurie Dries [00:41:19] They lay the eggs generally on the underside of a rock, or they might be in plants or in moss. They're attached to something. And they stay there in the flowing water and then hatch. So, there's no parental care or guarding, that we know of anyway.

Laurie Dries [00:41:39] They are adapted to fluctuations in the amount of water that's available flowing through the system. And they are animals that evolved in flowing water systems. They don't naturally live in natural lakes. You know, they don't live in ponds like tiger salamanders do. They're flowing water, they're stream salamanders. Their common name of the whole broad group is brook salamanders.

Laurie Dries [00:42:15] I would say the niche for Austin blind salamanders I was describing before is somewhat different in that they, because they don't have eyes, they clearly have a really good sensory system for detecting food in the water in a dark environment. So, they're going to be very, very good at that.

Laurie Dries [00:42:38] It's a slightly different kind of niche than being at the surface where you have light.

Laurie Dries [00:42:42] And then the food sources are going to be somewhat different also because it's dark. So, I think it was Andy Gluesenkamp who started at one point hypothesizing, and he may have researched it some, whether there are tiny, just microscopic or microbes that Austin blind salamander may eat in the subterranean environment, because there's a lot less food in the subterranean environment. There's no light.

Laurie Dries [00:43:14] So, it's a little bit different. You know, many things are the same. They're sensitive to how much oxygen is in the water like any other animal that lives in the water and breathes oxygen.

Laurie Dries [00:43:30] I'm trying to think if there's something else really notable that I'm forgetting. Just think they're fascinating. But, you know.

Laurie Dries [00:43:37] Barton Springs salamanders are real variable in coloration. They have all kinds of blotches. They can be purple. They can be kind of orange. They can be a brown.

Laurie Dries [00:43:48] When they're juveniles, they don't have as many splotches. And then as they get older, they develop. And it turns out that the pattern of the splotches on their heads when they're adults is distinctive to the individual. Just like we recognize people by their facial features.

Laurie Dries [00:44:12] So, that's really key, because it allows the folks at the city who are still monitoring the salamanders now. They can go out, catch a salamander in the wild, take a picture of its head, measure it, put it back in the population, let it go. It's fine. You're doing almost nothing.

Laurie Dries [00:44:31] So, in this case, yes, you're harassing it for a brief amount of time to get a critical piece of information. So, you have all of the information on it, like its size, is it pregnant you know, what kind of fitness, how big its tail, etc.

Laurie Dries [00:44:44] And then you can go back and if you catch that salamander again, take that picture again, and, you know it's the same individual.

Laurie Dries [00:44:54] So, when you know it's the same individual, you can make a better estimate of what the population size is in that time frame, over a longer time frame, than just relying on abundance, which is "this is the number we had today". And if you take an average abundance over, you know, a year, you have an idea of what the population would be on average.

Laurie Dries [00:45:21] So, the whole set of markings is pretty fascinating - that it's individual. So that's really cool, I think.

David Todd [00:45:29] Yeah. So, it's like their fingerprint or their facial features that really set it apart.

Laurie Dries [00:45:35] Yeah.

David Todd [00:45:36] Well, that's neat.

David Todd [00:45:38] I think something else that that I think you've mentioned before as being pretty intriguing about Barnes Springs salamanders is their evolution, and I was very hoping that you might be able to comment about that.

Laurie Dries [00:45:53] Well, I think it's impressive that they've evolved to, at one time, thrive in a place, where, in central Texas, in the Edwards Aquifer, where you have pretty large

fluctuations in rainfall, where the climate is lots and lots of rain, lots of floods, and then drought, and then flood, and then drought.

Laurie Dries [00:46:25] And they need water all the time. So, it kind of makes sense in a storytelling way that they lost the ability to metamorphose because they, amphibians, still need a moist environment. So, if you go up on land, and it's a drought, you're done. I mean, there's no moist environment there.

Laurie Dries [00:46:42] But if there's still water in the stream, you're not done, you know, as long as that stream is still flowing and that spring is still flowing, you've got water.

Laurie Dries [00:46:51] That's a pretty, to me, amazing adaptation to be able to take variation, tolerate variation, at least the degree of variation that occurred through the trajectory of their evolution (I'm not talking about human-altered variation) in what is essentially the water flow.

Laurie Dries [00:47:13] And they also seem to be fine with water that is not fully saturated with oxygen.

Laurie Dries [00:47:27] So, a lot of water in surface environments that are not spring-fed, the oxygen is at saturation. It's the maximum concentration it can be, because of what's happening between the air and the water.

Laurie Dries [00:47:42] But because of the geochemical reactions in the aquifer, the limestone aquifer, the water that comes out of the springs, in the spring water, has less oxygen than what the saturation is, and it has a massive amount of carbon dioxide dissolved in it. And that's just from the geochemical reactions. There's nothing nefarious about it at all. It's just what happens when acidic rainfall goes down into the aquifer and changes.

Laurie Dries [00:48:10] So, for a species' basic respiration, for them to be able to maximize the amount of oxygen that's in the water and not be essentially affected by the CO₂ within the natural ranges, is a pretty impressive adaptation for that environment. So, they've evolved to do pretty well in what could be considered a harsh environment.

Laurie Dries [00:48:38] The tricky thing about that is that it is somewhat dependent on water flowing, rather than water being still, because water in a pond reaches an equilibrium between air and the gases in the water. So, but if water is flowing, there's constant renewal. And so, you can, hmm, the amount of oxygen that's in the water can stay relatively constant. It's complicated. It's, it's science. It's complicated.

David Todd [00:49:10] Well, you make it simple the way you explain it. So, thank you. And that's what makes it interesting.

David Todd [00:49:18] Well, so, can you coach us a little bit on why understanding the evolution of a creature like the Barton Springs salamander might be important for its conservation?

