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INTERVIEWEE: Bill Swanson

INTERVIEWER: David Todd

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David Todd [00:00:02] Well, good afternoon. David Todd here, and I am very fortunate to be with Dr. Bill Swanson, and with his permission, we plan on recording this interview for research and educational work on behalf of a nonprofit group called the Conservation History Association of Texas, and for a book and a website for Texas A&M University Press, and finally, for an archive at the Briscoe Center for American History, which is at the University of Texas at Austin. And those are our plans for this project. But of course, Dr. Swanson would have all equal rights to use the recording as he sees fit. And I just want to make sure that that is a good plan in his view.

Bill Swanson [00:00:51] Yes, that's perfectly fine.

David Todd [00:00:53] Great. Well, let's get started. It is Thursday, March 24th, 2022. It's about 1:30 Central Time, 2:30 East Coast Time, where Dr. Swanson is. My name is David Todd. I am representing the Conservation History Association of Texas and I am in Austin. And we are fortunate to be conducting a remote interview with Dr. Swanson, who is based at the Cincinnati Zoo in Ohio.

David Todd [00:01:28] Dr. Swanson is a veterinarian and Director of Animal Research at the Center for Conservation and Research of Endangered Wildlife at the Cincinnati Zoo and Botanical Garden. He has been deeply involved in using reproductive sciences to improve the welfare of feral and shelter cats, as well as rebuilding the populations of many diverse rare wild cats, including the ocelot.

David Todd [00:01:59] And so, today we'll talk about his life and career, so far, he's got, I'm sure, more in store, and especially focus on his work with the ocelot.

David Todd [00:02:12] So, with that intro, I wanted to first ask you to please tell us about your childhood and early years, and if there might have been some people or events in those years that influenced your interest in animals, including ocelots and other wild cats?

Bill Swanson [00:02:34] Yeah. Well, I think my upbringing is probably a little atypical for a lot of people in conservation, because I really didn't grow up around animals very much. And certainly to become a veterinarian, I didn't have that background as a child. I wasn't raised on a farm or a ranch. I didn't have a lot of animals as pets growing up. I had two dogs in my childhood that we kept as pets. I never even had a pet cat, which is kind of ironic because all of my work now is with cat species. So, it was kind of different.

Bill Swanson [00:03:04] My father was in the Air Force, and so we tended to move around every couple of years from the time I was born until I was about 10 years of age. And I was born in Texas. I was born in Big Spring, Texas, where there used to be an Air Force base called Webb Air Force Base, and it has since closed many years ago. But my dad was stationed in Big

Spring and so I was fortunate enough to be born a Texan. And then for the next 10 years, we just moved all around the world, really, living in different places.

Bill Swanson [00:03:33] And then back in 1970, when I was 10 years of age, my father was stationed back in Texas in Austin. And there used to be an Air Force base in Austin called Bergstrom. It's now the, the city airport. But at the time it was an Air Force base.

Bill Swanson [00:03:49] So, I moved around a lot and I didn't really have a lot of exposure to animals and, you know, was born a Texan and spent most of my formative years in Texas after I moved back to Texas when I was 10 years of age.

David Todd [00:04:03] I see. And, you know, this is jumping ahead a little bit, but you had a long career in school, and so, I thought it would be good to talk about that. I see you received a Bachelor of Science in Zoology from the University of Texas at Austin, and then went on to get a Doctor of Veterinary Medicine from Texas A&M University in College Station and also a Ph.D. in Animal Science from Louisiana State. And so, I was hoping you could tell me if there are any classmates or teachers that you might have met in school that perhaps led you to your interest in in science and particularly ocelots.

Bill Swanson [00:04:54] I think a little bit all along the way. I think in high school, probably one of the pivotal moments was we took a trip to the veterinary school on a field trip. My biology teacher at the time, Mrs. Rogers, for whatever reason, arranged the trip and I never really thought about veterinary medicine as a career, but when we went to A&M and I saw the facility and I saw the students and the professors working on animals, I remember thinking at the time, "Well, that seems really interesting. That's pretty cool." That might be an interesting job to have when I got older, but I never really grew up thinking I wanted to be a veterinarian.

Bill Swanson [00:05:31] And it was really in high school, when you get to that point, like, what are you going to do with your life? And I thought, "Well, being a veterinarian seems like it would be an interesting career to have." And that was kind of the extent of my decision-making back then. And so, because I was in Austin, I thought, "Well, I'll just go to the University of Texas, and I'll take the courses that I need to get into veterinary school, and then I'll go get my veterinary degree." And so, that's when I enrolled in UT and enrolled in zoology because zoology was focused on animal populations. And that seemed to be good training for, for my veterinary career.

Bill Swanson [00:06:07] But it took four years of undergraduate and then a couple of more years to get into vet school, primarily because I didn't have a lot of experience with animals. And so, when I would go up to A&M and interview and not get selected, I did that for four consecutive applications and I was almost ready to give up going to vet school. And I went to talk to him after the third application and I said, "Why? Why am I not being accepted?" He said, "You just don't have very much animal experience."

Bill Swanson [00:06:37] So, that's when I, I took a job at the Austin Humane Society and Mrs. Byrd. I remember she ran the facility at that time, hired me and I worked there for about nine months. And it was really kind of eye-opening to me about the issues of pet overpopulation and people not taking proper care of their dogs and cats and having them neutered and spayed. And it was really influential, I think, as far as, for me gaining the animal experience that I need needed to get accepted into vet school, but also to kind of have some impact on me and what I do now. And some of the work that we're doing now, here at CREW. But I think that, those sorts of experiences working at the Humane Society and then getting into Texas

A&M finally, on my fourth application, were really kind of pivotal, because if that didn't happen, I wouldn't be a veterinarian. I wouldn't be in this position that I am now.

David Todd [00:07:37] It's so interesting to hear that there are these gateways that you just have to pass through, and if you don't, you know your future life is really very different.

Bill Swanson [00:07:48] And so, once, I mean, once I got to vet school, I didn't really know what I wanted to do in veterinary medicine. It was kind of like the goal was to get to vet school and become a veterinary doctor. And there were some options for veterinarians, but not as many as there are now. And most of us were expected to go into practice, and at the time you either went into large animal practice, or some vets went to mixed animal practice. And then, as now, I think most veterinarians go into small animal practice, mainly dog and cat practice, and that really didn't interest me very much.

Bill Swanson [00:08:22] And we had a couple of professors at Texas A&M, one who is still there, but Dr. Stephen Seager was one of them and Dr. Duane Kraemer was the other. And they were working with wildlife, and particularly looking at reproduction of wildlife species, which was something that I never thought about. It wasn't really a field that was established back in the, until the mid to late '80s. And so, it was kind of eye-opening to me that you can do these sort of reproductive studies and reproductive procedures with wildlife species and take some of the technologies that we use in livestock, or in dogs and cats, and apply it to conserving wildlife.

Bill Swanson [00:09:03] And that kind of changed the direction of my veterinary focus was from becoming a veterinarian to becoming a reproductive biologist who also happened to be a veterinarian. So, it was really, really Dr. Kraemer and Dr. Seager who were doing things like collecting semen from wild animals. And Dr. Kraemer was, was well known for doing embryo transfers. He did the first successful embryo transfers in both cats and dogs and had a very active wildlife program at A&M back in the mid-1980s. And I wanted to, to stay and do my Ph.D. at Texas A&M after obtaining my vet degree. But he had so many students, he said he couldn't take on any more students. The university just said, enough was enough. And that's why I ended up at Louisiana State University. Otherwise, I would have stayed at A&M and gotten my Ph.D. there.

David Todd [00:10:04] So, there's a, I gather, a real distinction in the kind of skills that you get as a, as a vet in training versus getting a doctoral degree in animal sciences?

Bill Swanson [00:10:19] It's really quite different. I think the mindset going into veterinary school is, it's pretty much you have a set schedule that all the students follow. And so, at a certain time each day you have to be here in class, or you have to be in the lab, or you have to be in the large animal facility working with the animals. And so, I think part of it is this very structured curriculum, or it used to be, and it's a lot more flexible now. But you were kind of told what you needed to do and when you needed to do it. And it was kind of that structured learning environment.

Bill Swanson [00:10:52] And then you go to graduate school. And when I was at L.S.U. Is basically, "OK, we'll go do your research and show us the results. And if you get enough quality data, then you can produce a Ph.D." And so, a lot less structured as far as what you're doing on a day-to-day basis. And the type of focus that you have is quite different from veterinary medicine.

Bill Swanson [00:11:15] There are some similarities. For example, if you have a sick animal, you're basically your job is to determine why this, why this animal is sick and then, kind of on a more applied basis, determine how you can fix that animal, how you can treat that animal to make it healthy again, which is kind of a microcosm of doing a research study - that you develop a hypothesis about a certain issue and you design a study. And in vet medicine, you basically come up with a diagnostic plan, you gather your data and then you analyze that data and decide whether that fits your hypothesis or not.

Bill Swanson [00:11:52] So, there's a lot of similarities in vet medicine and research, per se. But in vet school, they don't teach you how to do research. They teach you how to be a good veterinarian, a good diagnostician.

Bill Swanson [00:12:04] And so, when you go to do a graduate degree, it's kind of like changing that mindset a little bit. You're using some of the same approaches, but it's kind of at a different level or a different degree about how you go about collecting that data and deciding whether you need to change your hypothesis or not.

Bill Swanson [00:12:24] So, I found vet school for me was relatively easy because I'm good at learning and remembering things (I have very good short-term memory) and then applying that information within a vet program and taking tests and passing that.

Bill Swanson [00:12:40] And graduate school was a bit more of a struggle because I kind of had to figure out a lot of this on my own and decide, you know, what studies that I needed to do to get the data that I needed to answer the questions that I wanted to answer.

Bill Swanson [00:12:53] So, I found that the change from veterinary school to graduate school to be quite stark. It was quite a big change for me. And it was more challenging, I think, to go to graduate school and work to get that Ph.D.

