Season2Episode1DrRangel.mp3

Dr. Rideout-Hanzak [00:00:09] Welcome to a Talk on the Wild Side, your biweekly tour, of all things, Wild in Texas. I'm your host, Dr. Sandra Rideout-Hanzak

George Eccles [00:00:16] And I'm your co-host, George Eckles.

Andrew Lowery [00:00:18] And I'm Andrew Lowery. Howdy. Howdy.

Dr. Rideout-Hanzak [00:00:21] You guys. I'm super excited. Guess what episode this is?

George Eccles [00:00:26] Hmm? What is it.

Dr. Rideout-Hanzak [00:00:29] Andrew?

Andrew Lowery [00:00:30] it's the first episode of season two.

Dr. Rideout-Hanzak [00:00:35] Happy birthday to us. Yes. We finished a whole year of our talk on the wild side. Nice, actually. Yeah, yeah, yeah. It's been. It's been a fun year. Really fun. We have been talking to so many experts from around the state.

Andrew Lowery [00:00:53] there aren't even really words because this has been one of the most like mind opening years of my life. Like, I've gotten to talk to so many experts in the field about so many different topics. And it's there's no words. I'm just thankful. Yeah, just thankful.

Dr. Rideout-Hanzak [00:01:09] Me, too. And that's what I want to talk about right now. We have some funders that we would like to thank. First of all, we all work for the Caesar Kleberg Wildlife Research Institute at Texas A&M Kingsville. But this podcast specifically was funded by the Harvey Weil Sportsman Conservationist Award of the Rotary Club of Corpus Christi. Now, the Harvey Weil Award was named after a long time South Texas sportsman and attorney and conservationist, and he was also a Rotarian, of course. He was really dedicated to the preservation of nature and sportsmanship. Also, the award, the Harvey Weil Award, is now in its 26th year. They've spent well over $1,000,000 now funding some really terrific projects that range from, you know, wildlife research to just conservation on the ground restoration, marine life, etc.. And we were the lucky recipient in their 25th year, and they gave a big award that year, and it was enough to fund this podcast for a couple of years. So we're really grateful to the Rotary Club of Corpus Christi.

George Eccles [00:02:22] Thank you so much. Really appreciate it. Because without this funding, this podcast wouldn't be a go. So thank you so much.

Andrew Lowery [00:02:30] Thank you.

Dr. Rideout-Hanzak [00:02:30] Yes, thank you. Now let's brag on us a little bit. So I just discussed the fact that we've completed our first year of the podcast. And even though we're all about wild things in Texas in that first year, we've had listeners in 46 of the 50 states and also we've had listeners in 36 foreign countries. So that's really been fun to see where people are when they're listening and and, you know, just just to think about, oh, gosh, people over in India are listening to what we're talking about, or Bangladesh or China and Germany, and that's really been fun to see. But we've also in that first year, we've surpassed 10,000 downloads, and podcast rankings are pretty fickle. They change

on a daily basis, but we have been ranked as high as 27 in nature podcasts for the United States, so I think that's pretty cool too for our first year. Also, we have several ratings on Apple Podcasts and they're all five star ratings with really good reviews and that is thanks to you guys. So I really appreciate you guys for taking the time to listen to us, give us reviews, give us suggestions for improvement and suggestions, ideas for topics that we can talk about, because you've really helped us make the podcast better.

Andrew Lowery [00:04:02] 100%, guys. Yeah, no, I mean, there would be absolutely no reason to even make this podcast if it weren't for people that were getting something out of it. You know? And I just want to say, I'm so thankful for those of you that are out there that have been listening and continue to listen because you guys make it worth it, you know, just thank you.

Dr. Rideout-Hanzak [00:04:23] Yeah. So it's all been good stuff, but we're not going to be satisfied until absolutely every Texan is a fan of ours and we've had millions of downloads. So we want to ask you to keep talking to your friends about us. Subscribe to us on your favorite podcast app. Leave a rating and review on Apple Podcasts. If you use that one, you can also leave just ratings on Spotify, but all of these things help people discover our podcast and and, you know, they just help us grow 100% agree.

Andrew Lowery [00:04:57] You know, and now that we're kicking off season two, we are actually going to be doing another book giveaway guys, for one lucky listener. We have Canyons of the Texas High Plains by Wyman Mentzer, who, if you guys do not know Wyman Windsor, he was or is the official is.

Dr. Rideout-Hanzak [00:05:13] He is a Texas State photographer

Andrew Lowery [00:05:15] Yes, he is a really awesome guy. We had an episode with him a few, probably about five or six episodes back. If you guys haven't heard that, please go listen to it. It was a great interview.

