**Season1Episode6Nurdles.mp3**

**Dr. Sandra Rideout-Hanzak** [00:00:23] Hello, 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.

**Rebecca Zerlin** [00:00:31] And I'm your co-host, not a doctor, Rebecca Zerlin.

**Dr. Sandra Rideout-Hanzak** [00:00:36] Yeah. This episode today is about a particular type of pollution that's becoming increasingly problematic in the oceans and sadly quite common along the Texas Gulf Coast.

**Rebecca Zerlin** [00:00:47] That was quite the alliteration. You just did a particular type of pollution becoming a problem. Now, their name sounds pretty cute, but they're not cute at all.

**Dr. Sandra Rideout-Hanzak** [00:01:00] Yeah, they do have a cute, cute little title, but not cute. Anyway, before we get to that, though, we have Tre' Kendall with our What's Wild and New segment. Hi, Tre'.

**Rebecca Zerlin** [00:01:10] Hi Tre'!

**Tre' Kendall** [00:01:11] Hello, ladies. Good to be back with you again.

**Rebecca Zerlin** [00:01:14] Thanks for coming over from the table over there. (Laughter).

**Dr. Sandra Rideout-Hanzak** [00:01:19] Tre', what's wild and new right now?

**Tre' Kendall** [00:01:21] Well, once again, the Texas Parks and Wildlife magazine is hosting its great outdoor scavenger hunt, also known as GOSH.

**Rebecca Zerlin** [00:01:27] Gosh!

**Rebecca Zerlin** [00:01:30] You have to say it. It's all capitals. It's a really. Gosh! Oh, gosh, yeah.

**Tre' Kendall** [00:01:35] G-O-S-H... No, no pound sign.

**Rebecca Zerlin** [00:01:39] Well, that sounds like fun, can you give us some more details on GOSH?

**Tre' Kendall** [00:01:44] Well, the scavenger hunt is broken up into six regions from the panhandle to south Texas, and participants can register on the Texas Parks and Wildlife Magazine website or their Facebook page. And from there, you can get a spot on the list by posting a selfie on the TPWD's Instagram, Twitter or Facebook page. The deadline to enter is Labor Day, and that's September 6th. And don't forget, be sure to include hashtag (#GOSH2021). That's, pound sign, G-O-S-H-2021, each time you post.

**Rebecca Zerlin** [00:02:20] Listen up Opah. It's hashtag now.

**Dr. Sandra Rideout-Hanzak** [00:02:23] It'll always be pound to me. Sorry or number, number sign. Anyway, what kind of places are on the list for you to find in the scavenger hunt?

**Tre' Kendall** [00:02:32] So it's a big range here. The Texas Parks and Wildlife Department has designated over two hundred and sixty eight thousand square miles across the state of Texas. Included within these six regions are state parks, Trailways fishery centers and others are on the list as well.

**Rebecca Zerlin** [00:02:49] Wow. So many cool places to see on that list.

**Tre' Kendall** [00:02:53] And there's definitely a lot of bonuses when participating. There are many iconic Texas food stops one can enjoy along the way. Everybody loves a little soul food, right?

**Dr. Sandra Rideout-Hanzak** [00:03:03] Absolutely. I bet there's some barbecue on that list.

**Tre' Kendall** [00:03:06] I would surely hope so. And also, if you complete the scavenger hunt, you will receive a two year digital subscription to the TPW magazine.

**Rebecca Zerlin** [00:03:15] A magazine...Gosh!

**Tre' Kendall** [00:03:16] Just wait. It gets better. And it's a perfect opportunity for you kids out there to bug your parents in the car. God...how I miss those days!

**Dr. Sandra Rideout-Hanzak** [00:03:27] Right! Are we there yet? (Laughter).

**Rebecca Zerlin** [00:03:28] Make sure you use the hashtag, though, not the pound sign.

**Tre' Kendall** [00:03:32] Get it right, Mom! (Laughter) Anyways, participants will receive a TPD certificate and a shout out in a future issue of the Texas Parks and Wildlife magazine.