Bill Swanson [00:13:08] But most of what I do now is more focused on the research side and certainly reproductive research and not so much on veterinary medicine. So, veterinary medicine has helped me do what I do now. I have a lot of skills because I am a veterinarian that I can apply to wildlife reproduction research. But most of my day-to-day work is really coming out, in fact, coming directly out of a lot of the work I did for my Ph.D. at Louisiana State.

David Todd [00:13:38] Oh, that's, that's really fascinating, this of combination of, of the, I guess, more structured applied education you get in vet school and then the more, I guess, research-oriented and very focused, you know, to, to what, what you are most curious about in grad school. But it sounds like good training on both sides for what you've ended up doing.

David Todd [00:14:09] You know, for a lot of people, and maybe less so for somebody like you who's had years of formal training, but I've talked to many people who've said that some of their first kind of inspirations and exposures to science or wildlife have been through popular culture, and they've mentioned books or films or TV shows. And I'm curious if there are any kind of avenues like that, that were important to you.

Bill Swanson [00:14:43] I think, again, people in my generation and I'm, I'm just 61 years old now, but people of my generation, I think a lot of us, we grew up on James Herriot who wrote his veterinary books, and it was probably not until after I decided at that point to be a veterinarian that I read all of his books. I think a lot of veterinarians, and certainly older

veterinarians you talk to, read those books when they were younger about him being a veterinarian, James Herriot, in England in the '20s and '30s. And the type of vet medicine that they practiced then is quite different from what we practiced in the '70s and '80s. But compared to, comparing the '20s and '30s to the '70s and '80s and then compared to what we do in medicine now, it is so different and it's so advanced from where it used to be.

Bill Swanson [00:15:33] And so what we learned in vet school in the '80s is, a lot of that is archaic 40 years later. And it's just the field, it is advancing so fast and the level of knowledge is growing so fast, that being a veterinarian in the present age has so many more advantages and certainly what James Herriot had in the '20s and '30s, but even what we did in the 1980s.

Bill Swanson [00:15:58] And all the technologies that are applied to human medicine are now being applied to companion animal medicine and some to wild animal medicine as well. But those books were kind of pivotal once I decided to become a veterinarian and understanding what being a veterinarian meant.

Bill Swanson [00:16:16] And then as I kind of went along the path of being a scientist, on the popular side, I read a lot of books by Stephen Jay Gould. I don't know if you knew of him...

David Todd [00:16:28] The paleontologist!

Bill Swanson [00:16:28] The paleontologist. And he wrote some really interesting books over 20 or 30 years. But I pretty much read all of them because I was really interested in the science that he was doing, and he was an excellent writer and he wrote at a very technical level. So, he expected you to have some understanding of the science that was involved. But I found that those books were just inspiring as far as how science worked. And that was interesting to me.

David Todd [00:16:59] That's great. Yeah, it's, I'm sure this is something that you've learned and practiced is that I guess science is both a body of knowledge, but there's also this idea of practicing it and, you know, exercising those skills of, I guess, as you were saying, you know, developing hypotheses and collecting data and testing that, that idea.

David Todd [00:17:29] Well, nice. And so eventually you, you popped out of school.

Bill Swanson [00:17:37] It took a long time to get out.

David Todd [00:17:41] Yeah. A newly minted vet and Ph.D. animal scientist. And if I understand this, you pretty quickly ended up at the Cincinnati Zoo and Botanical Garden?

Bill Swanson [00:17:57] Yeah. With, with a side journey to the Smithsonian Institution.

David Todd [00:18:01] I'm sorry. OK.

Bill Swanson [00:18:03] Yeah. And that was really critical too. So, both my wife, who is the director of CREW, and myself, we met at Louisiana State University and it just so happened we had the, we both had the same dream. We wanted to work on wildlife reproduction, and there aren't that many places that you can do that. And probably the best program at the time, and this was in the early '90s, and still the premier program, probably in the United States, if not the world, was at the Smithsonian Institution.

Bill Swanson [00:18:31] And the Smithsonian Institution basically operates 17 museums, but one of them is the National Zoo. And so, the National Zoo is run by the Smithsonian, and some people don't realize that. But that has a really big impact on how that zoo is, is operated. And it's always had this really intensive research side to it that when you go to the Smithsonian Museum, you know, the Natural History Museum, or the Air and Space, you don't realize the amount of, the amount of research that Smithsonian scientists do, because it's kind of behind the scenes.

Bill Swanson [00:19:03] And, with wildlife reproduction kind of our mentor was a man named David Wildt, who established a program in the late '80s. And he was a Ph.D. scientist that had worked with livestock, but also dogs and cats, and got the idea that this was technology that might be useful for conserving endangered species. And he found a place at the Smithsonian where he could develop that program.

Bill Swanson [00:19:31] And so when I left Louisiana State University, I went up to the Smithsonian to work on cats, and that's what I did for my Ph.D. So, it was a perfect fit and he was a wonderful mentor. And so, I was there five years, along with Terry, working on cat species. And that was really kind of instrumental working with Dr. Wildt and then Dr. JoGayle Howard, who was another veterinarian/Ph.D., who'd also gone to Texas A&M University as a veterinary student. And they were the two main, I think, drivers of the science that I do now, which is trying to apply reproductive sciences, but particularly reproductive technologies, as a way to propagate and manage endangered animal populations, not just cats, but other species.

Bill Swanson [00:20:20] And so, I was there for five years, and at the time, the Cincinnati Zoo had built a facility, "CREW", and the scientist that established that facility went down to the Audubon Zoo in New Orleans. And so, they had two openings at the Cincinnati Zoo at one time for a senior scientist to work on wildlife reproduction, and that was so rare that that was even an option, Terry and I applied for that position, and we were accepted into that, those roles. But it was kind of one of those challenges because when you have two people that work in the same field, and kind of an esoteric field like this where there aren't a lot of opportunities, to have both of us to be able to get positions doing the work that we love and that we trained for, was kind of astounding. And so that's how I landed up at Cincinnati 25 years ago.

David Todd [00:21:17] That is good to understand. Thanks very much. And I love the, the, you know, your generosity in sort of recognizing these people that have helped you along the way, have been mentors for you. It seems like there's a real daisy chain of influential people that have been important to you

Bill Swanson [00:21:42] Yes, I think on this sort of journey, because it wasn't a journey I set out on 30 years ago to be where I am now, it's to be constantly getting encouragement or getting direction by different people along the way, that's pretty much got me to where I am right now.

David Todd [00:21:59] Yeah. And you know, I got to admit I have not been to the Cincinnati Zoo, but reading about it, it's, it seems really interesting that they seem to have a focus on both animal and plant conservation, which in my experience seems rare. Can you tell us a little bit about the institution and how it tries to bridge those two kinds of focuses?

Bill Swanson [00:22:26] Well, the Cincinnati Zoo was established almost a hundred and fifty years ago. We're the second oldest zoo in the United States after the, the Philadelphia Zoo. And the zoo is a botanical garden, so that's one of the keys. The zoo has beautiful grounds, and if

you walk through the zoo, especially in the summertime or the spring, we have a tremendous horticultural staff that maintains the grounds. And so, when we talk about Cincinnati Zoo, we always, we try and always clarify it's the Cincinnati Zoo AND Botanical Garden. So, that kind of gets us into both worlds. We're concerned with animals and plants. And they're both a vital part of our biodiversity on the planet.

Bill Swanson [00:23:06] And when this research program was established back in the 1980s, actually, by our predecessors here, they decided that they needed a plant conservation research side as well. And so, beginning probably in the later '80s, they started doing research on plants. And plants are amazing. And I'm not a botanist, but I've kind of absorbed some information from being around the botanists that work here. And you can do amazing things with plants that you can't do with animals.

Bill Swanson [00:23:35] And one of them is, just take pieces of tissue, you can take root tissue or leaf tissue and grow an entirely new plant from that. And so, a lot of what they do is, is basically clonal propagation, which is much different from cloning that we consider for animals now, much more simple and easy to do. And it's been done historically for probably hundreds of years where you take leaf cuttings or root cuttings and grow a new plant from that. But it gives them a really useful tool for conserving endangered plant species, and they can preserve those tissues and then grow an entire plant from a little cutting of tissue and really apply this technology broadly to save different endangered plant species that are going extinct.

Bill Swanson [00:24:25] So, really an example of where cryopreservation of these tissues is being used in a real sense as a conservation tool, and we try and do this with animal species as well - wild species. And it's not nearly as perfected, obviously, in animals as it is with plants. So again, it is kind of looking at the broader picture of what we need to do to conserve biodiversity and ecosystem functions on this planet. And it's not just animals. In fact, plants are probably a lot more vital as far as our ability as humans to live on this planet than other animal species are. So, it's really, really critical that you consider both of them as part of this whole picture.

David Todd [00:25:12] Well, what a great insight, I mean, that it's not just, you know, plants and animals as being, I guess, the, the keys, or architecture of biodiversity, but, but also that that you can learn, you know, ideas and techniques from one and apply them to the other, like you were talking about this cloning technology? Fascinating.

David Todd [00:25:36] Well, so you know, we could talk about plants, but I guess today, with limited time, we would probably need to focus on animals and in particular, the ocelot. And I was hoping that you might just give us a very basic introduction to the ocelot and what you can maybe share with us about its life history and the ecological niche that it, that it fills.

Bill Swanson [00:26:06] I talk to a lot of people in the zoo world about ocelots, and one of the things that people don't realize is that ocelots are a Native American species. And if you see an ocelot, it's a spotted cat, and it looks like an animal that would probably live in a rainforest. And they do. And we do a lot of work in Latin America, particularly Brazil, and that's the habitat. Ocelots are a small spotted cat. They weigh 20 to 30 pounds as adults, and they live these solitary lives in the deep rainforest. And you never see them, but they're adapted to that environment. And I tell people, "Well, we have ocelots in the United States", and they're kind of amazed. And I say, "But they don't live in a rainforest. They live in South Texas and they live

in the thornscrub. And it's very dry and very arid. But we do have ocelots, and it's the last resident population in the United States."