Dr. Rideout-Hanzak [00:05:24] Yeah, he's an amazing photographer, but he's as good at telling stories as he is at taking photographs, too. So take a listen to that episode if you haven't had a chance to. But this is a really awesome book, just his photos of of these great canyons in Texas. And so some lucky winner is going to get this book.

Andrew Lowery [00:05:46] Yes, they will. And guys, all you have to do to get it, were on Facebook or on Instagram or on Twitter or on Reddit. Just follow us on one of those places. Find one of our posts. And what you guys are going to want to do is comment your favorite bird wearing your favorite hat. So just for an example, a Toucan in a top hat.

Dr. Rideout-Hanzak [00:06:05] Green jay in a fedora.

George Eccles [00:06:09] A.... Duck?.... in a top hat?

Andrew Lowery [00:06:11] Close enough.

Dr. Rideout-Hanzak [00:06:13] I thought surely you at some point.

George Eccles [00:06:16] I was actually thinking of something else that we talked about with a reddish egrets with the aigrette.

Dr. Rideout-Hanzak [00:06:24] *laughter* An Egret in an aigrette.

George Eccles [00:06:25] But I knew that's really not an ideal choice

Andrew Lowery [00:06:28] Yeah its kind of already wearing one.

George Eccles [00:06:29] But with how it was acquired. So it kind of put me on the spot. Man, it is mostly my go to is a duck.

Andrew Lowery [00:06:38] That was that was beautiful.

George Eccles [00:06:42] I didn't specify which duck so we could go anyway with this, you know.

Andrew Lowery [00:06:47] But guys, just so you know, it's one use per person. So if I say a toucan in the top hat, no one else can say that on any other platform. And if someone does a repeat, we're going to do our best to let you guys know that, hey, no, somebody else is already used that you're going to want to come up with something else.

Dr. Rideout-Hanzak [00:07:03] Yeah. And I think also we're going to get bonus points. In other words, you get a bonus entry. If you've got a picture of that or a meme of that, share that meme or share that picture.

Andrew Lowery [00:07:16] Yes, please show us your wonderful Photoshop skills. We may show you some of ours.

Dr. Rideout-Hanzak [00:07:20] That's right. You want to make that tag with your your bird and your hat before June 17th, because that's when we're going to draw our winner.

Andrew Lowery [00:07:30] Yeah. And to make it easy, guys, make sure to throw in a hashtag a talk on the wild side in your comment, please. That'd be awesome. We really appreciate you guys.

George Eccles [00:07:38] Well, we're all abuzz with excitement this second year of our podcast. And to kick it off, we have an interview about bees for you guys. So let's get to it.

Dr. Rideout-Hanzak [00:07:48] We are here today with Dr. Juliana Rangel, is an associate professor of Apiculture in the Department of Entomology at Texas A&M University. Dr. Rangel, welcome to our podcast.

Dr. Rangel [00:08:01] Thank you very much for the invitation, and I appreciate it.

Dr. Rideout-Hanzak [00:08:04] Yeah, well, we're excited to learn about what you do. Why don't you first just introduce yourself and tell us about your work there at Texas A&M University?

Dr. Rangel [00:08:12] Sure. I'm associate professor of Apiculture, which is the study of bee science in the Department of Entomology at Texas A&M University in College Station, Texas.

Dr. Rideout-Hanzak [00:08:26] And so, yeah. Apiculture is the study of bees, right? Has nothing to do with apes.

Dr. Rangel [00:08:32] That's right. That's right.

Dr. Rideout-Hanzak [00:08:34] So I'm sure you teach classes about bees maybe, and you do some research. Could you tell us about, like, your research and the classes that you teach?

Dr. Rangel [00:08:45] So mostly research faculty. So 60% of my time I spend performing research mostly with the Western Honeybee APIs. Melissa And then about 30% of my time I dedicate to teaching and that's to undergraduate and graduate level courses. So I teach, I developed and teach honeybee biology course for undergraduate, which is using the honeybee as a model system to study. All kinds of concepts regarding biology, from taxonomy to cytogenetics to nutrition to physiology, anatomy, culture, conservation, etc.. And then I teach a what you could call a laboratory class. It's a beekeeping course, so it's completely separate from the honeybee biology class. It's also for undergraduate students, and they learn how to keep bees from scratch. So they learn what is a bee? How does a bee colony live and maintain itself throughout the year? And how to humans maintain colonies for profit or for a hobby, etc. And they learn about diseases and how to treat them. They start from scratch, building a colony from zero to painting it to assembling it, then installing the colony and seeing it grow throughout the semester. And then finally, I teach a graduate level course on grant writing and teaching graduate students how to write successful grants, because that's basically how that's a currency in academia, is trying to get grants from different organizations and federal agencies. So that's, that's what I teach. Mm. But then I also spend a lot of time doing outreach activities because there's no extension agriculturist in the state of Texas. So in my free time I try to provide some sort of extension related and outreach related education activities for the general public and for the beekeeping community in our state and around the U.S.. Wow.