Laurie Dries [00:49:34] Sure. So, I think it's very important because if you don't understand how you got somewhere, it's going to be pretty hard to predict where you're going and it's going to be pretty hard to predict what might happen if you change what you're doing.

Laurie Dries [00:49:54] So, to put that in a more scientific context: they've evolved to variation in their environment, and they've evolved to whatever that environment is. And every environment is dynamic, you know, every ecology, every ecosystem has some sort of change that's always going on in it. You know, nothing is static on this earth.

Laurie Dries [00:50:19] So, if you've had hundreds of thousands of years of a certain range of variation that they are adapted to, and then humans come in and change that in a very short amount of time, it's very, it's nearly impossible then for the species to adapt to that new set of conditions in the environment because it changed too fast.

Laurie Dries [00:50:50] So, if you understand what happened naturally, I think it can give you a real perspective on how fast the environment can change due to whatever humans are doing, and have the species persist, and have the species be able to adapt to whatever the new conditions are.

Laurie Dries [00:51:10] So, they can evolve to new conditions as long as there's enough genetic variation, there are enough individuals around.

Laurie Dries [00:51:15] But, if you change that environment so quickly that generations can't survive, they can't adapt.

Laurie Dries [00:51:23] So, you sort of have to understand the time scales of evolution and be able to look at what's changing through that lens to then be able to predict what might be the consequences for the species: so, what might be good, might be bad. But you'd want to know.

Laurie Dries [00:51:43] And if it's an endangered species, you're trying to avoid having them go extinct because of humans.

Laurie Dries [00:51:53] Pretty hard to figure that out if you don't look at the past. If you don't study history, you're doomed to repeat it.

Laurie Dries [00:52:04] Does that make sense to you?

David Todd [00:52:05] Yeah. And so, while we're talking about, I guess, the variations through evolution and then the variations in recent days, in recent years, this might be a good chance to talk about how and why the Barton Springs salamander was declared endangered in '97.

Laurie Dries [00:52:29] Yeah. It was declared endangered because of threats to its habitat, and primarily that is habitat degradation, habitat loss. And that, for them, boils down to water quality, water quantity, and then, the size of habitats. How much is left, the size of their range, what do they have left?

Laurie Dries [00:53:04] So, Fish and Wildlife Service and many other people who lobbied very hard, including Mark Kirkpatrick and Barbara Mahler, very hard to have Barton Springs salamander listed, was a recognition that there were big changes happening with urbanization, with a rising human population in Austin - some big changes happening out in the aquifer, affecting what was happening at the Springs.

Laurie Dries [00:53:33] And, understanding that the use of Barton Springs as a recreation area was also altering that habitat and degrading the quality of the habitat.

Laurie Dries [00:53:45] So it was kind of on-site and in the broader aquifer, and a recognition that if those things continued, you can't expect the species to persist.

David Todd [00:54:01] Can you tell us a little bit about what the kind of proximate problems were for the Barton Springs salamander? I mean, I guess you sort of paint this large picture that it's stuff in the watershed that's happening, that's changing quickly, and then stuff that's happening in the pool itself, the springs. But what are the problems that are posed by those changes for the salamander?

Laurie Dries [00:54:30] Well, there are threats just to survival of individuals from certain ... there are, on-site, the way that Barton Springs pool was managed and the other springs were managed. Those things that just I mean, you put toxins in the water, chlorine. You know, we're cleaning it up like it's a regular, ordinary swimming pool. You know, we don't want algae. Well, yeah, they kill salamanders. There you are. You're just killing that outright in that respect.

Laurie Dries [00:55:01] We also have - when you remove things in the habitat, cover, rocks, moving things around - well, you can kill salamanders doing that. Or, you just make them more susceptible to be eaten by a predator because they don't have any shelter anymore. You are killing off what they eat. So, those sorts of simple things pose threats, very immediate short-term threats. So, those are very proximate.

Laurie Dries [00:55:30] Literally, the presence of impoundments, meaning dams and the amphitheaters around Eliza Spring and Sunken Garden, things that block the flow of water and slow it down and make it more like a pond than a stream, has an effect on everything in that environment. It has an effect on the animals, the food that's in there, what the conditions they have, how quickly, if a toxin comes in, how quickly a toxin can be washed out, you know, the amount of dissolved gases. So, those things happen.

Laurie Dries [00:56:05] People were also very concerned about, in the process of cleaning, the gates in the dam would be opened very quickly and the water would recede and the salamanders couldn't follow it fast enough because they'll follow water down into the aquifer. I mean, they just follow it. But if it disappears quickly and they have nowhere to go, then they're just stuck and they die because they're not in the water, they can't breathe.

Laurie Dries [00:56:30] So, there were concerns about that, of just killing them outright.

Laurie Dries [00:56:35] That is, that was a very big focus initially on how the pool was managed. And the first part of the endangered species permit with Fish and Wildlife Service, the Habitat Conservation Plan, delineated some changes in how those things were done to try to eliminate mortality at a high rate.

Laurie Dries [00:57:00] I don't think we were looking very closely at reproduction at that point. It was just trying to keep them alive long enough that they could make it and reduce the amount of disturbance in the habitat on-site.

Laurie Dries [00:57:12] So, that was when Eliza Spring and Sunken Garden (or Old Mill Spring) were closed to the public for public swimming, but then they were designated as places to be used for education, which they are. So that's a good thing.

David Todd [00:57:34] So that, I guess, touches on some of the things that were happening and then changing in the Springs itself. How about in the larger watershed and the problems there and some of the concerns.

Laurie Dries [00:57:51] Yeah, one of the big problems in the larger watershed has to do with construction and development and losing what's on the land surface to houses, etc.

Laurie Dries [00:58:13] One of the things that happens is you can have, when you've denuded an area and you have a lot of just dirt hanging around, so it rains and that carries all that sediment down into the aquifer. And anything that goes into the Edwards Aquifer travels very quickly, quicker than someone would think. If it's a high rainfall, it can be, out in Dripping Springs, something can go in and it can show up at Barton Springs in a matter of hours. Very, very quickly. If you're at Loop 360, you can get there in minutes.