Bill Swanson [00:26:59] And inevitably people get really interested in this, like they didn't realize that that was a native species.

Bill Swanson [00:27:06] And for us in Texas, it's an iconic species. And unfortunately, we're down to the last 60 to 80 individuals in the wild, and they live in these fragmented populations. And all projections show that this species, at least in Texas, is going to go extinct if things continue along the way that they have and mainly through habitat loss for, for those animals in South Texas. They just don't have the right places to live anymore.

Bill Swanson [00:27:38] And so, our role as scientists, and working in the zoo field but also working with the wild populations, is to try and figure out how do we, we can keep this population from disappearing. And so that's a big focus of what we're doing in Texas.

Bill Swanson [00:27:54] But we also do the same sort of work in Brazil. So, they have the same issue. Brazil is kind of the southern extent of the range of the ocelot. Texas is a northern extent. And much like in Texas, the populations in Brazil, in Sao Paulo state, have become greatly fragmented. So, we know that these fragmented populations are losing gene diversity. And just like Texas, some of them are going to start going extinct unless we start figuring out how to make connections between populations, or introduce new genetic variation into those fragments.

Bill Swanson [00:28:29] And that's kind of what's driven a lot of the work that I do with the ocelot, both in Texas, but within zoos. And I explain to people that, you know, basically zoos are a good model for what we're going to have to do with wild populations in the future if we don't want them to go extinct.

Bill Swanson [00:28:47] And in zoos we have, in North American zoos, we have about 80 ocelots. So, there are 40 zoos in the United States that have ocelots and we have about 80 animals. And those populations, we manage pretty intensively to, to make sure that we maintain as much gene diversity as we can. And the reason we do that is that inbreeding will eventually cause any population to go extinct if you lose so much genetic variation that they start having disease and reproductive issues and they can't reproduce anymore.

Bill Swanson [00:29:23] So, we know this through decades of research with wild populations, but also with zoo-based populations, what we need as far as gene diversity to keep a population sustainable over time. And the fact is that the zoo population is not sustainable with only 80 animals. And the wild population in Texas is not sustainable, with only 60 to 80 animals. And so, how do you address that concern and keep these animals as a viable population?

David Todd [00:29:57] Well, that sounds like a big challenge.

David Todd [00:30:03] You mentioned the, the problem both for the Brazilian population and the one in South Texas is habitat loss and fragmentation. Can you point to any other factors that might have been responsible for the decline to the numbers that are so low now?

Bill Swanson [00:30:23] Well, with ocelots, they used to be a major target for the fur trade, and I actually consider what, what changed that to be a success story. So, we're always looking

for conservation success stories and the ocelots, along with most spotted cats back in the early 1900s were hunted pretty intensively for furs. And the fur trade, certainly through the '40s, the '40s through the '60s and '70s was pretty intensive. And as a lot of the bigger cats disappeared, the target became the smaller felids that had spotted coats like the ocelot.

Bill Swanson [00:30:58] And at one time there were hundreds, hundreds of thousands of ocelot pelts entering, entering the trade for fur, coming primarily out of South America, but also Central America. Probably not that much from Texas, because I don't think the population was that robust, but I imagine some ocelots were being killed for the fur trade, even in Texas, back in the '50s and maybe '60s.

Bill Swanson [00:31:22] And it was devastating. Those populations were being devastated. You can't have a species like the ocelot, which typically produces one kitten a year, that's a normal litter size, and the mother would raise that kitten for at least a year before getting pregnant again. You can't have a population like that that has such a slow reproductive rate, losing hundreds of thousands of individuals every, every year. It's just a matter of time before that, that population would have gone extinct.

Bill Swanson [00:31:50] But fortunately, we passed the Endangered Species Act in the United States in the 1970s, and then there were some pretty stringent international trade acts passed about the same time - CITES treaty - that controlled and eliminated a lot of the commercial fur trade, at least with spotted cats.

Bill Swanson [00:32:10] And that was a life saver, I think, for the ocelot, at least for the species itself, that was being hunted so severely. And that happened 50 years ago. So, they've been protected in the United States for the last 40 or 50 years.

Bill Swanson [00:32:25] But with CITES, they've also got pretty broad protection throughout Latin America. And so, I think those populations have recovered pretty well. And if you go to the Amazon, for example, or the Pantanal, which is a major wetlands in Brazil, there are quite a few ocelots there. So, they're not on the edge of extinction there.

Bill Swanson [00:32:44] In Texas, they are. In Texas, we would consider the population to be critically endangered for the northern population. And then in southern Brazil, we'd probably consider them to be vulnerable, if you know the CITE, the IUCN classification schemes.

Bill Swanson [00:33:00] But the species as a whole is not, is not endangered. So, we have enough in the Amazon left, although we're losing a lot of that in recent years, and other places like the Pantanal, that the species as a whole is not going to be going extinct anytime soon.

Bill Swanson [00:33:16] But for those of us that live in the United States, and especially in Texas and people that live in southern Brazil, you still don't want to lose your native wildlife, and those animals are still important in those ecosystems where they live. So again, that's why we're, we're working so hard to try and keep those populations from disappearing.

David Todd [00:33:39] Well, this sort of raises a question that, that maybe this is not a good one because every animal great and small has value, but say there's an endemic species like a black-capped vireo or something that is only found in Texas, versus an animal like the ocelot, which has a big range. And you know, Texas is at the extreme end, and that population is facing really serious problems. How do you decide to invest in that animal that is, you know,

part of a larger group that, you know, in large part is in pretty good shape? Am I making myself clear?

Bill Swanson [00:34:29] No, I understand what you're saying. And again, we deal with this all the time. And there's a tendency to, with wildlife when you're looking at conservation, and you have limited resources, you can't, you can't spend infinite amounts of money to save every species or every individual. And so, that comes up quite a bit, and it's also quite common in the zoos. Which species are we going to maintain and manage in zoos, and which ones should we not bother with?

Bill Swanson [00:34:57] And so, there's kind of like a triage idea for some of these species. The ones that are so far gone that we can devote tons of resources to them and they're probably still going to disappear. And then the ones that are fairly common in nature that maybe are OK right now, but in the future, they might be more endangered or more in need of conservation efforts. So, you have to make those decisions all the time.

Bill Swanson [00:35:23] And for many years, I didn't work with ocelots. I considered the ocelot, much like the IUCN, to be a fairly safe species. But that's when you look at the species on a whole, and you don't look at the value of an individual or of a species in different countries or different habitats. And so, ocelots, at least in Texas now, because we don't have jaguars anymore. We still have some pumas, but it's kind of risen up to be almost an umbrella species in the places that it's found. It's the, one of the major predators that's left in that habitat, and we see this in southern Brazil as well. It's a phenomenon that, they call it, the ecologists call, "mesopredator release". So, you lose the big predators, and the smaller predators and middle-sized predators become more important in that ecosystem, and they start to become more populous and having a bigger impact in that ecosystem.

Bill Swanson [00:36:26] So, I'd say that the ocelot, or any other middle-sized predator, where the larger predators have gone, have assumed a bigger role. And so, they become more important for conservation as far as maintaining that ecosystem that has been disrupted by the loss of those larger predators.

Bill Swanson [00:36:46] But it doesn't mean that you just write off that ecosystem. That ecosystem contains other species that depend on that environment to survive. So, I think the ocelot, as a species, is becoming probably a little more secure in the wild, even in Latin America, because the jaguar populations are declining, and the puma populations are declining, and other species that people have conflict with are declining. The ocelot typically is not a species that directly impacts on people, so there's less incentive to eliminate the ocelot because it's killing your cattle, or your sheep, or your goats, or something like that.

Bill Swanson [00:37:30] So, I think in those habitats where they're still fairly common, they play an increasing ecological role and we want to preserve that. But in places where they've become very rare and endangered, and again, I would say, especially in Texas, as the last remnant of our spotted cat population, you know, we used to have jaguars in Texas as well, and they're gone. And this is the last major spotted cat species that we maintain in the United States.

Bill Swanson [00:38:00] We have bobcats, which are, some are little spotted, I'll admit that. But you know, we have we have lynx and we have pumas and we have bobcats. And then in that very tip of Texas, we have that small population of ocelot. And so, as a Texan, I consider it a priority that we conserve the Texas ocelot. And as an American, I think the same way.

Bill Swanson [00:38:24] So, yeah, it's a legitimate argument: there's a lot of ocelots; let's focus on those cat species or those other species that need a lot more work on our part to conserve them.

Bill Swanson [00:38:36] But I think it's important we don't lose sight of the value of the ocelot within this ecosystem as a predator, but also as an iconic species within a state or a country.

David Todd [00:38:49] OK. That helps a lot. Thank you.

David Todd [00:38:54] You know, one other question about the decline of these ocelots, and I thought maybe you could speak to this since you have been active with, you know, domestic cats, feral cats, for so long. And I'm curious if, if the, I guess, losses to the pet trade - you know, these animals are alive, but they're no longer in the wild - was that a significant issue? And I remember those pictures of Salvador Dali with his pet. Was it Babou?

Bill Swanson [00:39:31] Babou, yes.

David Todd [00:39:32] Yeah, I mean, was that a significant problem for, for the wild populations of ocelots?

Bill Swanson [00:39:39] Yeah, I wouldn't. I wouldn't say it was inconsequential. I think compared to the fur trade, it was relatively minor. So, for every ocelot that entered the pet trade, you probably had a hundred that were killed for the fur trade. So yeah, it helped to decrease those populations.

Bill Swanson [00:39:55] And a lot of what we know about ocelots and maintaining them actually came out of the pet trade. There was a group in Long Island, New York, the Long Island, Long Island Ocelot Club that were private people that owned ocelots and would get together about how to take care of their animals and breed them. And that kind of morphed over the years to an NGO called the Feline Conservation Federation, which still exists and is comprised of private citizens that like, like to own and take care of wild felids. And most of those animals are born within, you know, private hands and are not coming from the wild because that's not legal anymore. And that doesn't happen.