Dr. Rideout-Hanzak [00:11:12] That's a lot. And I would love to take your beekeeping class. That just sounds so exciting.

Dr. Rangel [00:11:18] Yeah, it's a really popular course. It's small because we have to give the students what we call packages of bees, which are one of the cheapest ways to install a new colony. As you get from any kind of bee producer, they will sell you a cage full of bees with a queen, and then you transport it to where your apiary is. And then you take that cage of bees and install it into beekeeping, you know, the regular hive box. And that's how you can get started in the cheapest possible way. And so that's expensive. It's a few hundred dollars per package. So we are limited in the number of students we can we can have in the course because of the price of the bees. But we've been really lucky for the last few years. We've gotten donations from mostly the Austin Area Beekeepers Association. They give us a donation so that we can purchase a box for the class in the spring.

George Eccles [00:12:28] Yeah, that's very cool. It's George here. I was interested about you talking about the outreach programs and so on. I figured that part of that role might be to give your audiences an overview of native bees in Texas. Could you give us a bit of information about that, what kind of bees we have in Texas and where there are where they're distributed?

Dr. Rangel [00:12:51] Sure. So in terms of Apis mellifera, which is the Western honeybee that we have here in the in our country and in Texas, we don't know exactly how many beekeepers we have because Texas does not have a mandatory apiary registration

system like other states do, like North Dakota, for example. So there's only like a guesstimate of how many beekeepers are in the state, which is about 5 to 7000, most of which are hobby beekeepers, and that the definition of a hobby beekeeper is someone who keeps anywhere from 1 to 50 colonies, and so anywhere between one and 50 is considered a hobby beekeeper. And we have, as I said, a few thousand beekeepers and then only maybe less than 100 commercial beekeepers, which are those that keep more than a thousand or more colonies and they make all of their income by keeping bees. But that as as you may or may not know, honey bees or the Western honeybee APIs nullifies only one species. And it's actually not a native species to North America. It was brought in by the European settlers into. North and South America in the 1800s. But we have thousands of solitary and other native or pseudo social beasts in the U.S. and in Texas. There are hundreds of native bees that are smaller in size, many of which are smaller in size than the regular honeybee. Also have bigger ones like the Bumble Bee. So we have several species of bumble bee that are of course bigger than the Western honeybee. We have carpenter bees. Those two are the bigger ones. And then we have the smaller ones. Leafcutter bees are in the family, . We have Mason Bees. If you've ever heard of Ozma bees, we have mining bees in the genus Andrena. We have squash bees, as the name indicates, that pollinate mostly squash. We have some flower bees. They pollinate some flowers. And in fact, we have there's about 18 native bees, species that are considered of great conservation need by the Texas Parks and Wildlife Department. So we have hundreds of native bees in our state, and a lot of them are either unidentified because we don't have enough people studying native bees in our state or endangered. And we don't even know about it because we don't. We have so few people studying them at the moment.

Dr. Rideout-Hanzak [00:16:03] Wow. So these are really important to the Texas economy right? "Yes". Can you give us an idea how important they are to the Texas economy?

Dr. Rangel [00:16:15] Yes. So that's again, it's a slightly difficult question to answer because we don't have the number, the true number of beekeepers in the state. But depending on the crop that honeybees pollinate, they can use anywhere from 1 to 4 colonies per acre of crop. For example, in a lot of Texas beekeepers colonies across the country to pollinate different crops, including almond in California in the in February stone fruit and seed crops in the Pacific Northwest during the spring. All kinds of Kermit's and other storms, fruit in the East Coast in the summer. And then, of course, honey production in the North Dakota, Minnesota area in the summer. And so it depends on what you consider Texas economy. There's most of the commercial beekeepers that call Texas. Their home will move their bees throughout the year across the country to make a living mostly through either pollination contracts or honey production. And Texas is not a terribly huge agricultural state. I mean, we have AG but it's not as large as other states. So the beekeepers typically have to move their bees to other states if they want to make money through pollination services. And they can get anywhere from $60 per colony to $200 in California for almonds per colony for a donation contract. So if you own a thousand colonies, you can do the math of how profitable we can get if you're if you're a Texas beekeeper moving colonies around the country throughout the year. But the reality is that most beekeepers in the state of Texas are hobby beekeepers. As I said, they own 50 or more colonies or they can be sideline ers, which is the next category B below commercial. And those are people who make part of their income through beekeeping practices, and they own anywhere from 51 to 500 colonies. And those people are important to our economy because they either take the bees for pollination services or they are the ones that provide pollination services locally because they don't own as many colonies. So they can pollinate our local crops that say the all the melons in north central Texas and other

crops. But a big part of our eat, let's say beekeeping economy in Texas. Texas is one of the largest queen producing states in in the U.S. because we have the mild winters, people bring the bees back after all of their other services, like pollination and honey production. They bring their bees in the late summer to Texas and they split them up and start making queens or splits, and they sell those to the general public and they make money that way as well. So there's all kinds of things that beekeepers do to make a living. They either do pollination services, they either make honey or they either make bees to sell. You know, like if you want to start a new colony, you buy, as I said much earlier, packages of bees. Or you can buy what they call a nucleus colony, which is a size same box with bees and a queen or an already large established colony or three. So you queens, because we always have to queen our colonies after one or two years. And so that's another source of income for Texas beekeepers.