**Rebecca Zerlin** [00:03:45] Certificate of what? I want to be certified!

**Tre' Kendall** [00:03:48] A certified expert! (Laughter).

**Dr. Sandra Rideout-Hanzak** [00:03:49] That really does sound like a lot of fun, though, I have to get on that side and register.

**Rebecca Zerlin** [00:03:54] I'm gonna do it!

**Tre' Kendall** [00:03:55] Texas is a big place, guys, so better get started.

**Dr. Sandra Rideout-Hanzak** [00:03:59] Oh, absolutely. Well, right now, before we start, our interview, Becca's going to break down some important information for us that we need to know for our interview. So here's Becca's breakdown.

**Rebecca Zerlin** [00:04:12] Today, we will talk about nurdles. So, folks, hold on to your girdles. They're not something cute, because they're pollute-tion; so dealing with them will have nurdles . Did you like my poem? I think it's rather fitting for today's topic. A specific type of pollution in the oceans called nurdles. Now, nurdles sound like they belong in a Dr. Seuss book, but there's nothing funny or cute about them. I'll let our guest expert define them for you later. But I wanted to go over some other things before you listen, since we'll be talking about the ocean today. Let's go over a few definitions first. All of these topics can have an effect on aquatic species. You know what time it is! Definition time! Let's start with pH. pH is a measure of how acidic or basic water is. Changes pH can create an environment in which animals struggle to survive. This is particularly a problem for animals that create a shell, like cute little snails. Turbidity, is the measure of clarity of a liquid. In other words, it is the cloudiness or haziness of a fluid caused by particles that are invisible to the naked eye. Basically, turbidity makes water cloudy or opaque. I think we can all relate to how creepy it is to get bumped by something under the water when you can't see what it is. What was that? A shark, a severed hand? You can't see because the water is turbid! Turbidity can also cause some issues for aquatic species, such as clogging or damaging gills and possibly smothering habitat, eggs and larva with all that sediment. Endocrine disrupting chemicals, (or EDC's) are chemicals that interfere with an animal's natural hormone levels. These are typically attributed to pollution and cause adverse effects in organisms and their populations. Effects of EDC's have been reported in a wide variety of species, including fish, reptiles, birds, mammals, and there's even evidence that they can affect us humans as well. These may all seem daunting, but luckily there are ways we can all pitch in and make a difference. One such method that you'll hear us talk a lot about today, is to get involved in a citizen science project. Citizen science! That sounds important! Like something you would hear about as a call to action, in one of those apocalyptic alien movies, sci fi, call me. I've got ideas. Don't worry, it's not that scary. Citizen science projects are kind of like open source scientific research. Many of these projects rely on the help of everyday people who may not even be scientists to contribute to the research of a specific topic. There are four common features of a citizen science project. One, anyone can participate, no matter their job or background. Two, participants all use the same protocols. This way, data can be combined and we make sure it's going to be high quality data and not give us funky results. Three, this data can help researchers come to real conclusions. And four, because this community of scientists and volunteers work together and share data, this information is readily available to both scientists and the public. There are tons of citizen science projects happening around the world covering lots of different topics. If that sounds like something that you might want to participate in, take a look at what kind of projects meet your interests; such as today's topic, where we get to learn about a cool project that's really making an impact in Texas. I guess you can say...it's making a splash!

**Dr. Sandra Rideout-Hanzak** [00:07:28] So today, we're with Jace Tunnell, who is the director of Mission Aransas National Estuarine Research Reserve at UT Marine Science Institute. I did it, that's a mouthful! It took a lot of tries to get that out. (Laughter) So thank you so much for coming on the podcast with us. We're really excited to have you here because I have done some nurdle patrolling before. So it's finally nice to meet you in person.

**Jace Tunnell** [00:08:02] Thanks for having me.

**Dr. Sandra Rideout-Hanzak** [00:08:04] Thanks for coming. Thank you for being here. Yes.

**Rebecca Zerlin** [00:08:07] So we're going to start by having you tell us a little bit about yourself and what you do as director of that big, long title. I just sait (Laughter).