Laurie Dries [00:58:46] So, anything that's a toxin or anything in sediment that gets washed in then ends up in that water and you've degraded that water quality when it hits the springs and the whole underground environment.

Laurie Dries [00:59:00] Sediment carries toxins, but sediment itself, excess sediment, is a problem because it does clog gills and it clogs skin so the animals can't breathe. And it smothers all of the good algae. Algae are not bad - necessary for life on earth. The algae that the invertebrates feed on that, then the salamanders eat the invertebrates. So, you change that whole environment such that there's less food.

Laurie Dries [00:59:30] It also affects how much oxygen ends up in the water, how much the water can hold.

Laurie Dries [00:59:36] So, it affects the physiology of the salamanders when you have excess sediment in it, and then when it gets deposited, you have a multitude of other sort of problems.

Laurie Dries [00:59:47] So, that isn't a good thing. And that was happening quite a bit.

Laurie Dries [00:59:52] And like I said, toxins, those things can be carried into the aquifer pretty quickly.

Laurie Dries [00:59:57] And that was a pretty big boom in development when the salamander was being listed. I think the construction of Barton Creek Mall was one of the big triggers - that it was so close to the springs.

Laurie Dries [01:00:11] So that's one thing that happens out in the aquifer.

Laurie Dries [01:00:13] The other thing that happens with increasing urban development is the demand for water for all those people out in the broader watershed and the contributing zones and in the recharge zones. So it might be that they're using wells to just take the water out of the aquifer so it never gets to Barton Springs. And now what you have is just a smaller pool of water that that gets to Barton Springs. So, you have less water at Barton Springs in the long run. Right? The water table goes down.

Laurie Dries [01:00:50] And that again changes water quality and of course, quantity's important. If there's no water, salamanders are dead.

Laurie Dries [01:00:56] But not only that, the humans aren't getting water either. I mean, something feeds the rivers or Lady Bird Lake. It's a river. It's just a reservoir. All of those creeks, all that stuff. All that's water that we're using for things - to drink, to water lawns, to whatever it is. I mean, whether you're pumping it out of the aquifer or whether you're relying on it when it gets to the surface, it has an effect. So, it's not just salamanders that need the water. We need the water.

David Todd [01:01:39] It's connected. Yeah.

Laurie Dries [01:01:41] It's connected. You know, when you can't necessarily control the rainfall, you got to kind of, you know, think about it. What are you going to do with that very precious water?

David Todd [01:01:54] Well, you know, it seems that a lot of these concerns triggered the listing and then protective measures. And I know that you helped in this regard, doing biological assessments for construction projects and lots of other things. So, can we talk about some of those conservation measures that were taken to protect the salamanders?

Laurie Dries [01:02:25] For particular projects or that are associated with the Habitat Conservation Plan and the permit? Which are you thinking of?

David Todd [01:02:38] So, you know, I think it'd be interesting to hear about conservation efforts that were really organized to try to protect the salamander. You know, we don't need to talk about individual projects if that's complicated. But just the sort of things that would draw concern about a given construction project and how do you mitigate those impacts? How do you keep sediment from getting into the aquifer, for example, if you've got a construction site?

Laurie Dries [01:03:12] Okay. Yeah.

David Todd [01:03:12] Bad example, but maybe that's a start.

Laurie Dries [01:03:14] No, it's not a bad example. The broader remit for implementing the Habitat Conservation Plan that's part of the endangered species permit, is to protect the environment as best you can from detrimental effects of projects. And if you can't completely eliminate what that might be, you do something to mitigate it. You minimize and mitigate.

Laurie Dries [01:03:42] So, that just means that each project requires the scientific experts, the geologists, the biologists, to look at the proposed project, the methods they're going to use, the materials they're going to use, the timing of the project, how they're going to do things. And make an assessment of the potential for harm. And what could be done to mitigate the harm, minimize the harm or eliminate the harm.

Laurie Dries [01:04:29] So, for some of these things, there are some standard construction practices that are designed to do that. So, there are standard construction practices designed to contain sediment on a site. And those things improve over time. You know, it started off with just silt fences. And now there are all kinds of silt containment logs. And these things get developed over time to be more and more effective.

Laurie Dries [01:04:54] So, that's one example - that you protect that, that you work hard to identify in advance a place that might have a sinkhole beneath it so you don't end up hitting it in construction and having a bunch of stuff go, you know, rocketing in there in a rain. So there are those things.

Laurie Dries [01:05:18] And those things apply to any project that's on-site, like the bypass culvert repair, dam repair, any of those things. We did a sediment removal project from the pool, a dredging project. So, all of those you look at.

Laurie Dries [01:05:37] Well, we need to use an epoxy sealant around these cracks, say. Well, then the biologists look at what that is. You look at the compounds that are in it, what's toxic, what isn't toxic. And then you start mining any of the research out there that might give you an idea of whether that will harm salamanders if they come in contact with it.

Laurie Dries [01:06:00] And usually, there's not a whole lot of research out there on how something affects the Barton Springs salamander, because when they're endangered, you know, you generally can't just expose a crap ton of them to something that kills them to get the data. It's not very productive, really.

Laurie Dries [01:06:19] So, you look at similar species. One of the really good species for that are, amazingly, rainbow trout because they have similar skin. They have very permeable skin. And so you can look at, well, does that go through? How do they get affected? And that's a pretty standard model for an aquatic organism. And they're pretty sensitive to things.

Laurie Dries [01:06:43] So you just have to go look at it and then go back and say, well, can you use this instead? Can you do this instead? Can you try to do this instead?

Laurie Dries [01:06:52] And then, if you can't, then you devise ways to prevent salamanders from coming into contact.