Dr. Rideout-Hanzak [00:20:34] Wow. Wow.

Dr. Rangel [00:20:36] So I would say it's a multimillion dollar industry, but we don't really know the numbers because it's not actually apiary. Locations in the state of Texas are considered a trade secret. So you don't have no one knows where people have bees because they don't want competition, you know, for really nice locations. They want to keep it a secret. So that they don't have competition for resources for their bees.

Dr. Rideout-Hanzak [00:21:08] Interesting. So part of the research in your lab, I think, has been investigating ways that environmental factors can affect the reproductive health of honeybees, right? Can you talk a little bit about that.

Dr. Rangel [00:21:21] Yes, absolutely. So we had a USDA in this program for a few years that helped us explore mostly how agricultural pesticides affect the developmental and reproductive health of honeybee queens and drones. And so we set out to establish whether or how exposure of wax, which is the works that are in, inside of which the queens and drones are reared. Contamination of that wax with field relevant concentrations of agrochemicals. Somehow affects the development of Queens and drones. And when they emerge as adults, whether that exposure in the works during development made any alterations to their physiology as adults and turned out that it did. And so we saw that when we spiked wax with feel relevant concentrations of mostly beekeeper applied chemicals, the microscope that we use to kill the varroa mite. Those concentrations were in the works cause queens to have lower sperm viability. So honeybee queens are highly promiscuous. They may with anywhere from 12 to 15 drones. So basically there are anywhere from 12 to 15 subfamilies of workers in the colony. So there's mostly yeah, there's mostly if you are a worker in a colony and you encounter another worker, you have only one in 12 chances that they're going to be what we call full sisters because they share a father. The vast majority are only your half sisters because they have different fathers. But that genetic diversity helps with to help maintain the colonies productivity and lower susceptibility to disease. But the queens that are reared and do pesticide laden works have lower sexual competitiveness. And when they made something happen in the sperm that they store inside their body in a special organ called the sperm a thicker and the sperm start to die prematurely. So we don't know the process or why they they start turning in viable, but they basically cannot be used to fertilize eggs. And so the viability of the sperm in the sperm thicker goes down, which then means that the queen has much fewer sperm, sometimes 40 to 60% fewer sperm cells over indiscriminately go to fertilize eggs until they run out of sperm much sooner than normal. And in. So they have to. Be replaced with a new queen because they have run out of sperm. And if they don't, if workers come from fertilized eggs. So if you don't have sperm to fertilize the eggs, then

they can't make workers. They will go and forage for food and make honey, etc.. So colony productivity goes down. And we found that most of these agrochemicals are beekeeper applied. So we also looked at other things that but iron works. There are some herbicides, some fungicides, insecticides, but they're not actually as ubiquitous as of the beekeeper applied chemicals. It's it's because it makes sense, because most beekeepers have to use chemical treatments to control for the destructor mites. And so it's unfortunate because if we don't treat, the colony typically collapses and dies within two years because varroa transmits several dozens viruses and then also consumes the bees dead body tissue. It's a parasite that sucks the tissue with a sucking, piercing mouse part and transmit the virus. So if we don't do anything about the colony collapse and so we have to do something for typically chemical treatment. But we now know that the chemical treatment is causing some lethal effects to the bees, and that's the actual species that we want to preserve. So it's kind of a catch 22 situation.

Dr. Rideout-Hanzak [00:26:35] Yeah.

Dr. Rangel [00:26:35] But we also found, you know, not just pesticide exposure, but also poor nutrition is one of the major factors that causes that affects bee health. Habitat loss, climate change. Changing weather patterns. Extreme temperatures also affects queen and drone reproductive behavior and colony productivity. So there's just way too many factors that are causing these two to suffer.

Dr. Rideout-Hanzak [00:27:13] So this is interesting. I was channel surfing just a few months ago and I came across a show that caught my attention and I quit surfing. It was a show where they were interviewing you and also showing you at work while you were artificially inseminating some honeybee queens. So what is the purpose of that? Why are you doing this artificial insemination?