Bill Swanson [00:40:35] But there was a time when the ocelot, I wouldn't say, was a common pet, but you could go to a pet store in most big cities and buy an ocelot as a pet.

Bill Swanson [00:40:44] I don't think they are the best pet to have. They can be pretty destructive. And if you've been around a male ocelot in particular, they do not hesitate to spread their scent by urinating. So, I can imagine that there were a lot of disasters with people thinking that they would be like a domestic cat within their household, and then they tear up the furniture and urinate all over the place. So, probably not the first choice for a house pet, but it was fairly common, again, going back to the '50s and the '60s that people had pet ocelots.

David Todd [00:41:20] That's fascinating. I love the thought about how you can't always question where you get knowledge.

Bill Swanson [00:41:27] No.

David Todd [00:41:27] I mean, that this Long Island Ocelot Club, the idea of keeping pets probably wasn't the most appealing to people in your field, but maybe you got some good information from them.

Bill Swanson [00:41:41] Yeah, I think at the time and again, you have to put yourself in the context of the times, the same with the fur trade. There, there wasn't this, this revulsion at somebody wearing a fur coat. It was common. People bought fur coats and they thought it was attractive. And now we look at those pictures and we just think these are horrible people, but these were just normal people. And that was the culture at the time.

Bill Swanson [00:42:02] And even people that owned ocelots, it was, you know, it was, they were interested in the species. They maybe weren't that conservation-minded. It wasn't thinking, "Oh, I'm going to help conserve the ocelot", but it was an exotic animal that was impressive to have as a pet. So, many of the people now that still have wild cats as pets, they've become really strong conservationists.

Bill Swanson [00:42:26] And so, one of our big challenges in zoos is to get people to care about the future of these species. And you don't have that problem with somebody that has owned a pet ocelot or another wild animal. They are strong conservationists. We disagree about the best way to go about conservation, but convincing them that it's important that we save wildlife isn't one of the issues at least.

David Todd [00:42:49] I see.

David Todd [00:42:50] OK. Well, and, and, you know, given that these ocelots are so rare, I think you were saying earlier that you and some of your brethren at other zoos have been working on captive breeding and trying to use reproductive science to try to preserve the genetics of the ocelots both in captivity and then also, I guess, in the wild. Could you talk a little bit about the role that that idea and those techniques have?

Bill Swanson [00:43:29] Sure. Just start out by just talking about the domestic cat a little bit. So, we use a domestic cat as a research model for all of our wildcat species. And we've only had domestic cats as domesticated animals for about 10,000 years. So, genetically and reproductively and physiologically, they're not that far removed from being wild cats. And domestic cats can basically rewild themselves by becoming feral again if they're abandoned out in nature.

Bill Swanson [00:43:59] So, they are essentially wild animals that we have temporarily domesticated, that would gladly revert to being wild if they have to, although I think they prefer being fed each day and not to have to hunt for their food. But it's been, it's been essential for us to be able to have that research model to learn more about just cat reproduction in general, and understand how cats reproduce, but also to develop the sort of sciences and technologies like semen collection and freezing and artificial insemination that lets us propagate wild cats like ocelots and tigers and other species.

Bill Swanson [00:44:38] So, everything that I do, and I explain to people here at the zoo, everything that I do starts with the domestic cat. We don't touch a wild cat species until we have a pretty good understanding of what we need to do with a domestic cat to have some success. And so, that's been really kind of essential. And so, when I, when I did my Ph.D. at Louisiana State, it was all with domestic cats. And the focus that I had was trying to

understand how we can use some of the reproductive technologies, like in vitro fertilization and embryo transfers, as a way to manage wildcat populations.

Bill Swanson [00:45:15] And so, when I went to the Smithsonian, we continued working with domestic cats. But the species, the wild species, that I was kind of directed to work with was the ocelot. And at the time at the Smithsonian, I mentioned JoGayle Howard and Terri Roth. They were working on some of the bigger cats. They were working on snow leopards. JoGayle was working on cheetahs and clouded leopards, which are all bigger cats than ocelots.

Bill Swanson [00:45:41] And so, the thought was, "Well, why don't you work on the ocelot? We don't know very much about the reproduction. And there's a decent sized population in zoos, not huge. But there were a lot of ocelots in zoos in Texas, as there are now. And it would be a good population to start working with."

Bill Swanson [00:45:59] And so, it was it wasn't because I was from Texas. I grew up in Texas. But I was directed to work with ocelots. It was just the species that we kind of decided needed to be worked with when I got to the Smithsonian.

Bill Swanson [00:46:13] And so, a lot of the focus then was trying to develop artificial insemination as a way to propagate these wild cats. And that was an area that JoGayle Howard specialized in. And she had done studies in the domestic cat showing that she could produce pretty high pregnancy percentages using a technique called laparoscopic artificial insemination. So, a laparoscope is a surgical instrument that you use to visualize the reproductive tracts, the reproductive tract in the cat's abdomen. So, people in the human field, you might know of it as keyhole surgery. So, you make these very small incisions so you can insert a scope so you can visualize the reproductive organs. And then you can make other small incisions to insert forceps or aspiration needles or whatever you need to use to manipulate the reproductive tract to collect composite sperm into the uterus or collect eggs from the ovaries.

Bill Swanson [00:47:12] And the attraction of that is it's minimally invasive. So, these very small incisions, you do have to anesthetize the cat and it is a surgical procedure, but these incisions are very, very small. And so, when you're done with the procedure, you basically put a couple of sutures in place and the cat recovers from the anesthesia. And pretty much by the next day, they're back to normal, back to being a cat. So, it gives us a way to do these sorts of procedures with greater success, while not traumatizing the cat very much, not as much as would be required if we didn't, if we if we use a non-laparoscopic approach.

Bill Swanson [00:47:50] So, JoGayle had worked this out in the domestic cat and worked out how we could, we could stimulate their ovaries to get them to produce follicles and ovulate at the right time, and then deposit sperm into the uterus of that female and produce fairly high pregnancy rates. So, 50 percent of females could become pregnant doing that procedure.

Bill Swanson [00:48:12] And then she applied that to cheetahs initially and had a lot of success producing offspring in cheetahs using the same basic approach that she used in the domestic cat. And so, when I got to the Smithsonian, we wanted to, to try to do this with ocelots, and nobody had ever tried to do artificial insemination in ocelots before.

Bill Swanson [00:48:31] So, one of the bigger challenges in trying to move from cat species to cat species is getting the science and technology to work exactly the same way, and it never works as well as it does on the domestic cat. We just know a lot more about the domestic cat

than we do these other species. We know a lot more about their basic reproductive physiology. So, when we go from the domestic cat to a wild felid, we know our success rate isn't going to be nearly as high. And we know that we're going to have to modify and kind of tweak this technique a lot to get it to work better in that wild felid.

Bill Swanson [00:49:07] And that was certainly true of the ocelot. And so, part of that, that protocol is to stimulate the ovaries with gonadotropin and gonadotropin are a type of hormone. The two main ones that we use in cats: one of them is called equine chorionic gonadotropin or eCG, and it induces follicular growth on the ovaries of the cat. So, it's similar to the endogenous follicle stimulating hormone that cats and all mammals produce. And its role is really to stimulate the ovary to cause a follicle to start growing and have the oocyte in the follicle to start maturing.

Bill Swanson [00:49:46] And then there's another hormone that in the cat is called luteinizing hormone, or LH, that causes that follicle to finish maturation and to ovulate. And the exogenous version of LH that we used at the time was human chorionic gonadotropin. And as the name suggests, it comes from humans. And it's isolated from the urine of pregnant females, pregnant women. And then that hormone is then used in cats to induce ovulation.

Bill Swanson [00:50:15] But the challenge with working with different cat species is that they all have different sensitivities to these two hormones, so, eCG and hCG, it doesn't matter what the weight of the individual cat is or the species. It seems to be independent of their weight how sensitive they are to these gonadotropins. So, it means that on a species-by-species basis, you basically have to do these dose-response studies to see how the ovaries respond and if they ovulate or not in response to that treatment. Because if they don't ovulate, then you can't do artificial insemination and produce a pregnancy.

Bill Swanson [00:50:52] And so, when I got to the Smithsonian to work on the ocelots, we'd already collected a fair amount of data from domestic cats, and cheetahs, and clouded leopards, and were getting data on snow leopards. And it seemed like these cats were really sensitive to these gonadotropins: that you could use a dose similar to what you used in a domestic cat and get the same sort of response. It didn't matter that some of these cats, like a cheetah, is 10 times bigger than a domestic cat.

Bill Swanson [00:51:20] And so, when we started working on the ocelot, we kind of followed that philosophy. Well, we need to go low on the hormones. We need to start basically at a domestic cat dose and see what sort of response that we get. And we found out that ocelots were really insensitive to these gonadotropins. They were totally different from these other cats. And I ended up doing 17 procedures with ocelots, increasing the dosage of the hormone that we were using until I was getting consistent responses where the female would develop multiple follicles and ovulate. But it was just through trial and error that we got to that point. It took a couple of years until we produced our first pregnancy in the ocelot with artificial insemination. And the biggest part of that was just trying to figure out these hormone dosages and how to get them to respond the right way.

David Todd [00:52:11] Well, and is there a danger to using too much of one of these hormones?

Bill Swanson [00:52:17] Yeah. Well, you can overstimulate them to a degree. But what I found in the domestic cats and you see variable responsiveness in domestic cats, the individuals respond at a different level, even within a species. And some of these cats would

produce, you know, 60 or 80 follicles on their ovaries. And you would think, well, that's, that's 20 times what they should have, or more than that, but they seem to recover pretty well.