**Jace Tunnell** [00:08:16] Right, so mainly, I manage people. We have 20 staff members. We have a couple of different sectors of research and education that we do. One of those includes the Amos Rehabilitation Keep, that rehab sea turtles and birds. So that's one of our more public facing programs that you've probably seen before. And actually, we have a sea turtle release multiple times a year that we have a lot of people that come to; so, you've probably seen that on the news. But some of the research we do, we are part of a national system. So there's actually 29 research reserves around the country. Some of the things we're known for is that we all use the same type of equipment and same protocols so that you can compare what we're doing right here in Texas to anywhere else in the country. So a lot of this stuff is like you'll see if you're ever out into the bays, you'll see these monitoring platforms. We have equipment on those that are collecting data 24/7. We also have a K through 12 program where we're going out to schools or we bring schools to the university and just talk to them about estuarine science and stuff even that's in the Gulf. So what's washing up on the beach and things like that.

**Rebecca Zerlin** [00:09:29] So when you say collecting research and everybody's doing the same kind of data collection, what what kind of collection is that?

**Jace Tunnell** [00:09:37] So we do water quality. You know, we have the basic parameters that you'd see on any kind of water quality station. So temperature, pH, D.O. We also look at turbidity, we look at nutrients, plankton, and then we have vegetation monitoring and and some sea level rise type equipment. And so some of the vegetation is long term vegetation changes in the marsh. We're really interested in climate change impacts. So we look at erosion and accretion, rates of the sediment, vegetation shifts, and then we have what's called surface elevation tables. And we had some of the first ones around this area. And now there's some other institutions that are picking this up and spreading it out. But those are really good for looking at long term change in the marsh.

**Rebecca Zerlin** [00:10:32] Well, that's really interesting. And you said you're one of 29 locations?

**Jace Tunnell** [00:10:37] Right! One of 29 locations around the country. We're the third largest. So we manage about one hundred and eighty six thousand acres. Alaska is the largest and then Ohio is the smallest. And Ohio, they actually have an estuary there and there are about 600 acres.

**Dr. Sandra Rideout-Hanzak** [00:10:53] Oh, wow. That's neat.

**Rebecca Zerlin** [00:10:55] That's that's really cool. I thought I read that I had seen it was one of a few, but that's really cool. I didn't know that you guys did the same kind of data collection at each one.

**Jace Tunnell** [00:11:06] Right. We're we're funded by the National Oceanic and Atmospheric Administration by 70 percent and then 30 percent by the university. And so all the reserves have a state partner. Ours is the University of Texas.

**Rebecca Zerlin** [00:11:20] Gotcha. OK, so before we continue, we are going to discuss the most pressing question. What exactly is a nurdle?

**Jace Tunnell** [00:11:28] So a nurdle is the basis of everything plastic. And so it's a small plastic pellet that's about the size of a lentil. And these things are made. Then they're shipped around the world to factories that melt them down, put color to them and make them into a product that we use on an everyday basis.

**Dr. Sandra Rideout-Hanzak** [00:11:48] Does everything plastic start with a nurdle?

**Jace Tunnell** [00:11:52] Not everything there's there's also powders and flakes that produce other plastic items, but by the large part, nurdles are the basis for almost everything plastic.

**Dr. Sandra Rideout-Hanzak** [00:12:05] Wow, so where do these nurdles come from, what are they used for? Well, you just tell us what they're used for, but yeah, where do they come from?

**Jace Tunnell** [00:12:13] So it's actually a byproduct of refining oil and gas for our cars and everything else that we use fuel for. But the plastics industry came up with, oh, we could use this material. And so they're made in factories that have, you know, big extrusion processes where they push melted plastic through them to give the shape and size that each of these nurdles have. And then they add additives to them depending on what the product is going to be. And so, you know, sometimes like if you have a water bottle, you don't want it turning yellow real quick. So they might put an additive in it. They might want plastic to be more rigid. So they put a different type of additive to it. And so that's the basics of how it's made.

**Dr. Sandra Rideout-Hanzak** [00:13:04] OK, and basically you're here with us today because sometimes these little guys get away and they get into the Gulf. How does that happen? Or out into the ocean? How how is that happening?