Dr. Rangel [00:27:42] Yeah, that's a good question. So it's doing instrumental insemination or artificial insemination of Queens is a very unique trait. Not very many people do that because they don't really have to. Most of, as I mentioned before, honeybee queens meet with 12 to 15 drones and they make out up in the in the open air they leave for their mating flights when they're virgins. And they do their mating about a mile away from the hive so that they meet with drones that they're not related to because that will reduce inbreeding. But in doing so, because it's an open mating system, you don't really know who she mated with. Right. You can they can meet with any types of drones that are present in out in from any any colonies that are a mile within a mile radius. So they could be mating with drones from from the colonies that you own in a different apiary or beekeepers around on in a different apiary. Or they could be meeting with drones from feral colonies or manage colonies in tree cavities in typically in Texas, those are Africanized. And so then you have all sorts of genetics that you don't really can control and you don't know with bees coming, the drone sources are coming from, so to speak, to know exactly what the genetics and genetic line of the drone partners are. You can do instrumental insemination of queens, and so you can go select the drones that you need for their genetics, whatever that means. Like you can do things for experimental purposes, like you want to test what the effects of mating, let's say an African queen with a European drone is and there several lineages of bees. So you can choose different genetic lines from different lineages. Like some people are sort of Italian bees or Caucasian bees or German bees. That means the subspecies of the Melissa that is endemic to those parts of Europe or Eastern Europe or Africa or even Asia. So you you can control the meeting. Basically, you can control the genetics of the of the queens by taking the semen from the drones, mixing it up. If you're doing several drones per insemination and then injecting the

semen from the known genetic source into the Virgin Queen through the insemination process, and that's basically bypassing the Queens outdoor mating. Once you inseminate the queen and you take certain precautions, like you have to give her a little bit of CO2 to kick start a plane because it's not a natural occurrence. Right. It's instrumental. But once that happens, the queen no longer is no longer goes out to meet it. She changes her physiology and her chemistry and she doesn't go out and meet anymore. So that's how you can control the genetics of the mating process. You're basically in control of everyone sometimes when you need to control the genetics. All the way and you're looking for a specific question or you're doing a specific breeder colony for a breeding program. You can do what are known as single drone inseminated queens, which is unnatural because as I said, queens made with 12 to 15 drones. But for experimental purposes, you can just take the semen from a single drone collected with a syringe and then injected into that queen. And she doesn't rise very long because she runs out of sperm really quickly. But at least her progeny are all sisters, full sisters. They all share the same dad. So you only have one family in that colony and then you can use those workers for your experiments.

Andrew Lowery [00:32:23] That is so cool. I love seeing a modern scientific approach is being used in both lab and field research. You know, I spent a little time over with the in NNTRC-the National Natural Toxin Research Center, which we have another episode for our listeners who haven't heard that. But we actually looked into doing some artificial insemination with some of the venomous snakes over there because breeding success in venomous snakes, especially in captivity, can be very low. So we mentioned a mite before that causes collapses with bees. How big of a deal. Is that problem?

Dr. Rangel [00:32:58] Yeah. So Destructor is an actual parasite of Apis mellifera Meaning it's on the outside of the body, but it still parasitized the bees both in the pupil state and in the adult state. Baroud Destructor has co-evolved with the cousin, the immediate cousin, let's call it of Apis mellifera in Asia, the Asian honeybee or Apis sorana. And so the destructor has parasitized Apis rona for thousands of years and has learned to co-evolved and kind of withstand the pressures of being parasitized by the mite, and they can typically handle varroa levels and still be relatively healthy. They have behavioral tools, genetic tools, strategies to combat the varroa mite. A few decades ago, the varroa mite switched hosts because there are areas in Asia where you have both the Asian Honey Bee episode and the Western Honeybee Apis melliferia. And when those where those two species coexist, there was a switch of hosts. And so started Parasitized. It was Melissa. But Melissa never had this parasite before, so it didn't have the behavioral genetic toolkit to combat the mite, then started spreading west and going all the way to Europe. And then, of course, through migration of packages, of bees, through port towns. The varroa mite made it to North and South America. And basically now in almost every continent where apiculture is practiced except for Australia and a couple of islands in Hawaii, otherwise it's everywhere. And it was Melissa is not yet capable of of controlling this very basically an invasive parasite. And so when you have high levels of varroa and actually you don't need high levels, you only need a 3% infestation, which means three mites per hundred adult bees. If you don't do anything against the rural mite, the colony collapses. It causes it to the bees. They they lose weight because they're being kind of fed on. But the varroa mite is also a very effective vector of almost three dozen viruses that have been around but are really low levels. But as soon as they were made, became a good vector for these viruses. But the virulence, the levels of them, of the viruses spiked up. So if you have a really high infestation of Aurora, that's correlated with a very high viral load. And as you know, for almost every virus, there are no antiviral treatments. So the only thing you can do to combat varroa mites is. Treat sorry to combat viruses is to treat for the mite and try to control low levels and keep them low because there's no antiviral treatment. And