Bill Swanson [00:52:46] And so, at least in the domestic cats where we have these sorts of hyper responses, when you, you go back in laparoscopically and you look at the ovaries again, they seem pretty normal, like they recover. They ovulate all those follicles and they form all of these what are called corpora lutea. And then once those regress, the ovary goes back to being pretty much normal. And we know in our domestic cat research and some of the work I did for my Ph.D. that they can reproduce normally after they do those procedures. So, it's not like once you do a procedure and you stimulate the ovaries this way, they're not able to breed naturally and produce offspring naturally. So, it doesn't seem that using the higher dosages adversely affects their ability to breed naturally or artificially later on.

David Todd [00:53:38] Well, it sounds like there's been a lot of, I'm sure it's very advanced, but there's been some trial and error these 17 efforts. Yeah. Can you can you talk a little bit about the sort of arc of your efforts? I understood that you managed to produce an onslaught kitten with artificial insemination, one of the very first, as I understand it, at the Dallas Zoo, back in 1995. And I'd be really curious to hear, you know, what that experience was like and then, you know, what you've learned as things have evolved and you've picked up new, new knowledge over the years since then.

Bill Swanson [00:54:21] Well, the Dallas Zoo birth was the first ocelot born from AI. It was only the second wild cat that had been born using frozen semen. And our intent was not to use frozen sperm for the artificial insemination, but at the time the Dallas Zoo didn't have a male. So, when we were working in Texas, the two main zoos that we worked at were the Caldwell Zoo in Tyler, and then the Dallas Zoo in Dallas because they had ocelots. And the Tyler, the Zoo in Tyler, had a male ocelot. And so, what we would usually do is we'd go to Tyler first and try and collect semen from their male, and then use that to inseminate the females at the Dallas Zoo. But the female at Tyler, or the male at Tyler, never gave us very good sperm samples.

Bill Swanson [00:55:05] And so, when we got to Dallas, when we did the AIs that resulted in the pregnancy, I didn't have any non-frozen sperm to use, but I brought along some frozen semen from a male that we had collected and banked at the Cheyenne Mountain Zoo in Colorado Springs, Colorado, about a year earlier. So, we always brought frozen semen as a backup just in case the male that was at the zoo, or at the nearby zoo, didn't produce any sperm for us.

Bill Swanson [00:55:33] And so, we did the insemination on that female, and she responded well to the hormones and we did the AI. It was a uterine AI, much like the technique JoGayle Howard had developed. And I remember it was probably 70 days later that the zoo called us and they said, "You know, the female that you AI'd, she's come back into heat. And so, the normal gestation in an ocelot is about 78 to 82 days. And at the time, we had no way to determine pregnancy in these cats. We have a couple of different techniques that we can do now.

Bill Swanson [00:56:07] But at the time when we did an AI, we just told the zoo, "OK, she might give birth in 80 days or she might not. We don't know if she's pregnant. So, keep a close eye on her when she gets close to parturition, and you know, she might give birth to a kitten."

Bill Swanson [00:56:22] But when they contacted us and they said that she was in heat and we didn't know enough about ocelots at the time to know what that really meant, we just

thought, "Well, she's not pregnant." So, we said, "All right, you can probably stop the pregnancy watch and go back to managing her like you normally would if you didn't think she was pregnant."

Bill Swanson [00:56:39] And then a few days later, I got a call and it was on a Sunday morning and I remember this and it was JoGayle Howard calling me. And she said, "You know, the Dallas Zoo called me this morning, and they told me that that ocelot had given birth, that we had done the AI on." And the reason they knew this was that they had a wedding at the zoo the night before, so, the Saturday night. And they had the reception at the zoo and one of the wedding guests looked into the exhibit and there was the mother with a baby ocelot, and she went to find one of the zookeepers and said, "You know, you have a baby ocelot in that exhibit." And the keeper looked at this person like they were crazy.

Bill Swanson [00:57:17] And sure enough, that female was pregnant and she had given birth on exhibit, which is not where you want a mother to give birth. And so, the keepers basically had to get the mother to go into the office of the holding area and then go into the outside exhibit and get the kitten and carry it back around and give it back to the mother. And unfortunately, that was apparently so stressful to the mother that she killed the baby and she ate it.

Bill Swanson [00:57:41] So this, this tremendous scientific achievement, and this incredible baby, which seemed to be very healthy, unfortunately, didn't survive. But the science was valid.

Bill Swanson [00:57:52] And the reason that she came into heat, and we know this very well now from research that we've done, is that as progesterone drops in an ocelot, or any female cat, one, one of the side effects is sometimes the follicles, or the ovaries, will start developing follicles as the progesterone drops because the progesterone is what is keeping the ovary inactive. And once that progesterone level drops, you can start developing follicles, even if the female is pregnant and the estrogen levels increase enough that she will appear as if she's in heat when she's really just about to give birth to her kitten.

Bill Swanson [00:58:29] And we didn't know that at the time. And unfortunately, it didn't work out well for the kitten. But the science that we did, and the fact that we were able to use frozen sperm was really significant. And again, this was 28 years ago, right, 28 years ago that that kitten was born, 27 years ago. And that was only the second wild cat of any species that was ever born with frozen semen, artificial insemination.

Bill Swanson [00:58:54] So, it was it was pretty significant from a science perspective, but also from a conservation perspective, because this kind of told us that, yes, we can collect ocelot sperm, we can freeze it and then we can use it later on for AI and produce offspring. And until we did that successfully, we didn't know that for certain with ocelots. And since that, that time period and that was the first successful, AI in an ocelot, ever, we've produced nine other, eight other, ocelot pregnancies with AI, and the last two were both with frozen semen. So, we know that the frozen semen approach is usable. It's not as efficient and successful as we would like, but with what we've learned since that first ocelot birth, we think that it's to a point that we can actually apply it to manage our zoo populations, but also possibly the populations in the wild. And that's kind of what we're working on now.

David Todd [00:59:53] Well, so, this may be a silly question, but the appeal for using frozen sperm, in my mind, seems like it could be that that you could have a male cat in Tyler, for

instance, and without having to disturb that cat and take him someplace and freak him out, you could just collect the sperm, freeze it and then take it to Colorado or take the frozen sperm from Colorado and take it to Dallas. But it maybe it makes it easier for you all to manage populations that are in different zoos or in different areas of the wild. Is that, is that the thought?

Bill Swanson [01:00:34] Yeah, it's really essential, semen freezing in particular. But you can also extend this to oocyte freezing or embryo freezing. But semen freezing because the semen is the easiest thing for us to collect from wild cats. And you can freeze that sperm. And again with, with domestic livestock or humans, we've been freezing sperm for decades and decades, and at least in the cattle industry, the dairy cattle industry, it's the primary way that offspring are being produced is with frozen sperm, artificial insemination.

Bill Swanson [01:01:05] So, we know from that research that frozen sperm is viable for at least 50 years, and there have been offspring produced in livestock with semen frozen for 50 years and probably much, much longer for hundreds of years that we can store that sperm. So, from a genetic perspective, it gives us a great way to preserve gene diversity within a liquid nitrogen tank and not have to maintain these large living populations, which are the main challenges that we have in zoos. We just don't have the space to house 300 ocelots. We have 80 ocelots, and that's pretty much filling up all the space that we have.

Bill Swanson [01:01:42] So, with that many animals, just like the wild populations, you can't maintain gene diversity. You just don't have enough animals to do that. But if you can use frozen semen to introduce new genetics into that population, you can keep that population sustainable just as if you had three to five hundred animals.

Bill Swanson [01:02:01] But you have to make sure that that frozen semen is viable enough that you can produce offspring when you need it, and then periodically produce living offspring from that frozen semen to get the genes back into the living population. So, for management in zoos, that's great. It does give us a way to move genes between different zoos, but we're exploring moving genes between wild populations back to zoo-based populations and from zoo-based populations back to the wild. And that lets us do that as well, and it lets us maintain so much of that gene diversity in a much less expensive, simpler way, just within a liquid nitrogen tank.

Bill Swanson [01:02:40] So, for a hundred dollars a month, I can have the sperm from 50 ocelots in one tank and be able to maintain the gene diversity of those 50 animals for hundreds of years. It's a tremendous resource, but we have to have the expertise to be able to use it successfully.

David Todd [01:02:57] I see. Well, so, you talked about the opportunities that the artificial insemination provides for moving genetic material from one zoo to another zoo. But then it sounds like you're also looking at zoos to wild populations and then maybe even among wild populations?

Bill Swanson [01:03:21] Eventually. I think right now, with the ocelot, we've had enough success using artificial insemination. We've done a lot of IVF and embryo transfer as well. But the main approach that we're looking at right now is artificial insemination with frozen semen. It's actually been a really important tool for us managing our ocelot populations in zoos. And with the pregnancies that we've produced with AI and then having those offspring grow up and breed naturally, it's been really critical for the current sustainability of our zoo-

based populations. But we think that we've got this figured out well enough that we can start applying it with wild populations, but initially just looking at collecting semen from wild males and using that sperm to inseminate females within zoos. And that's something that we're working on at this moment with the Texas ocelot.

David Todd [01:04:14] I see. So, one story that I've heard from one of your colleagues, Hilary Swarts, was this effort to, to collect sperm from a roadkill ocelot, that was, of course, in the wild, freeze it and then take that to artificially inseminate a female ocelot. And that seems pretty recent and, and pretty amazing. I was hoping that you could tell us about, about that incident.

Bill Swanson [01:04:49] Well, it's really kind of interesting because I started working with Hilary a few years ago on this idea of collecting semen from wild Texas ocelots and freezing it. And we've developed a really simple technique to do that, that a field ecologist like Hilary can learn the technique pretty easily. And then, as part of her normal sampling that she does whenever she caught a wild ocelot, collecting blood samples or fecal samples, whatever, she could also collect a semen sample and freeze it in the field so that we could use it for artificial insemination.

Bill Swanson [01:05:23] And because she had that training, she knew that she needed to get the semen frozen pretty quickly, and that if she could do that, then there would be a chance that we could produce offspring with that semen.