**Jace Tunnell** [00:13:15] Well, so these plastic pellets are really small. And so they're considered micro plastic, which is anything that's less than five millimeters in size. And so with anything that small, it's going to be hard to contain. And so whenever they store these nurdles, they put them in big silos to get them out of the silos. They have six inch corrugated tubes that they pneumatically blow these things into railcars or they can gravity feed them into rail cars. They also put them into trucks. They also bag them up and put them on pallets and then they ship them, you know, all over the world. But each stage of that process, there's an area where these pellets can get out on the ground. And so what happens when things are on the ground that are lightweight? It gets into the storm water, then it gets into the nearest water body, usually a creek or river, then out into the bays, then ultimately out into the ocean and then washes back up on our shores. And so that's how we're finding all of them on the beach.

**Dr. Sandra Rideout-Hanzak** [00:14:20] Yeah. And how long have these nurdles been in production? How long have they been around?

**Jace Tunnell** [00:14:27] They started mass producing plastic in the 1950s. It was mainly for kitchenware. And so some of the nurdles were finding could even be from the 1950s. Really? Yeah. These things, you know, they're not going to break down in our lifetime, right? No. Plastic lasts forever. And that's one of the great things about plastic. You know, it lasts forever. But then that's also the downfall. You know, if it gets out into the environment, it's like, well, how are we getting rid of this stuff? So, yeah, some of the some of the it's this situation where it's just accumulating. And so they're so small, it is very hard to find these things and pick them up. And so what we're seeing now is just an accumulation over time.

**Dr. Sandra Rideout-Hanzak** [00:15:09] OK, so correct me if I'm wrong. Every piece of plastic that's ever been created is still with us. Right. In some form or fashion.

**Jace Tunnell** [00:15:19] Yeah, there are some, you know, solutions. People are trying to come up with bioplastics and things like that that could break down faster. But yeah, your normal everyday plastic is still around. And it doesn't dissolve. It's you know, it doesn't just go away. It just breaks down into smaller and smaller pieces which that allow smaller and smaller wildlife, you know, animals, fish, things like that, to be able to uptake it, get into the food chain and then so on and so on.

**Dr. Sandra Rideout-Hanzak** [00:15:46] Sure. So you just mentioned food chain. What about humans? We might be at the very end of the food chain, but are there health impacts for humans?

**Jace Tunnell** [00:15:57] There's...absolutely! I don't know if you saw that report that came out a year or two ago, but it says that each person consumes about a credit card, a plastic a week.

**Dr. Sandra Rideout-Hanzak** [00:16:09] I was going to ask you about that. Yes, I did see that.

**Jace Tunnell** [00:16:12] And if you do laundry, so I'm the person who does laundry in my family. And so, you know, whenever I take that lint thing out of the dryer, it just like a big plume right in your face. Well, that's part of it...

**Dr. Sandra Rideout-Hanzak** [00:16:24] Wow! (Laughter).

**Jace Tunnell** [00:16:25] But yes. But, you know, does that just go through our body and not impact us? There's some studies that we're looking at now that suggests that there could be an impact depending on, you know, where that plastic had been before it gets into your body. And so, you know, nurdles by themselves just, you know, say they were released immediately. They're probably inert. If, say, a bird or a fish eats one of these pellets, it probably just goes right through their system. No impact. But these things act like sponges once they're out into the environment. So, you know, you hear all these acronyms like PCBs, DDT, PAHs...these are all really bad chemicals that you don't want on your skin. These nurdles are absorbing these. And so we've done a lot of different research on, you know, the concentrations of these chemicals within the pellets. And they're really high concentrations. And we're about to actually come out with a report here in August that a local group here, the Coastal Bays and Estuaries program, funded and it looked at 24 different sites, including here in Kingsville along the railroad plastic pellets. So we went out and we collected around 300 plastic pellets at these 24 sites. And we're looking at the chemical concentrations in these pellets. And so getting back to the human part of it is, say a fish eats one of these pellets that's been in the environment. It has these chemicals that have been absorbed into it. You know, do those chemicals leach out of the pellet once the fish eats it, get beyond the stomach lining and into the muscle tissue that then we're eating? So then there could be a human health impact. Yeah, and, you know, that's hard to find. The reason you know, this, it hadn't come out yet is because it's hard to determine. You know, we put so many other things in our bodies and we're exposed to so many other things in our lifetime. You know, who's to say that it comes from that specific thing? And same with the fish. The fish are exposed to a lot of different things. And so there are studies, I know at Texas A&M, Corpus Christi, they're actually looking at their growing fish. They're feeding on plastic. They're fish that grow in a three month period. They'll be adults. And then after those three month period of feeding on plastic, they can chop them up and look and see what the chemical concentrations are in their body.