unfortunately. Even though we've been dealing with the mind for over 40 years now, we still have it and we have it in Texas. We have in almost. I would say 95% of colonies, if not 100% of colonies. In our state and in the U.S., at least continental U.S., we have mites in our house. Wow. There's it's just a never ending problem. And we have to, most of the time, apply at least commercial beekeepers. They can't afford to use methods that are not as effective. So they have to do harsh chemical treatments. And that means that our colonies are contaminated with high levels of pesticides to kill the varroa mite. And unfortunately, they don't really kill them all the way. It just keeps them at low levels. But there's never, almost never a colony that you can say has zero mite levels and that's more destructive. Continues to be the number one problem in Apiculture, even though we've been dealing with it for decades and we've been trying to get rid of it, it's just here to stay because it's such a novel parasite. The bees are just still unable to to live with them. Like the cousin of Serrano did for thousands of years, you know, every year the Bee Informed Partnership, which is a nonprofit organization that kind of helps beekeepers around the country, they are the ones that do the colony loss survey. It's a voluntary survey that any beekeeper of any size can fill out, either online or on paper. It asks questions about the number of colonies that the bee beekeepers started with at the beginning of the year, how many they ended up with the following year. So basically how many colonies they lost both in the summer and in the fall. And they also asked them to note the top five causes of why they think their colonies died. And the number one issue is always like always, or at least in the top three for my poor nutrition Clark Queen quality. Pesticide and exposure, pests and parasites. I call it the four piece pesticides. Parasites, pests. And then poor nutrition, poor queen quality. Those are typically the top. Causes of colony loss. And so it's it's really difficult to isolate them individually because they're always present together. Right. Most of the time you have issues with poor forage. You know, if we with habitat loss, there's lower availability of native forage for the bees to feed on, especially in the summer. And so there's typically good enough diversity in the spring because everything's blooming in the spring, you know, that we just had the beautiful, wild summer explosion, you know, blooming explosion in March. Right now in our area, the horse mint is finally fading out. But it was a spectacular bloom this spring and that's a huge honey crop for area. But in the fall, some late summer and fall is almost like a food desert. There's not a whole lot of things are blooming. And so the bees are starved of essential micro and macro nutrients from, um, from the natural forage so that if they're managed colonies, then the beekeeper has to supplement their, their colonies with artificial protein supplements and or shrivel up to keep them alive and well.

Dr. Rideout-Hanzak [00:41:12] They're just getting hit from all sides, huh?

Dr. Rangel [00:41:15] Yeah, one side. So it's. It's actually quite amazing that they're so resilient. If you consider all the issues that all the problems that they encounter, they're almost like they're also good kind of organisms to assess what the other native population may be going through, because since they're managed and we can see them open the hive and see what they're eating, you can imagine that in times of birth, colonies of native bees are probably are also suffering from either starvation or poor nutrition in general.

George Eccles [00:42:01] That's really concerning to hear that for sure. And I'm I'm positive that our listeners will be saddened to hear these really huge issues that are impacting such an important pollinator. And we will have some big fans of bees and other pollinators that tune into our podcast. I was wondering what can they do to help support healthy bee populations of both native and honey bees? Is there anything that they can do on a local level or a bigger level that can help towards trying to reverse some of these these changes that are happening to the bees in Texas?

Dr. Rangel [00:42:41] Sure there's many things that the general public can do. So one selfless pitch would be to help donating to research programs, because we are trying to solve the problem of inspecting how or how these environmental factors affect bee health. But just in their local community, they can plant pollinator, attracting seeds that bloom all year, not just in the spring. Reduce the use of pesticides in their gardens if they have any pollinator attracting plants so that it reduces the probability of these plants being exposed to pesticides and then the bees picking that up when they're in the foraging mode. Something else. Believe it or not, as simple as not mowing. So right now there's a campaign that is called no mow, may no more meaning. You can look that up. So no mow may so campaign to not mowing the lawn in this month of May. And you'll be surprised how much how many wildflowers start popping up in your in your front yard that are actually quite attractive to be not just honeybees, but but native bees. So there was a cool study that came out a couple of years ago that had a fun title like Lazy Homeowners Help with Biodiversity. And it was about because it was a scientific study, they they had people in there who whose front yard was either mowed or not, and they measured bee diversity before and after after a certain amount of time. And of course, not surprisingly, they found that there was a lot more bee diversity in the in the lines of people that did not know for a couple of months, because, again, these small flowers, things that we consider weeds are actually very good for bees. And and so you will have an increase in bee diversity and pollinator diversity if you don't mow or manicure your lawn, because that's basically a food desert for bees. So I understand that a lot of people have homeowners associations that make them. So maybe you have to move your front lawn, but maybe your flower bed, your flower bed, you can then plant pollinator attracting plants or your backyard. No one's seeing your backyard, so maybe you can dedicate areas in it where you don't mow and instead you plant a pollinator garden. Now there's something for pollinators called flower fidelity. For fidelity. And any means that to save time and energy. Individuals tend to forage the same resource. All at once until they run out. So if you look at the pollen bag, the little pollen basket that a bee honeybee has that I was talking about earlier in the week, you're 99, 98% of the pollen in each bowl comes from the same species. So they don't really do cross-pollination of different species during one foraging trip. They stick with the same species at once because it saves them time and energy. There don't have to go pick and choose. They know that they're going for, let's say, I don't know, Goldenrod. And they just go for Goldenrod until they run out of. Goldenrod, pollen. And then they'll switch to something else. So it's good to plant my. That's a long way to go to the point that I was going to make is that you want to plant big patches of flowers, not just one of each. They like they like abundance, not just diversity. So having a large patch of the same flower. And then many different types of flowers. So do you want both diversity, but also abundance? Mm hmm. So the more you have of the one flower, the less energetically costly it is for the bees to exploit that resource until it runs out.