Bill Swanson [01:05:37] So, in this particular instance, there was an ocelot that was outside the refuge, outside the National Wildlife Refuge, that was hit by a car. And fortunately, they notified Hilary pretty quickly after that animal was killed. And most of the time when ocelots get hit by cars in South Texas, you never find them until days later, and there's no chance to rescue their semen. But it just so happened that after this animal was hit by the car that somebody saw the animal and called, knew to call Hilary and inform her that there was a dead ocelot on the side of the road.

Bill Swanson [01:06:12] And so, she was able to get to the body within a few hours after death, and that was kind of critical. And then because she had this training that we had done with semen freezing, along with Tom de Maar, who's a veterinarian at the Gladys Porter Zoo, she knew that she needed to get the semen to a place where it could be frozen. She wasn't trained to do postmortem recovery like that. It's a little bit different from the semen collection technique that she was using, which just involves a catheter that's basically inserted in the urethra. For postmortem recovery, you have to surgically removed the testes and recover the epididymis and the vas deferens from those tissues to, to recover the sperm from.

Bill Swanson [01:06:55] And so, she contacted Dr. de Maar and took the, the body over to the Gladys Porter Zoo. And then Tom de Maar's a veterinarian, so he was able to remove the testes. And then they put the testicles on ice, on an ice pack, and then overnighted them to me in Cincinnati. So, they arrived at my door about 36 hours after this ocelot died, which is a little bit longer than we usually prefer if we're going to do a gamete rescue. Of course, it's a lot easier in the zoo because if an ocelot dies overnight, you know, we usually know the next morning and we can get the testes right away. So, the 36-hour delay from the time of death until we got the testicles is a little bit longer than we prefer. We normally like to get them within 24 hours.

Bill Swanson [01:07:43] So, I wasn't terribly optimistic when I got the tissues at CREW. And then I did the recovery and we got 400 million sperm, which is a huge amount of sperm from an ocelot. And then most of it was viable and motile. And it was just, it was just incredible that we could get that tissue from, you know, out in the middle of nowhere in South Texas to a research lab in Cincinnati in a 36-hour time period and recover all of this incredible semen. And we ended up freezing, I think it was, 20 or 30 semen straws and stored that in our liquid nitrogen tanks.

Bill Swanson [01:08:20] And then last year, we did an AI procedure at the Albuquerque BioPark in Albuquerque, New Mexico, and used that frozen sperm for the insemination. And unfortunately, the female did not get pregnant. I don't blame the semen in particular. The semen looked pretty good post-thaw and sometimes with AIs we don't get pregnancies. But we have so much of the sperm frozen, and it's of really good quality. I think in the next couple of years, we'll probably be able to produce a kitten from that frozen sperm, and this particular male will have offspring within the managed population, which is pretty extraordinary.

David Todd [01:09:03] It's life after death. What an amazing story.

Bill Swanson [01:09:08] And I think it was exceptional because again, I think you have to be able to find that animal so soon after death. And many of the animals, the ocelots in South Texas, that die from being hit by automobiles, but again, you never, you never find those bodies, if ever. But you usually don't find them until a couple of days later. And by that time, it's too late. So, I don't want to see any more ocelots get hit by cars anyway, but I think the chances of us getting more samples that way are probably negligible.

Bill Swanson [01:09:39] I think that the sampling and the freezing they're doing now when they capture the ocelots for their ecological studies have been much more productive, and both Hilary and the Ph.D. student that I'm working with at Texas A&M - Kingsville have done tremendous work in getting semen from these wild males and freezing it. So, we have the opportunity to use it with our zoo-based population, and possibly the wild population in years to come.

David Todd [01:10:08] Well, you've been doing this for literally decades now, the reproductive assistance to, to ocelots and another wild cats, and domestic cats, for that matter. What do you think you've learned? I mean, where do you think the big progress has been in this reproductive arena? And where do you think the big challenges still remain?

Bill Swanson [01:10:36] Well, I think with, and we work with a lot of other wildcat species, and I haven't talked about a lot of the other research that we do. It's a lot more basic science. We use a technique called fecal hormone analysis, and so a lot easier to do with zoo-based animals than those in the wild. But we can monitor their hormone levels just by measuring the metabolites in the feces. And so, that's a really interesting tool. It's totally noninvasive because you're using voided fecal samples, and most cats will defecate on a daily basis so you can get a daily indication of where this animal is, whether it's a male or female, reproductively.

Bill Swanson [01:11:12] And with the females, we know where they are in their reproductive cycles. We know if they're coming into heat. We know if they're possibly pregnant. We know if they've ovulated and are not pregnant. And the males - we know if they are producing high testosterone levels, which correlates with good sperm production.

Bill Swanson [01:11:28] So, with all of these species, and the ocelot is no exception, we do this really basic characterization of learning as much as we can about their normal reproductive physiology and the hormone analysis from feces is a key part of that. The other is semen collection and analysis. So, with the male ocelots and other cats in the zoos, it's a lot easier to collect semen from them than it would be to capture and collect a wild ocelot. And so, we've learned a lot about their normal sperm quality and the normal numbers of sperm that they have in ejaculate, and the best ways to process and freeze that semen.

Bill Swanson [01:12:05] So, I would say my career, which spans over 30 years now, probably the main advance as far as knowledge level is that basic reproductive biology. And with all of these small cats that we've worked with, we know so much more than we did 30 years ago. But that's not to say that that's going to make everything work as well as it does in a domestic cat and still doesn't, because these species are different. They've evolved differently. They have similarities to the domestic cats, but they have a lot of differences.

Bill Swanson [01:12:34] And so, the painstaking part of this, with trying to apply artificial insemination or embryo transfer and those sorts of technologies, is what we talked about before, is this animal-by-animal research to find out how they respond to these sorts of methodologies that we've developed in the domestic cat.

Bill Swanson [01:12:53] So, that's the big challenge. And so, with artificial insemination in domestic cats, I can take frozen semen and I can inseminate 10 females and seven or eight of those females are going to become pregnant, because we've worked out the basic science to be able to do that. If I did the same thing with an ocelot, and I got one or two of the ten to get pregnant with frozen semen, I would be ecstatic. So, we still have a ways to go to improve the knowledge that we have to make it more efficient that artificial insemination really becomes a useful management tool. So, that's the big challenge for us.

Bill Swanson [01:13:28] And I think the other big challenge is, is time. I mean, you look at the Texas ocelot, we have maybe 60 to 80 animals. That population's declined by at least 50 percent in the last 20 or 30 years, and it's probably going to still decline unless we intervene pretty forcefully to reverse that decline. And fortunately, there's a lot of institutions in Texas that are devoted to doing that - Texas A&M - Kingsville in particular, but U.S. Fish and Wildlife Service, the Texas Parks and Wildlife Service, and the East Foundation, which is an organization in Texas that is focused on making wildlife conservation compatible with agriculture. So, their interest is really having a lot of the big ranchers in South Texas and West Texas care about ocelots and be a partner in trying to conserve and recover that species.

Bill Swanson [01:14:24] So, with the time issue and the technology and the knowledge that we have kind of working all together, and with the, the Texas Ocelot Recovery Program to, you know, if we have to do AI, if we have to do semen freezing, you know, translocation, what are the options that we need to look at if we want the Texas ocelot to exist in Texas 100 years from now? And so, I think the time, the time question, we're I think we're really running out of time.

David Todd [01:14:58] You know, it seems like some species, such as the ocelot, become so rare and at risk that they need major interventions to help preserve them and even possibly hopefully restore them. But at some point, I guess you characterize them as "conservation-reliant" and, and I wonder, how do you decide if that help that you provide, you know, maybe really heroics, are worth it?

Bill Swanson [01:15:33] Yeah, that's a, that's a difficult one. And if you're aware of the extinction crisis that we're, we're going through now, the sixth great extinction, and the projected loss of species globally, it's hard to, hard to reconcile that basically saving this one cat or saving this one population is going to make a huge difference in the big picture. But I kind of look at it like as we need to, we need to start somewhere and we need to do something.

Bill Swanson [01:16:02] So, the alternative to that is to basically say, well, the Texas ocelot is too far gone. Let's just let it go extinct. And once it's gone, it's so much more difficult to reestablish a population. And this is true in zoos, as well. Once we lose a managed population, restarting that population can be almost impossible, especially in this day and age, where you just can't go out into nature and capture a bunch of wild cats and bring them into zoos.

Bill Swanson [01:16:28] So, I think the same as with species like the Texas ocelot. And I kind of look at it as a, an iconic model of what we're able to do. And so, in Texas, that is an iconic species that is, it is a very high-profile species, and it's one where I think you can basically bring a lot of divergent views and people together to work on one objective, and that's to keep that species from disappearing. And the big thing in conservation, and if you've worked in this field for decades, as I have, is having hope that what we're doing is going to make a difference, and maybe not for the million species that may go extinct, but at least for some of them.

Bill Swanson [01:17:13] And I think the real concern is that, you know, how many species can we afford to treat this way that, that we have the resources that we can devote to this? And I really don't know. But I think for at least a few species that we can get people, impassioned people, to work together to save, we have a chance to do that. And if we have the chance to do it, then we should do it. And that's what we're trying to do with the Texas ocelot.

David Todd [01:17:39] OK, I think I follow you. And I guess the, the ocelot is sort of, as you said, iconic and high-profile and charismatic, and maybe success there will encourage success elsewhere.

David Todd [01:18:01] I noticed that you gave a presentation about 15 years ago about the ocelot as, as a poster child and about how politics and endangered species can interact. And I guess, is that where you going with that argument?

Bill Swanson [01:18:19] Well, it's, it's again, it's challenging. It can be challenging from a regulatory side, and this is true within zoos, but I do a lot of international work, primarily in Brazil now, but I've worked in Mongolia, and Thailand, and South Africa, and the Middle East. And from a regulatory standpoint, it can be challenging to try and do conservation where you need to move scientific samples, and you need to move frozen semen, and sometimes you need to move cats between countries. And so, the regulatory framework that you, that you work in and with the us and the U.S. Fish and Wildlife Service that issues the permits that we need to be able to do that work, it can be really challenging. In some ways, it can make it much more difficult for us to have success.