Laurie Dries [01:07:02] So, for instance, a coffer dam had to be built on the pool side of the bypass culvert, so they could do some work inside the bypass culvert where there were cracks. And so that what they were working with wouldn't just go into the water of the pool.

Laurie Dries [01:07:21] Well, just having the coffer dam there, it doesn't eliminate all water over what is salamander habitat meant that it's the potential that every day a salamander could have gone in there. So, every morning, either Liza [Colucci] or I would be out there in the winter, at 6 a.m., at dawn, climbing through the coffer dam, looking through the substrate to make sure there was no salamander there so they could go to work.

Laurie Dries [01:07:48] So, you go from, you know, academic research into sitting on the ground looking for salamanders. And if they're there, you relocate them.

Laurie Dries [01:07:57] It can be an extensive amount of work to minimize whatever harm there might be.

Laurie Dries [01:08:07] Which also goes into, you had mentioned something in our previous conversation about spill response. Catastrophic spill response is another, it's a similar thing. We have an entire plan. I don't know - a couple of hundred pages plan for how do you respond to something that is toxic, that has gone into the aquifer somewhere or directly into the

springs? What do you do? Who do you call? What measures do you take? What equipment do you need?

Laurie Dries [01:08:42] And then we would do drills, either tabletop or you'd get a phone call in the middle of the night and you don't know if it's really a spill or if it's a drill. It's just, "We think this is happening and it's coming in 3 hours." You're up, you're down at the Springs, you're pulling all your stuff out, getting ready.

Laurie Dries [01:08:57] Do you need to collect salamanders? Because if it's something that's going to kill all the salamanders and you can't stop it from coming, then the responsibility for the Salamander Conservation team is to collect as many salamanders from the wild as you can before that toxic thing arrives and get them over to the captive refugium, so that they're at least protected and pulled out of that environment.

Laurie Dries [01:09:23] And then when the environment is safe, you can put them back.

Laurie Dries [01:09:27] So there are some pretty extensive measures that we're prepared to take to try to conserve the species.

David Todd [01:09:45] That's amazing.

Laurie Dries [01:09:46] Does that answer your question?

David Todd [01:09:46] It does. It does. No, it's wonderful that people have thought through this and the, you know, the different kind of repercussions of, you know, one toxin or one spill. Yeah, it can all happen so quickly. And it's nice that there has been thought beforehand that, you know, we should be prepared.

Laurie Dries [01:10:07] Well, I'm sure people think, well, why would you just want to do that for a salamander?

Laurie Dries [01:10:10] Well, if it's something that's that toxic coming through, I can guarantee we don't want to be in it. Right? I mean, it could be something that comes flying through the system. And if you didn't have this whole infrastructure for responding to it for salamanders, well, people could blithely go out there at 5 a.m. to do their morning swim and get in the water and not come out well. So, there's other benefits for humans to it, you know.

David Todd [01:10:41] So, you talked a little bit about the bypass culvert and the need to repair the dam and how you try to arrange that in a way that that the salamanders would not be damaged. I think one of the other issues that were in the spring area involved the Eliza and the Old Mill outflows. And I guess earlier those were submerged by the development of Barton Springs recreational area. But as I understand it, there was an effort to daylight those springs and the outflows from them. Can you talk a little bit about the thought behind that and how that happened?

Laurie Dries [01:11:23] Yeah. When I started at the City, I noticed that the water in Eliza Spring was pretty deep, and at that point the outflow went through a pipe. There was an amphitheater, you know. And it went through a pipe and that then went into part of the bypass tunnel and then down into Barton Creek, downstream of Barton Springs Pool.

Laurie Dries [01:11:51] And that pipe from Eliza would get clogged a lot, and sometimes it would be clogged intentionally because these things are hydrologically connected, you know, underground. So, if you open the gates in the dam at Barton Springs, the water level goes down, but it will also go down in Eliza Spring. So, there are times when you want to clog it. Like, you want to stop it because you don't want the water to completely disappear from Eliza Springs.

Laurie Dries [01:12:25] So, anyway, over the years stuff had kind of gotten clogged. That outflow was clogged. There were tree roots in it, all that kind of stuff.

Laurie Dries [01:12:33] And it used to be a stream. And I know there's a couple of old pictures where you can see there was a stream coming from Eliza down into the area where Barton Springs pool is, before the culvert was built.

Laurie Dries [01:12:47] So, just with that thought that these are stream salamanders, not pond salamanders, it seemed like a really good idea, to me, to just start off with, "Let's see if we can clear out the pipe and get a better flow system through there." And this goes back to a flow regime. Try to eliminate what's damming up the water a little bit and get that moving. And then the whole surface habitat should be better within the amphitheater.

Laurie Dries [01:13:16] And so that was kind of the start. And the idea that while it would be really beautiful if we just had a stream again, because the pipe's kind of fallen apart. There's tree roots in the middle of it. Where we're sitting there with poles, with saws on the end, trying to clear the tree roots.

Laurie Dries [01:13:33] This is not really very manageable in the long term.

Laurie Dries [01:13:38] So how about if we get a stream going? And other people had said that before me. That's not new there.

Laurie Dries [01:13:45] But I then talked to my colleagues. And everyone said, "You know, I think we need to put this on a long-term plan. Let's work toward getting a stream. Let's work toward getting this an open stream. Get rid of that pipe because we can't manage it. It's going to improve habitat and it will make more habitat because you can't crawl inside the pipe and put in rocks and, you know, measure stuff and whatever."

Laurie Dries [01:14:12] So, that was a big part of it.

Laurie Dries [01:14:15] And it would expand the amount of habitat. And it would improve the flow regimes.

Laurie Dries [01:14:19] So, we managed to convince the other folks that that was ecologically a good idea and just kept working toward trying to make that happen and collecting data. And that's why we collected a lot of data about the flow regime in Eliza Spring, and we were able to correlate that with salamander abundance to be able to show that when you have a more stream-like environment, and the water is flowing through it in a more natural way, that you basically have higher salamander abundance because everything else gets better.