Dr. Rideout-Hanzak [00:47:36] You got that plug in there for donating to research. I want to come back to that for a second, because your lab sells honey, right?

Dr. Rangel [00:47:44] Yeah. So we're the only ones that can have the trade name. Aggie, honey. So we have Aggie. Honey, honey. Honey is sold at the Rosenthal Meat Center on Texas A&M on the Texas A&M campus. They have a really good website. And you just Googled Rosenthal Meat Center, and it pops up and they they can either sell it in person at their store. They have also awesome meat, all kinds of meat cuts and do some food quite affordable. You know, meat is expensive, but they have really good prices for a really good quality. And then they they sell our honey. But we also have the Nevin Weaver Endowment Fund for Honeybee Research. And people can donate to that endowment

fund and then. Every now and then, if we have enough donations, we can use interest from the from the endowment to help fund our research. Yeah. So it's through the Annan and Foundation. And so you can just look up neven, Nevin weaver endowed fund. And then there's a link right there that people can click on and then make a donation of any amount that will go directly to our program.

Dr. Rideout-Hanzak [00:49:23] And we might have some budding beekeepers who are listening. If you had, you know, just like one or two pieces of advice for maybe novice beekeepers, what are some of the things that they need to do?

Dr. Rangel [00:49:35] Okay. So first and foremost, foremost for novice beekeepers, I would say get educated first. Join your local bee club and or the regional club. So we have, for example, I mean College Station, we have the Barossa Valley Beekeepers Association, but there's also a regional bigger regional group, the Central Texas Beekeepers Association. And then there's the umbrella group, the Texas Beekeepers Association of the statewide organization. But there's there's almost every large county has its own beekeeper club. They typically meet once a month. And you by attending those clubs, you not only learn from experts in the field of apiculture and sometimes honey bee biology, because sometimes there's scientific speakers, but they also have a mentoring system and then they carry you up with a mentor that will help you get started with bees and learning from their mistakes, learning, you know what they did wrong when they first started. They give you advice on exactly what's blooming in your area at that particular time. They tell you that the let's say the what we call a honey flow, which is or a nectar flow. That's when large bee foraging plants are blooming. They tell you, okay, let's say horseman assortment from starting, you have to have boxes in your hives to be for the bees to be able to exploit that resource and make honey. So they will tell you how to prep your colonies throughout the year for what's coming because they have the experience. So being educated, attending as many talks as possible, as many beekeeping conferences as possible, is the first step, because it's very unfortunate to. Start with these and then learning the wrong way that you were ill prepared and that your colonies died because you didn't know what you were doing or negligence or. Yeah, just, just not knowing what what was happening and not being well informed and having someone to talk to about what was going on and then you lose BS unnecessarily. So I would say that before you get your babies, before you get too excited and you get your bees. Just read. Good. You know, watch videos, talks, webinars, go to the beekeeping club meetings. Shadow a beekeeper for your first year, you don't even have to own the bees. That's better than getting into beekeeping without knowing what you're doing. Because then you're harming the bees instead of helping them. Mm hmm. Yeah. And then once you have the bees, learn your mite levels. That's the second point of advice. You always have to check for mites because it's, again, the number one problem, and you can do something about it. I mean, you can't get rid of the mites, but you can help lower the levels of mites. And so you can't just do like a simple eye test you have to do. There's certain very easy techniques to measure well levels and that way, you know, if you have to treat and then you have to learn how to treat so that you can keep your mite levels at bay and keep your colonies healthy. Mm hmm. Cool. And then, of course, then then select the appropriate location for your apiary. Having enough equipment, having enough forage around that. You know, the bees are going to go for having a water source because they they get thirsty, so they need a water source. But all of those things are down the line. First, you need to learn what you're going to get into. And then. And then. And then you have fun because it's a wonderful hobby, and. And people really, really enjoy it. Yeah, but once you do it, I mean, I know there's a lot of attrition, especially for people who are new, but. But most people stay because it's such a wonderful hobby and the B is such a fascinating

animal with so much to teach us and such an incredible biological system of the superorganism being a social insect. Everyone in the hive is kind of working together as a cohesive unit. It's just fascinating.