Bill Swanson [01:19:05] And that's always been a big issue I think in Texas, with the federal government oversight of endangered wildlife, and particularly with the ranchers, for example, in South Texas that may or may not have ocelots on their property, but getting them to understand that the presence of those animals doesn't mean the federal government's going to take over your land and kind of working with them as partners in those sorts of efforts.

Bill Swanson [01:19:29] So, you know, going back to when the Endangered Species Act was passed, one of the net effects of that is that a lot of these pet ocelots that people had in their homes were basically dropped off at the zoos. So, it became much more difficult for a private person to have a pet ocelot. And so, the zoos actually were flooded with pet ocelots. But the problem was we didn't know where these cats came from. So, a lot of them probably came out of South America, some out of Central America, but there were no origins on these animals. So, genetically, the zoos really didn't know what we had. And so, we pretty much bred all those individuals together over the years. But genetically, they don't really represent any wild population that we know of. And so, that created challenges for us.

Bill Swanson [01:20:17] And again, that was an outgrowth of the Endangered Species Act. Because if we had set out to establish an ocelot population and to manage it, we would never have gotten ocelots from all of these different countries. We would have focused on a single country to be our source population. And that's what we're trying to do now with the Brazilian ocelot, is to establish a separate population of Brazilian ocelots in our zoos that have a known origin, that have known ancestry, so we know genetically what exactly that we're working with.

Bill Swanson [01:20:51] So, yeah, the regulatory side and it's really important, you know, the Endangered Species Act has been a life saver for, for hundreds of species, but it also creates challenges for those people that want to try and conserve those animals.

David Todd [01:21:10] So, I think that there are some scientists who are content to stay in the lab or out in the field, but for some reason, you have been willing to be a spokesperson and, and appear in public and speak on behalf of wildlife in general and ocelots in particular, and I'm curious what that experience of outreach and public education has meant to you. And, and then in turn, you know what sort of effect you think it's had and what sort of reaction you, you feel you've gotten from those talks with the public.

Bill Swanson [01:21:49] Well, I probably, I probably haven't given that many talks to the public as I have at scientific conferences and some other places. I mean we have a very active cat ambassador program that kind of spreads the message about ocelot and conservation to visitors at the zoo. And when we had an ocelot ambassador, they were the ones that took that ocelot down to Texas every year for the Ocelot Conservation Festival in Brownsville. And I always thought that that was probably the most impactful thing that we've done as far as education, because we're not spreading the message of conservation here in Cincinnati, which as far as I know, it doesn't have wild ocelots, but we're taking that message down to South Texas to be part of this collaborative effort to educate the people in Texas about their native wildlife, and about this incredibly endangered cat species that lives in their backyard. And to get them to care about ocelots living in Laguna Atascosa and some of the counties in southern Texas.

Bill Swanson [01:22:55] So, from an education perspective, probably the biggest thing I've done was produce the, the ocelot ambassador that we used for those procedures. Her name was "Sihil", and she went down to Brownsville for 11 years in a row to help spread this message as part of the Ocelot Conservation Festival and our ambassador keepers would make that long drive every year, 20 hours to Brownsville from Cincinnati, to take her down there to spread that message.

Bill Swanson [01:23:24] And she was the cat that I took on, it was actually "Good Morning America", right after she was born. She was the first ocelot born from embryo transfer, and

she was also a frozen embryo transfer. And they thought it was, was newsworthy enough that I went on "Good Morning America" with Diane Sawyer, in New York City, and probably impacted millions of people with that one TV session.

Bill Swanson [01:23:52] But that ocelot then grew up to become this incredible ambassador for its species, and over her life, she educated millions of people, millions, including tens of thousands of people in Brownsville, about why ocelots are important and why they should care whether they go extinct or not.

David Todd [01:24:15] I guess there's no substitute to seeing an animal in the flesh, and despite all the images that are on TV or, you know, movies or, you know, leaflets and so on, that seeing an animal live and breathe and move around - this is powerful.

Bill Swanson [01:24:36] I would agree. I mean, some people question why we still have zoos, and I think there's still tremendous value in being able to, to see an animal in real life. That, you know, watching a video is great. Getting nature, nature shows showing these animals in the wild is really important. But that kind of that face-to-face meeting, that personal contact, to actually be able to walk into an elephant barn, to smell an elephant, or to see an ocelot up-close, and listen to an ocelot purr, those sorts of things, I think are really impactful on developing that personal connection that people need to really care about wildlife.

Bill Swanson [01:25:13] So, zoos have a tremendous role, I think, still, for education.

Bill Swanson [01:25:18] For myself, as a, as a scientist, they're indispensable. We would never be able to gain the knowledge that we need to conserve a lot of these wild populations if we didn't have animals within zoos to work with. It would just be impossible.

David Todd [01:25:34] Well, that was something I wanted to talk to you a little bit about is, you know, even when I was a kid and I'm roughly your age, zoos seemed more about exhibits and small cages where you could see the animal close. But I've been really startled to see how much zoos have evolved in the last 40-odd years to being really so involved with education and conservation, you know, both with the kind of research that you do, but also, you know, in holding a reserve population for release at some later date. Can you talk a little bit about the evolution of zoos, at least during the time that you've worked in the field?

Bill Swanson [01:26:26] Yeah, I've been here in Cincinnati for 25 years and I was at the National Zoo for five years before that. So, I've been working in zoos for about 30 years. And even within that time frame, within that time frame, there's been a tremendous change in zoos. And once, when they were initially established, they were mainly just about seeing the animals and having a good day with your family. And a lot of people still go to the zoo mainly for that purpose.

Bill Swanson [01:26:51] But we've become more cognizant of the fact that we have this tremendous resource for conservation that in the United States, we have 240 zoos that are part of the Association of Zoos and Aquariums, and we work together as one massive organization to manage all of these endangered wildlife species. We have breeding programs for pretty much all the species that we, we house in zoos. And then one of our missions has really been to connect our populations back to the wild. So, zoos fund tens of millions of dollars of conservation programs in the wild and research with wild populations. So, zoos have, have moved from being kind of the menagerie of old.

Bill Swanson [01:27:36] And if you're my age, you may have grown up and you thought zoos were kind of like animal prisons. But the changes in how we, we house these animals and the welfare that we give them have been astronomically different from what they were even 30 years ago. And it's really about meeting the needs of each individual that we, we have and finding out what those needs are. So, it's not always apparent but making sure these animals are not being stressed by the environment that they are in, and that they're at a certain comfort level, that they can thrive and reproduce and live full lives, albeit it's under human care. They're not in the wild. But their lives are not deprived the way I think some critics of zoos still present these institutions. These animals get tremendous care, much better than, I think, many, many people probably give their pet animals at home with the veterinary care that these animals get from our animal care staff and just the daily care they get from the keeper.

Bill Swanson [01:28:39] So, zoos evolved a lot from their founding, you know, going back a couple of hundred years ago to the first more or less managed zoo populations to where we are now. And I've always kind of said, well, if we, if we didn't have zoos, we would need to invent them, if we're really serious about conserving all of these populations that are becoming endangered, because we're kind of on that track. And these wild populations are facing a lot of the same issues that we've already dealt with in zoos. How do you maintain these animals to be sustainable and healthy when you have very few individuals in a given population? How do we manage them to keep them viable? And the tools that we've developed as far as just genetic management are things that are going to have to be applied to a lot of wild populations if we don't want them to go extinct.

Bill Swanson [01:29:31] So, in a lot of ways zoos are essential to the future of conservation in the wild. It provides the knowledge and the tools that we need to really keep some of those populations from disappearing.

David Todd [01:29:46] That, that's a really powerful idea that, you know, even though these institutions, some of them, like Cincinnati's, are 150-some years old, what they've become is so different from what they were and their reason for being is now is maybe something that would have caused them to be created if they hadn't existed in the past. And that's, that's a powerful, powerful thought.

David Todd [01:30:15] So, you know, I know that we've, we've just focused on one small part of your practice, and that you work with many felids and lots of wild cats. And I was curious if, if there are wild cats, other than the ocelot, but you know, such as the Pallas's cat, or fishing cat, Amur tiger, black-footed cat, sand cat, that you know, have similar, maybe different, challenges that are sort of instructive for when we think about ocelots.

Bill Swanson [01:30:50] I think probably the closest analogy is some of the big cats. In that case, you know, you're talking about Amur tigers, probably the tiger populations, the tiger subspecies, are among the most, most endangered in the wild. But again, there's been this collective effort among tiger conservationists to try and grow those wild populations. And in some countries, they've been successful. So again, it goes back to kind of getting this collective will that we will not allow this species to go extinct and we're going to get the resources to do what we can to save it. And tigers, of course, are even much more iconic than ocelots are, you know, the largest wildcat species. And there are a lot of people working on conservation on tigers. There's not nearly as many people concerned about conservation of the ocelot or some of these other small cats that I've kind of devoted my career to.

Bill Swanson [01:31:46] And that was concerning when I started in the field, and the ocelot was the first wild species that I worked with. But from there, I've worked with a number of other small cat species primarily. We're doing a little bit more big cat research now. But it was because there was very little attention being paid to them. It was kind of like they were an afterthought. You know, we need to save the cheetah and the tiger. But does anybody really care about the fishing cat or the Pallas's cat? And I thought that was wrong, and I thought we needed to care about those species as well.

Bill Swanson [01:32:17] So, a lot of our research has really been trying to define the reproductive biology of these smaller cats, led by the ocelot, but a lot of these other small cats as well, and then apply some of the same technologies to conserving them. So, we've kind of specialized in the small cats. We've gotten more involved with the large cat work, with tigers and snow leopards and Amur leopards and jaguars, because there's a need and it was a need we didn't think was being fulfilled, and we felt that we had the expertise to, to extrapolate what we know with small cats to the larger cats.