Laurie Dries [01:14:56] So started there.

Laurie Dries [01:14:59] And then, with that, you know, the same problem in Old Mill Springs, Sunken Garden. A lot of that was very clogged, in an old, there was an old pipe that had been blocked. But then there was a kind of a stream that came out of it - informal, just didn't work as well. So that was, again, one of those well, we should probably try to do that over there.

Laurie Dries [01:15:26] But there are a lot fewer salamanders in Sunken Garden and Old Mill Spring. So, doing a project, it's another one of those "the cost of doing nothing, versus the cost of doing something."

Laurie Dries [01:15:38] You hope that you have more salamanders somewhere, so that it's okay if you harass or harm ten of them while you're doing this project to make the habitat better. Because by definition, somebody is going to get harassed. Some salamanders are going to get harassed. There's probably some that are going to die. You're not going to see it, but you got to balance that.

Laurie Dries [01:16:02] So, with the success of Eliza Spring and having a good population in there, meant there's a reservoir population. So, my understanding is the City now has got a request out to get information and proposals to be able to daylight or improve the stream coming from Sunken Garden.

Laurie Dries [01:16:27] Now, bearing in mind it's 20 years later. So, that should give you an idea of how long it takes to do some of these things and the kind of dedication it takes and that you can start with an idea, and it may be two or three people later, that can make it happen. You know, very few people can make all those things happen all in the same tenure. It's hard.

Laurie Dries [01:16:58] And that's probably a good thing. Because those sites did not get that way overnight. They got that way gradually. So maybe reverting things or reconstructing things gradually is a good idea. That's my thought anyway.

David Todd [01:17:14] Yeah, I hope you can explore that a little bit. I mean, I think when we were first talking about the evolution of these Barton Springs salamanders and the range of variation that they can tolerate and the pace of their evolution and then the pace of the changes we've imposed on them now, it seems like the rate of change is really important. And, I'm curious if you could talk a little bit about, you know, if you're trying to reverse or mitigate, and trying to do the right thing, but you don't want to do it so rapidly that you may cause more harm. Is that where you're going with this?

Laurie Dries [01:17:54] Yeah. So, you know, Sunken Garden, the part of the wall at Sunken Garden is still there. Part of the wall was from the mill that was there - early - previous century.

Laurie Dries [01:18:17] Then we had the thirties, with the Works Progress Administration, where they came in and they built the tiered walls and the rest of the circular wall around the spring and all of that and. I'm sure they had some heavy equipment. But they used a lot of people. You know, when they built the mill walls, there's probably horses and that kind of equipment involved. So maybe a little less intrusion while you're building it.

Laurie Dries [01:18:51] So, if you want to reverse that, if you want to imagine you wanted to take that down, well, coming in with a honking huge bulldozer and a crane and just ripping it down in two days, is a completely different pace of change than how that happened.

Laurie Dries [01:19:06] So, I think you're more likely to do unintended harm if you try to change, revert things, quickly. If they happen gradually, it's probably better to try to revert some things gradually.

Laurie Dries [01:19:24] And I have a little bit of a pet peeve about habitat restoration. In some circumstances, and I think particularly in these circumstances, which is none of these things, in none of these things, are we restoring habitat, because we're not actually removing everything and taking it back to what it was before humans started building things.

Laurie Dries [01:19:53] There's still a concrete floor in Eliza Spring. We're not really thinking about... You know, one time there was a, I thought about "Well, we should pull it out of there." There's some advantages to doing that.

Laurie Dries [01:20:05] But, that might destabilize the whole amphitheater.

Laurie Dries [01:20:09] And there's just more human activity. I mean, it's not going to be the way it was. We're not, we can't really restore that. But we can reconstruct it.

Laurie Dries [01:20:18] So, by reconstructing things, we can pull out the, do the things that can be the most helpful and do it in a way that is the least harmful and not be in a hurry. And get a benefit out of it.

Laurie Dries [01:20:35] And we can also take advantage of the science, the data we've collected, and what we know about how the whole climate has changed and maybe incorporate that into what we're doing in our reconstruction.

Laurie Dries [01:20:53] One of the predictions for water flow out of springs in the new climate conditions is that, from the aquifer, is that the variation is going to get larger. So, the floods are going to be bigger. The flow is going to be faster. And then it's going to cut off and that droughts will be worse.

Laurie Dries [01:21:19] So, if you imagine that on a graph, it's just like the peaks are going greater distances on either side of, you know, your zero mark.

Laurie Dries [01:21:27] Well. Probably not, far as we know, something the salamanders have adapted to, per se. They've not experienced it as a species, yet. But, they're beginning to experience it.

Laurie Dries [01:21:46] We can't recreate the climate from even a hundred years ago. We got to deal with what we have.

Laurie Dries [01:21:57] So, our best chance is to do things in the habitat and reconstruct things in the habitats such that it gives the salamanders a chance to evolve to the new conditions.

Laurie Dries [01:22:10] That goes back to being gradual about what you're doing. Give them a chance to evolve to what the new conditions are. So, try to stop changing things so fast.

Laurie Dries [01:22:24] It makes me think about dissolved oxygen. You can reconstruct a habitat and have streams. The more that water is moving at the surface, the more oxygen it can gather and entrain in the water. And that's better for the salamanders. So, the more

habitat you have like that, the better opportunity the species has to evolve to the variations in the amount of water flow because they're still getting the oxygen to survive and reproduce.

Laurie Dries [01:22:59] And then they can, hopefully, there's enough genetic variation, get a mutation, they might be a little more resilient.

Laurie Dries [01:23:12] Does that makes sense?