George Eccles [00:54:52] Yeah, sure. And I can imagine with having worked with so many colonies that you have, that there's potentially been some experiences in the field or in the lab that haven't gone so well. And it's one of our favorite questions that we like to ask in the podcast. It's a biology blunder. We were wondering if you had a story where something didn't go exactly to plan.

Dr. Rangel [00:55:14] Yeah, there's one that I like to tell because I have the privilege of doing my Ph.D. under one of the most famous scientists in the world and definitely in the United States. His name is Dr. Tom Seeley. He's at Cornell University in the Department of Neurobiology and Behavior. Actually retired this year, but. He has written several books, which I highly recommend because they're for the lay person. And they he writes in a really easy kind of language that everyone can enjoy and understand. I recommend his book, Honeybee Democracy. It's an amazing book. Anyway, so when I was doing the Ph.D., I finished in 2009, and so I was doing I was studying honeybee swarms and how how honeybees swarm, basically how the swarming event occurs, how bees prepare to issue the swarm, which is basically the way the colonies were produced. About two thirds of the working population in a colony in the spring will leave with the mother queen. And then we'll found a new unit somewhere else in a different tree cavity. And that's how colonies kind of reproduce them. But anyway, so I was doing swarming behavior experiments, or I had five colonies going at once that I wanted to send them to swarm. And I got too good at getting colonies to swarm and to the point that I sometimes would get two or three swarming at the same time, which did not work for me because I had I needed them to swarm at different times so I could collect the swarms individually because I needed their genetics not being mixed between one another. And Dr. Seeley had planted what he called the Millennium Oaks right outside the shed where I was doing my work. So as the name says, he planted them in the year 2000 and he called them the Millennium Oaks that were very special because they were. Yeah. They were planted for the new Millennium Tour. One time, one day, my. My treat. Three different colonies swarmed at the same time, and they. They clustered on the branch of the millennium box, and they broke it in half. Oh, no, we're too heavy. Wow. So the the. Oh, yeah, it was. I mean, it was kg and kg obese because there were too many swimming at the same time. And so basically broke Dr. Sealy's Millennium Oak. I felt really, really, really awful because he loved us. He would show them to people, you know, because they were for the millennium and he wanted them there for maybe another thousand years. And then here I am doing my science. And I broke his millennium box. So he was I mean, there was nothing he could do, right? Could we can't put it back together. But I guess he later on laughed. I'm sure he was not very pleased when it happened the first time and I couldn't use the bees either because they mixed. So it was a failed attempt at doing the study with the genetics. And then I destroyed his millennium oaks.

Dr. Rideout-Hanzak [00:58:52] Gosh. Well, this has been fascinating learning about bees and learning about your work. And I hope that people will get that take home message that, you know, we're all interconnected. We're dependent on a lot of different kinds of insects. Yeah, it's it's crazy that we, you know, we so often just sit down to eat and we really don't think about all that went into it. But and some of so much of our food is just dependent on insects.

Dr. Rangel [00:59:22] Just like just one simple example that people may not be aware of. If you eat almonds, drink almond milk, if you eat granola with almost anything that has almonds, you have to thank honeybees for their combination of almond crops. 100% of almond production is dependent on honeybee pollination. Without honeybees, you would not have almonds.

Dr. Rideout-Hanzak [00:59:47] No almonds. Wow.

Dr. Rangel [00:59:49] Yeah.

Dr. Rideout-Hanzak [00:59:50] Yes. We're all connected now. I want to hold hands and sing and. Yeah.

Dr. Rangel [00:59:56] That's right.

Dr. Rideout-Hanzak [00:59:57] No, that's great. Thank you so much for talking to us. I really appreciate your time.

Dr. Rangel [01:00:03] Thank you for the invitation.

Dr. Rideout-Hanzak [01:00:04] Okay. Thank you so much. Bye bye. A Talk on the Wild Side is a production of the Caesar Kleberg Wildlife Research Institute of Texas A&M University Kingsville. Funding for this project is provided by the Harvey Weil Sportsman Conservationist Award by the Rotary Club of Corpus Christi. Editing was completed by the talented Gabby Olivas, Andrew Lowery and Trey Kendal. We thank the team a distance learning lab for all their help and cooperation.