Bill Swanson [01:32:54] And as I mentioned, it's always a challenge when you go to a new species and large cats have their own set of unique challenges. And part of that's related to just how big they are. It's really hard to work with these big cats, especially animals that literally can kill you if, you know, they should wake up from anesthesia at the wrong time. So, it does create a lot more challenges, but it's kind of interesting that we use the domestic cat as a model for the wild felids. I kind of consider the ocelot as our model for all the others, all the other small wild felids, because what we've learned in the ocelot, we're now applying to these other small cats. And then in a way, these small cats are the model for the big cats. And what we've learned in them, we're trying to apply to the big cats now.

Bill Swanson [01:33:41] So, it's all kind of connected in small successes as we move down the line. But we're, we're working now with 12 different wild cat species, which is a lot for us to handle. But there's a conservation need. We need to do it.

David Todd [01:33:56] That's, that's great to be able to sort of transport things you've learned in one species and not have to start from absolute scratch.

David Todd [01:34:07] You know, one thing I been really struck by is that not only do you work with wild cats, but that you have a very, sounds like a really robust practice with feral cats in trying to improve the welfare of them in shelters and out on the streets. And I was hoping that you might be able to talk a little bit about that practice, in particular, how you've tried to figure out ways to provide some contraception since I guess their, their numbers can expand so fast.

Bill Swanson [01:34:42] Yeah. And it's kind of not our primary focus, although we've been devoting more and more attention to dog and cat overpopulation, in our case, mainly cat overpopulation in the United States and globally. And here in the United States, we have about 80 million what we call free-roaming cats. They're not all feral cats. But these are cats that live outdoors and they're not really owned by any one person, or are cared for by any one person.

Bill Swanson [01:35:08] And those animals, they have pretty short, brutish lives. I mean, most of them, you know, might live for a couple of years, but inevitably they get hit by a car, they get attacked by a dog, they get some infectious disease, and a lot of them just don't live very long. And when they die, it's not in a very pleasant way.

Bill Swanson [01:35:27] So, there's an animal welfare concern. But from a conservation perspective, which is where a lot of my attention goes, they are like the ultimate predator. You wouldn't believe how adept domestic cats are at killing wild prey. And even a domestic cat that has lived in your house his whole life, if you put it in an outdoor environment and it sees a bird or a mouse, it knows instinctively how to hunt that animal. It may not know how to kill it effectively. But hunting is ingrained in their DNA, and they never really lose that. Even your house cat - you can see him following the birds at the feeder. So, they're, they're ultimate hunters and they're very good hunters.

Bill Swanson [01:36:06] The downside of that is when you have 80 million of them out in the environment, and they're hunting wild birds, you lose hundreds of millions of birds every year. And wild bird populations, like wild cats, are being hammered. They're really in decline. A lot of different factors, but one of the main ones is predation, and primarily by domestic cats.

Bill Swanson [01:36:27] So, as a conservationist ... And I love cats and I have cats at my house. I work with cats all the time. So, I'm not an anti-cat person. I adore cats. But I do think that in an outdoor environment, they're devastating.

Bill Swanson [01:36:39] And so, as a society, we have a need to be able to control those populations. And traditionally what we've done is we will capture those animals, take them to a veterinarian and do a spay or neuter, so depending on if it's a male or female. And spaying cats is a surgical procedure. It's an abdominal surgery. It's pretty invasive. And then once those cats recover, then they usually go up for adoption. In some locations where they have trap, neuter, return program, they put them back into the environment they came from.

Bill Swanson [01:37:14] It's very labor-intensive. It's very expensive, and you need a veterinarian. It's kind of the veterinarians are kind of the bottleneck because they have to do the surgical neutering.

Bill Swanson [01:37:23] So, what we've been involved with for the last six years is trying to develop a non-surgical sterilization method for domestic cats, primarily focused on these free-roaming cats so that a layperson, not a veterinarian necessarily, but a layperson can give an injection and cause this cat to become sterile, and that removes that animal from the breeding population. And over time, if you sterilize enough of these animals, those free-ranging populations will decline and hopefully we can lessen the impact that's being inflicted upon wild prey species.

Bill Swanson [01:37:59] So, our involvement in this is because we know so much about cat reproduction that conversely, we should know a lot about how to get cats not to reproduce and because we evaluate reproduction in cats a lot as part of the work that we do, we can determine whether these methods are actually effective or not.

Bill Swanson [01:38:18] So, we've been working with an organization called the Michelsen Found Animals Foundation, which is based in California, which has been funding most of the research that's being done. And then locally, we have the Joanie Bernard Foundation, which is a cat welfare organization that's very interested in this goal, this ability to sterilize free-roaming cats. And so, they are our main partners.

Bill Swanson [01:38:43] And our collaborator on the research, they're actually at Harvard University. And they've developed a gene therapy approach that, at least in female cats,

appears to sterilize them. And so, that's the technique that we're testing. And if it's effective, then again, it kind of revolutionizes is how we go about controlling cat overpopulation, not just in the United States, but probably globally, if we can, if we can apply this around the world. But we're a few years away from getting something to the point where we can just get approval to use it in that regard.

David Todd [01:39:20] That's exciting. Gosh that could have a big impact, and, as you said, not just for the welfare, but also for the conservation of the wild birds.

Bill Swanson [01:39:32] Your black-capped vireos would probably appreciate it.

David Todd [01:39:35] Yes, exactly.

David Todd [01:39:37] Well, you have been so kind to spend all this time with me. I just had a couple more questions, if you can spare that.

Bill Swanson [01:39:46] OK.

David Todd [01:39:46] I thought we've mostly talked about, you know, your work to-date, and the concerns you've had, the perspectives you gained, but I understand that you've been the coordinator for the Ocelot Species Survival Plan for the Association of Zoos and Aquariums for over five years now. And I'm wondering what you and your colleagues in the Association foresee for the ocelot in captivity and maybe in the wild as well?

Bill Swanson [01:40:17] Well, things are with the Ocelot Species Survival Plan are kind of, in flux right now. And I mentioned that we manage Brazilian ocelots, so, we have two different ocelot populations in our zoos. About half of them came from Brazil. So, this is a population that's probably benefited most from the artificial insemination that we've done as far as being able to grow that population to about 36, 38 cats now.

Bill Swanson [01:40:41] And then the other ones are the descendants of that, that hodgepodge of pet ocelots that came into zoos 50 years ago. And so, genetically, they kind of represent, they're kind of like an "every ocelot." they have the genes of every ocelot population from Texas all the way down to southern Brazil. And originally, the plan was to kind of manage those generics through to extinction, to basically house them until we could replace them over time with the Brazilian ocelot.

Bill Swanson [01:41:14] But as we're working on the Texas ocelot recovery program, there's a lot of interest in possibly using some of those cats as a source population. And so, genetically, they're ocelots. They're not Texas ocelots. But it might be possible to, to interbreed Texas ocelots with them and introduce more genetic variation into the Texas ocelot population, but at the same time, eliminate the inbreeding that's been such a big factor in keeping that population viable.

Bill Swanson [01:41:43] So, on managing the population, we're kind of looking at different scenarios, and depending on how the recovery program goes, and we look at these different options for recovering or reintroducing ocelots into Texas, those generic ocelots might really play a key role as a breeding population that could produce the offspring that would then be re-wilded to go back into nature in Texas.

Bill Swanson [01:42:11] So, it's kind of an exciting time, but it's, it's complicated because we're trying to manage the population in zoos so the zoos have ocelots. But we have to decide if they're going to maintain generic or Brazilian ocelots. And if we remove one from their zoo, we have to replace it with another. So, it's kind of a numbers game to make sure that the zoos can still have the ocelots that they want to house at those facilities.

David Todd [01:42:40] Boy, lots of moving pieces here, moving ocelots.

Bill Swanson [01:42:47] Yes.

David Todd [01:42:47] Well, thank you. So, just the last, kind of open-ended question: is there anything that we might have skipped over that you might want to add - things that you've learned, want to share about ocelots or just more generally about wildlife conservation?

Bill Swanson [01:43:07] Well, I think we've probably skipped over a lot. We could talk for many more hours about all of the intricacies of this and all the issues that are involved, not just with ocelots, but with wildlife conservation.

Bill Swanson [01:43:19] Again, I come back to the what I would think would be the expected audience of these archives. At least one of the primary audiences would be Texans that are interested in wildlife and just reinforce this, this need for, for those of you that care about native wildlife to basically do what you can to help us conserve them. So, hopefully you're not listening to this, this interview 50 years from now, we don't have ocelots in Texas anymore. That would be heartbreaking. But that you, you live your life and you take actions that would benefit the conservation of these species.

Bill Swanson [01:43:54] And I'm not going to get political. I'm not going to go down that road. But we have to be more impassioned about conserving nature, not just for the animals, but for human beings as well. And so, if you're in Texas, there are a number of endemic species in Texas, ocelots included, that need conservation help, and they need politicians and leaders that recognize that conserving those animals needs to be a priority. Humans will always have their needs and, and I understand that the priority people are looking out for themselves and their families. But you also need to look out for the ecosystems that all of us live in. We're all kind of part of nature, even as humans.

Bill Swanson [01:44:40] So, if you're hearing this, and you're in Texas and hopefully, maybe not 50 years from now, become impassioned about the wildlife that's native to Texas and do whatever you can to help us to conserve it.

David Todd [01:44:53] Yeah. All connected.

David Todd [01:44:58] Well, thank you for laying out all these wonderful ideas and of course, explaining your background and history that has brought you to this point. I wish you all the best and applaud all that you're doing, it's just terrific to read about and hear about. And thank you for sharing it.

Bill Swanson [01:45:20] Well, it's been enjoyable talking to you, David, and I hope that you get more people to participate in these archives, I think are really important.

David Todd [01:45:28] Well, it's been a pleasure and an honor to talk like you. So, thank you and thanks again for your generosity with your time today. Really appreciate it.

Bill Swanson [01:45:37] You're very welcome.

David Todd [01:45:39] All right. Have a good day.

Bill Swanson [01:45:40] You, too. All right. Bye now.