**Dr. Sandra Rideout-Hanzak** [00:18:52] So I was just going to ask you if anybody was doing that. Right.

**Jace Tunnell** [00:18:55] And so, you know, we now have the tools to be able to look at really low concentrations. And so I think it's just a matter of time before we have that answer.

**Dr. Sandra Rideout-Hanzak** [00:19:06] Wow... Yeah, I love my seafood, so now I'm kind of scared.

**Rebecca Zerlin** [00:19:14] On your website, there's a really interesting map that shows where these nurdles have been found and we will try to have a link to that in our information box for the podcast. But it's a really interesting picture to look at because you see the Texas coast really seems to be a hotspot for these nurdles. I don't know if hot spots is the right word for it. Why do you think Texas is so, popular?

**Dr. Sandra Rideout-Hanzak** [00:19:40] Popular for nurdles. Yes, it's our beaches, they love our beaches.

**Jace Tunnell** [00:19:45] That's a great question. And really, I guess I'll go back to how nerd patrol started because it gets to how that map was created and what it's telling us. And so in September of 2018, at Bob Hall Pier, there in Corpus Christi, I was out there and there was a nurdles spill. There was we went about 20 miles of the beach. There was a spill of nurdles that came in and it was 300000 to one million per mile is what is what we had come up with based on transects and stuff like that. And so we had it immediately. Well, actually, I took a picture of it put on social media, you know, what do we do for social media? But somebody immediately said, you need to call the Coast Guard. That's a spill and somebody needs to get out there and clean it up. And I thought, oh, that's a good idea. So I called the Coast Guard and they were like nurdles. What are you talking about? I've never heard of that. And so they ended up calling the Texas Commission on Environmental Quality, who's the state agency, who, you know, kind of regulates the environmental side of things. If there's an oil spill, you know, they get involved. And so they came out the next day. I met them out at the beach and they took samples. And then they called me a couple of days later and said, well, there's nothing we can do about it because most likely, you know, happened offshore, have another country. There is no responsible party to pay for cleanup. And so, you know, I was like, OK, well, we got to do something about this. You know, we at least need to see how long it's going to be around and how far it spread. So we wanted about four or five people to help us out for Mustang and North Padre Island. And so we started the Facebook page called Nordal Patrol so that we could post our pictures and keep all our data there. Well, I mean, we created that Facebook page, and within a week there was 300 people on there from even down in Mexico. Other states, they said, we want to know if these things are going to show up on our beach. Yeah, so we said, OK. I said, OK, well, I'll just start keeping a spreadsheet, you know, on my computer. Just email me. You know, your concentration you find in ten minutes. And people were using pool nets, they were using buckets and civs and we we quickly found out. So you can't compare somebody using their hand as somebody using a pool net. So we came up with this methodology that we ended up getting published that, you know, you sample for ten minutes and it's for one person and it's your hand only that way you can compare site to site. Now, we have groups of 25 people going out that sample for an hour, but our database that we created automatically splits it up. So it's all standardized. And so that way you can compare. So when you're looking at the map on a patrol dog at concentrations of pellets, you can compare one site to another. And so what we ended up finding was that, well, for one, I was getting 300, 400 emails extra month. And I said, OK, we got to do something about this. Oh, my goodness. So we got a small grant from eleventh hour racing to build the website, and it was for three thousand dollars with Texas A&M, Corpus Christi. And so they built this website and automated everything. So people just go in, they put their data in there and automatically populates on this map. But what we found within the first few months was that, you know, this probably wasn't happening from a spill offshore or another country. You know, the highest concentrations being found out of the entire Gulf of Mexico is what we knew at the time was in Galveston Bay. And there's no way that these pellets that if it was a spill offshore, that they would be you know, they were collecting over 5000 pellets in 10 minutes and get up in Galveston Bay, way up into where the port area is, which is coincidentally what we found out is where the highest concentration of plastic manufacturing sites are in the country.