David Todd [01:23:13] Yeah, it does. This helps. And I think that your knack for explaining these things may be something worth talking about, because I think when you were discussing the efforts to daylight Eliza Springs, you said, "We had to talk about this, you know, with our colleagues". And so, I thought it would be good just to discuss your role sitting on the U.S. Fish and Wildlife Service Recovery Team, being on the Biological Advisory Team, the Management Advisory Team, you know, all these sort of administrative bureaucratic apparatus that, you know, are contentious. There's a lot of negotiation and transactions. Can you talk about how you "navigated that", I guess, is the current term?

Laurie Dries [01:24:09] Well, I tried very hard to stick with the science that I knew, what I knew about inferring things, being very clear about, well, this is what I think will happen based on such and such, you know. And, try to understand why someone thinks what they think, or what the objection is, and whether an objection makes any sense. And sometimes it's better to just not say anything, even if, say, it doesn't make any sense. Sometimes it's better to just illustrate something in a completely different context.

Laurie Dries [01:24:59] I had to learn not to be as sarcastic as I could be. I did grow up in Wisconsin. I do have a dry sense of humor. I needed to learn to temper that.

Laurie Dries [01:25:14] And remember that most people don't mind learning something.

Laurie Dries [01:25:24] And, you know, if you can stay cordial and even make people laugh, you know, if you keep it there, you can get some other information across. You know, if you get a little comic relief, the tension can go down.

Laurie Dries [01:25:40] And then some of it, it's just a whole lot of work of knowing what all the science is and being able to come in and go, "Okay, I don't know about that".

Laurie Dries [01:25:47] I think it's really important to be willing to say, "I don't know". You can call me an expert, but I don't know. We don't know. I don't have data on that. So, I think something might happen. But, you know, it's a great equalizer because I don't know tons. So, so what?

Laurie Dries [01:26:10] It's been a lot of work. You know, some of it's successful, some of it isn't. But I think, in the end, you get what you're supposed to get.

Laurie Dries [01:26:21] If you .. Let me think, a fellow I worked with, he worked at Fish and Wildlife at the time and went to the Forest Service afterwards - Will Amy. He stated it so perfectly and he said, "You know, if nobody is perfectly happy, I've done my job. Because nobody's going to agree perfectly with everything."

Laurie Dries [01:26:48] Well, yeah. You do what you can. You can't. And you let it go. Some of the rest, you just let it go.

David Todd [01:26:58] So, a lot of these discussions are with your peers, they're people from science or, you know, the natural resource management fields. I'm curious about your discussions with the general lay public, people who are curious or interested, but they ..

Laurie Dries [01:27:20] Or angry with me because there's too much algae in the pool!

David Todd [01:27:26] There you go. Yeah, it's the whole gamut.

Laurie Dries [01:27:30] It is the whole gamut.

David Todd [01:27:30] I noticed that you had talked to Lady Bird Johnson Wildflower Center, St. Edward's University, Texas State, Texas Tech, Texas Herpetological Society, Barton Springs University, Barton Springs Edwards Aquifer Conservation District. The list goes on. So, I'm wondering how you approach people with different levels of interest and knowledge and animosity to, you know, share what you know.

Laurie Dries [01:28:01] Yeah, Those the things that you listed there are more formal environments, generally talks, kind of a conference thing or, you know, something where there's a structure of "I'm going to let you know something about what I know", and then we have questions afterwards.

Laurie Dries [01:28:16] And then some of them, what I like most really are the more informal things, because people notice things and when they're not scientists or policymakers, if they're not on the job, sometimes you get to hear really good observations that you'd never hear that turn out to be maybe kind of important for conservation that you don't even know that you would get.

Laurie Dries [01:28:40] So, back to the nuisance algae example. So, I worked really hard to get people to understand there are nuisance algae, and then there are desirable algae, because we're never going to have a good environment if we have no algae, because then everything is dead and you do not want to be in that water. If all you see is white, do not get in that water. It's like just there's something bad in there.

Laurie Dries [01:29:04] Anyway, you know, we, part of my job was to go check on the springs every day. Just go do a walk and make sure everything looked okay. And I just talked to the swimmers all the time: "What did you see today? What didn't you?" And a lot of times people just want to complain at you so that they know someone's listening. Okay. And find out, and sometimes you'll get some amazing observation from someone.

Laurie Dries [01:29:32] The day this fellow was hanging around Sunken Garden, started telling me about when he was younger with his wife (he was probably 75 years old) about how deep Sunken Garden was when they used to go in it and go swimming. Now really! And much deeper than anybody from the seventies who used to swim in there ever talked about it. Really! And he said to me, "You know, there's a ledge in there that we'd sit on, and then it would go deep down in the center." Huh? Really! Well, we had no idea.

Laurie Dries [01:30:15] And that sent me down a rabbit hole looking at old historical photographs of the mill to figure out where did the water really go? Where is that lower level? And then I started hand excavating. There was a lot of trash in there, I can tell you. A lot of

trash. So, I'd be pulling out glass and things and just lifting rocks, release sediment, lift rocks, you know, stuff.

Laurie Dries [01:30:36] And you know what? I found that ledge in there. And underneath that ledge were areas where I'd move a rock and suddenly all this spring water would come flowing out of it.

Laurie Dries [01:30:49] Well, I never would have known that, unless I just talked to that guy. So, it's so interesting sometimes to just talk to people and find out what they're doing. It's really ... or what they've observed.

Laurie Dries [01:31:03] And the kids, oh, my God, doing kids? That's the best because they just observe things and they're so direct. I just love it.

Laurie Dries [01:31:15] Anyway, I find that, you know, the most fun and taking them on field trips and showing people salamanders, adults, kids, whatever, salamanders, people from other environments.

Laurie Dries [01:31:26] Assistant city manager came down to visit Eliza with some of the other folks one time. I don't remember why exactly, but they came down. So, we did a tour, like we always do a tour. And in Eliza Spring you could most of the time show them a salamander in the wild. And you'd do that and we'd take off our shoes and get in the spring, you know. "Here. Look at this."

Laurie Dries [01:31:51] And then they'd get so excited, like little kids. Well, hey. Win-win all the way around. They get it. And that, to me, was probably the most fun.

Laurie Dries [01:32:01] And there's something I probably wouldn't have been doing if I'd been in academia.

Laurie Dries [01:32:07] So I enjoyed it. I mean, you know, I enjoyed having the contact. I enjoyed ... it's just another form of teaching people something when you can talk to the folks who aren't scientists that are in the city. Most people want to learn something.

David Todd [01:32:27] Tell me about talking to the media. I think that you were responsible for talking about Barton Springs biology and its local salamanders.

Laurie Dries [01:32:40] Yeah. Here's a roundabout way to go at this. I grew up, I grew up in Madison, Wisconsin. And at the time, there were a lot of riots and protests against the Vietnam War - bombing of Sterling Hall, that kind of thing.

Laurie Dries [01:33:08] At that time, my father was an alderman for the City of Madison. And he was the president of the council. So, he was in the eye a whole lot. And he was a Republican, so he wasn't well-liked. And one of the things I learned from my dad was that, you know, just talk to the press. Don't hide from them. Don't run from them. Don't do that. And any time there's anything good that happens, tell them, because they're always looking for stories about something that's good. You know, their lives are spent finding the things that are terrible. Tell them every time there's something good. Take them on stuff.

Laurie Dries [01:33:50] So I took that into, that idea, into this job. Yeah, go ahead. Talk to me. If I don't know something. Fine. Now, do you need talking points? Here are some talking

points. You know, here's the science part of it for a talking point. Or take them to the Springs. Take them on a tour. Here, go see this, or here go see that. Oh, you need a photo op? I'll meet you over there. I've got to do this.

Laurie Dries [01:34:14] Because at that point, once they feel, you know, once you can trust somebody, then they can come to you when there really is something contentious and they need some information and they'll believe you. And they won't twist your words unless you're Alex Jones, but they won't twist your words. And they just, you know, they value the information.

Laurie Dries [01:34:41] So, I always looked at it as an opportunity to crow about our program.

David Todd [01:34:50] So, you mentioned going to visit the Springs with an assistant city manager, and I'm curious about that other part of your public outreach - just dealing with people in the government who may be decision makers about the Springs and about the salamanders. What was that kind of experience like?

Laurie Dries [01:35:13] You know, it was mostly good, most of the time. I think by the time someone was asking me questions, they were usually asking me questions about science. And I could tell them, "This is what I know. This is what I don't know." Or they would ask me. They may have heard something from someone, or a citizen brought something up or whatever that they could ask me, "Does this make sense to you? Did this happen? Is there a way we can answer this person that's consistent?"

Laurie Dries [01:35:54] Because that part, you know, the policymakers don't know all the details. But it's an advantage to them to provide really accurate scientific information. It's easier to rely on the science than say, "Well, I just don't like that. I just don't like that you said that."

Laurie Dries [01:36:12] There would be things that would be real inflammatory or misinterpretations of something that may have happened. And we were able to, at least in our program, we were able to say, "Oh, no, that's not really what happened. It's this. And the origin of it is this. And I was on site during this project and this is what happened. That's not where that came from, you know."

Laurie Dries [01:36:45] So, I didn't find it onerous. And I found most of the folks were interested to hear about something different. And hearing about the science and the Springs and ecology and nature, it's different from what they hear every day usually. You know? You want to hear about sidewalks or salamanders? Usually, salamanders win out.

David Todd [01:37:14] Fair enough. So, while we're talking about salamanders, they're, you know, one type of a larger world of amphibians. And I'm wondering if there are lessons that you've gained from thinking about Barton Springs salamanders and Austin blind salamanders and others that are local that helps inform what's happening to amphibians as a group.

Laurie Dries [01:37:42] Oh, I think the habitat loss and degradation, the rate of it, is a problem for all of them. You know, that seems everywhere.

Laurie Dries [01:37:55] And I know there are some diseases that have plagued - the Chytrid fungus - that plagued, plagues, a lot of frogs, didn't seem to bother Barton Springs

salamanders. Still, doesn't mean that, you know, it never could, but, you know those things, they only get worse when there's less habitat or when the habitat is poor.

Laurie Dries [01:38:24] And amphibians get kind of lost in the shuffle. There are not as many species. And they're not, you don't see them. You have to kind of look for them. You know, they're not just flying around like birds. I love birds. But they're not easy to see. Right?

Laurie Dries [01:38:46] So, I think it's larger forces that are really contributing to a loss of habitat everywhere, and habitat degradation.

David Todd [01:39:09] So, I guess another thing, too, to talk about while we're talking about salamanders is just wildlife conservation in this place. Not so much about amphibians, but about central Texas and Texas in general. Has it given you a window into what's been going on here?

Laurie Dries [01:39:33] Well, I think, yeah, having worked at the city and having had the responsibility for a time of being a tender of Barton Springs and its salamanders made me more aware of the kinds of conservation challenges in all of the areas in Texas, because Texas has, it's so big, but it also has this great diversity of ecosystems. I mean, there's Monahans sand dunes. And there's coastal plains. And there's the East Texas tall trees, almost swamps. You know, desert mountains. All the deep canyons in the Caprock area. So, there's just, there's a really amazing array of ecosystems.

Laurie Dries [01:40:37] And I think they all are somewhat subject to changes. It's just different.

Laurie Dries [01:40:44] And I think that Texans have a well-developed pride in their state. And I lived there for 30 years, but I am not foolish enough to call myself a Texan. I know better. But there's a lot of appreciation and affinity for the state.

Laurie Dries [01:41:06] So, being aware of it, I think, you know, I think there's some real desire to protect those areas and conserve the areas that may not be so prevalent in other places.

Laurie Dries [01:41:22] There's a lot that can still be protected there and conserved. So there's huge opportunity and there are a lot of people who want that to happen.