**Dr. Sandra Rideout-Hanzak** [00:23:35] What a coincidence, right?

**Jace Tunnell** [00:23:38] Right, exactly. And so, you know, you look at that map and you look at Florida and there's all these greens which those green dots represent, zero pellets found in 10 minutes, really. But the further west you go, the warmer the colors get. Yeah. And that means higher concentrations of pellets being found in 10 minutes. And so once you get to Texas, the the concentrations and the colors are just super high, you know, real warm colors. And so that's a real indication that, hey, Texas has a problem here. And think about this. Florida doesn't really have any plastic manufacturing sites. Only until you get up to Pensacola do you start finding plastic manufacturing sites. And so then as you go west, the concentration of plastic manufacturing sites could get higher and higher. And so so do the pellets being found. So it's been real telling with that map.

**Rebecca Zerlin** [00:24:29] Yeah, it has.

**Dr. Sandra Rideout-Hanzak** [00:24:30] So that's, I guess, a byproduct of us here in Texas being so richly blessed with oil resources, I suppose.

**Jace Tunnell** [00:24:39] Right, right, I mean, you know, we have the Eagle Ford Shale, we've got other natural gas, which is how they're making these nurdles.

**Dr. Sandra Rideout-Hanzak** [00:24:48] Oh, from gas, okay.

**Jace Tunnell** [00:24:49] From gas. And so, you know, we have this resource right here. And so to be able to, you know, produce it and ship it out from here is makes it easy.

**Dr. Sandra Rideout-Hanzak** [00:25:00] Yeah. And I just want to I just want to point out, you know, for anybody who's thinking, well, there may be more people searching in Galveston that has nothing to do with it, because you are breaking this up into, you know, it's a 10 minute search for one person. So it doesn't matter whether there's one person searching or 100 people searching at a time. It's a 10 minute for one person count. Right. And none of that other stuff matters.

**Jace Tunnell** [00:25:26] Right. We've had over 4000 volunteers have sent data and we've had over 9000 surveys done. And, you know, actually, when we first started, I thought, well, you know, Florida, they're finding all these zeroes, although that can't be right, because I'll go out to the beach here in Corpus Christi and it's not uncommon to find 50 to 100 in ten minutes. And so me and my buddy got together, we got in a car and we did what we called the Nurdle Expedition. And it was 10 days around the Gulf of Mexico at every accessible point. And sure enough, we couldn't find hardly any nurdles in Florida. And so we ended up creating this documentary that actually just came out a couple of months ago that's on our nurdlepatrol.org website called the "Great Gulf Nurdle expedition. And it's it's an entertaining look at two guys driving around in a Prius to every accessible point in the Gulf of Mexico all the way to the Dry Tortugas, which we did find some there.

**Dr. Sandra Rideout-Hanzak** [00:26:28] Really? That's sad...

**Jace Tunnell** [00:26:28] Even in paradise!

**Dr. Sandra Rideout-Hanzak** [00:26:29] I'm sure we can make some kind of Jimmy Buffett song about nurdles in paradise. So we...on the map. You also see the cities seem to have hot spots. Would that be because there's manufacturing in those areas or just there's more people, you know why?

**Jace Tunnell** [00:26:50] So anywhere? That's a good point, because it's not just the plastic manufacturing sites. If it was that easy, the problem would be solved already because it's actually has to do with not only manufacturing site, but also transportation. It also has to do with whenever the transportation company gets to the facility, that's got to offload these pellets and then also at distributors. So there's folks or there's companies that are just getting, you know, massive amounts of these pellets and then putting them in smaller bags and then distributing to, you know, Hobby Lobby or, you know, whatever. They're a different retail stores or selling it on, you know, online and things like that. And so at every single point, these pellets can get out into the environment. And so you look at these cities on the map that are way inland, like you look around Dallas Fort Worth area and they have some really high concentrations. And if you zoom in to the map, you can click on one of those dots and it will give you all the metadata. So it tells you whether it was collected at a railroad, whether it was along a creek or lake. And so what you're finding like up in the Dallas area is that there are some long railroads, but there's also some along creeks and lakes. And then so if you follow those creeks, you know, from the lakes where these were being found, what do you find upriver? You find plastic manufacturing sites or you find stacking lanes for railcars, which is where they have hundreds and hundreds of these railcars just waiting to be, you know, moved, moved around. And so, yeah, that's that's what I tell people. They said, well, I don't live by a beach. How can I get involved? I said, well, go to Google Earth and type in plastics in your community and see what pops up. And so the plastic manufacturing sites or the distributors or the the factories that are melting them down, they'll show up on that map and then, you know, just go sample around their fenceline or downstream from them. And, you know, there's a good chance you're going to find some nurdles.