David Todd [01:41:35] So, I saw a review that you wrote about a fellow named Janovy who wrote "On Becoming a Biologist", and I thought it just was a really interesting kind of mix of what the life of a biologist can involve, you know this unique mix of idealism, a job to pay your bills, and then the ideals of science, which, you know, are a whole other kind of aspect of a life. And I'm wondering if you can talk about what it's meant to be a biologist and particularly one involved in conservation.

Laurie Dries [01:42:27] I don't know. I think, I think it gave me a better sense of my teeny, tiny place in the universe. Like, I hope I don't overestimate my place in the universe like I did before I was a biologist, because it's just this continuum of time. So, it's not a very big place. That doesn't absolve me from trying to do things, you know, about things that I care about, which is nature and conservation and ecology.

Laurie Dries [01:43:05] And, you know, I'm still trying to reintroduce native plants to the pond in our farm here. So, it doesn't go away.

Laurie Dries [01:43:18] And I think, I hope that, having worked on that one species to try to help make things better and try to improve things for Barton Springs salamander, and Austin blind salamander, and for Barton Springs in general, and just hopefully they'll be more resilient. Maybe I've helped that. Maybe the species will stick around just a little longer because I helped. I hope so. I mean, it'd be amazing if they're around for another hundred years.

Laurie Dries [01:43:48] So, you know, for me, that's a little bit of a legacy that I can leave something behind. I don't have children, so I'm not leaving that sort of legacy behind. But it would be really nice. I mean, the species is still there. It didn't go extinct within the five years that I figured it was going to go extinct. So, I felt like, "Yay, success!".

Laurie Dries [01:44:13] And, I don't know, it just gave me a lot of perspective.

Laurie Dries [01:44:24] We humans, you know, we like to change things. We just like it. We just do.

Laurie Dries [01:44:36] I think as time passes and we have more devices and ways to entertain ourselves that is not just sitting outside being still, the more important it is, I think, to sit outside and be still. And being a biologist, you have to do, well, a field biologist, you have to do that sometimes. So, I already know how to do it.

Laurie Dries [01:45:01] And I think for some folks, especially some children now that weren't just sent outside to run around, that it's hard to learn to do that. I think we all need to be able to do that, even if it's just five minutes. Just sit there.

Laurie Dries [01:45:15] Because there's always something going on. There's always something going on in nature. Always. You just have to look for it or listen for it. You know, just be still enough to see what happens.

Laurie Dries [01:45:30] That's probably what being a biologist has done for me.

Laurie Dries [01:45:35] It's probably also helped me be a little more tactful.

David Todd [01:45:38] Let me sort of put this on its head and then hopefully I'll be able to let you go. When we first started talking, you talked about your philosophy of, you know, being a conservationist. And I think you were making the distinction between getting too wrapped up in the fortunes of an individual and trying to focus on not its mortality, but on getting it to the point of reproduction.

David Todd [01:46:12] And I'm curious if, when you think about the individuals - these particular Barton Springs salamanders - do you think they have a soul? I mean, is there something that you see as value for those individuals, not as a population, but just as one creature, you know, crawling around on the bottom of Barton Springs pool looking for a little creature to eat, maybe one of its cousins.

Laurie Dries [01:46:55] You never know.

David Todd [01:46:56] You never know.

Laurie Dries [01:47:00] I think it doesn't hurt to think they have a soul. I don't know. I think that mostly because I don't have a good definition of soul in my head, but if the definition for soul is that there's an intrinsic value - something that's peaceful, something that adds to harmony in the universe - sure.

Laurie Dries [01:47:46] They're part of that ecosystem. They're part of that whole system, connected community, of the environment and the species and the plants and everything that's there. They're all part of that.

Laurie Dries [01:48:00] So sure. But then the community has a soul.

Laurie Dries [01:48:10] So it's, you know, I don't think it hurts to think that, at all.

Laurie Dries [01:48:18] That's an interesting question. Never thought about that before. I'll keep thinking about that.

David Todd [01:48:26] Ponder, percolate.

Laurie Dries [01:48:29] Percolate and ponder.

David Todd [01:48:32] Well, you've been really generous with your time. I don't want to take your entire day. And I know the horses are hungry. They're looking at their watches.

Laurie Dries [01:48:42] They're dying.

David Todd [01:48:43] But before we say goodbye, is there anything you would like to add that maybe we didn't cover the way we should have?

Laurie Dries [01:48:54] I guess that for the folks who are still asking themselves, or me, "Well, what's the point? I mean, what's the value of this? Come on, these salamanders ... there are salamanders everywhere. Who cares if there's a bunch of different species, you know? I mean, it's fine. Why do you care about that?"

Laurie Dries [01:49:20] I think it's worthwhile to consider that this particular species, that its value to humans is still expanding, and we still don't even really know, like it's more than the value of the wonder of their existence - it's great - and their soul in the community, or their utility as a creature, as a canary in the coal mine, as a creature that can tell you there's something toxic in the water.

Laurie Dries [01:49:51] But that there's still things about their biology that could be so helpful to humans that we haven't even fully explored yet. They have antibiotic properties in the mucus on their skin. It doesn't disappear in water. Like, imagine that. That you could just put something on that's an antibiotic and you can get in the water and it doesn't wash off. That could be useful.

Laurie Dries [01:50:20] Their toes and their tails regenerate, bones and all. Now if we could figure out how that happens, there are some people without fingers that would be really happy to regenerate them.

Laurie Dries [01:50:32] So there's just value that's undiscovered. And I would hope that people would be willing to consider that.

David Todd [01:50:49] I love that thought. I like that word - expanding value. You know, all the things you don't know. That's great.

Laurie Dries [01:50:58] Yeah.

David Todd [01:50:58] Very good.

David Todd [01:51:01] Well, thank you, Laurie.

Laurie Dries [01:51:05] Thank you.

...

Laurie Dries [01:52:13] Okay. Bye.

David Todd [01:52:14] Bye now.