**Rebecca Zerlin** [00:28:53] Hmm, yeah, that's. The idea that there's what hundreds of millions of these everywhere does, and I've seen them because I did a nurdle patrol a couple of years ago and just I think we collected 30 something in the 10 minutes and just I feel like I wasn't even getting them fast enough. So it's just it's nuts to me. Just the idea of tiny little plastics everywhere. But we are. We mentioned that they are a micro plastic. Is there a difference between a nurdle versus another kind of micro plastic or is that just it's all micro plastic?

**Jace Tunnell** [00:29:29] Right. No, there's definitely a difference. So one is what we call preproduction plastic and one's post-production plastic. So if you go out and you look at the high tide line at any time of the day, you're going to see little bits of plastic that's in that high tide line or even a riverbank or up in the bay. You know, wherever you're at, you're going to see little bits of plastic and they're going to be all shapes and sizes, irregular shapes. That's all from products that were made a long time ago. They had been in the sunlight. They've been in the wave action just broken up over time. That's by far the most of what you're going to see. Then you're going to find the little round pellets so they can be square. I've seen square different colors, flat oblong. But but you can tell they're they used to not that they used to be something, but but they actually have a shape. It's not like broken up plastic. And so that's the difference between the two is like one has already been made into a product. There's probably no way you'll ever find out where that came from. These nurdles, on the other hand, it's 100 percent preventable from those getting out into the environment. And they you can find out where those came from, or I should say this, we can't find that out yet because all that information is proprietary. So the company can tell you whether they made the pellet or not, just based on shape and size alone or through the chemistry. But we cannot because we don't have the formula.

**Rebecca Zerlin** [00:31:06] Gotcha...So is there legislation or something? What could help fix this or prevent spilling?

**Jace Tunnell** [00:31:13] So there's a couple of different things here that that could help prevent pellets from getting out. One is we think that having stricter regulations on stormwater permits for plastic, any any company really that that handles plastic pellets. And so we partnered with the Surfrider Foundation, the Coastal Bend chapter this year, and they created a Texas nurdle bill that was submitted by Representative Tod Hunter. And so that that was submitted in March, it went through. We had a lot of meetings with even the director of the Texas Commission on Environmental Quality, as well as some of the plastic lobbyist and tried to come up with, you know, what's the best way forward. And so now, luckily, Texas Commission on Environmental Quality, they saw that there's a problem. There was a number of things that the nurdle patrol data helped them say. Oh, yeah, we do have a problem here. And then also there was a plastics company name Formoa, that had a large settlement and or that there was a large lawsuit. And Diane Wilson and the San Antonio Bay and Water Keepers had sued Formosa for discharging plastics. So TCQ, saw that there was a problem and they they're already making changes. So there's a public process going on right now to change their stormwater permit. So what this allows them to do, the the state they can go, they can do an inspection. If they find a nurdle, they can immediately say this is not right. You know, they can do enforcement right away because the problem is the way the permits are currently written. It says that these companies are allowed a trace amount of suspended solids, which is a gray area. So that Formosa cases I just told you about, they said that they were allowed ten thousand pellets per day per outfall. They have 12 outfalls. So they said a trace amount to them was one hundred and twenty thousand pellets per day. Oh, my goodness. And luckily, the judge said, no, you know, we don't agree with that. And so but that just tells you that was a gray area and that is now going to be solved. And so the Texas nurdle bill that was submitted, it is now into a year long study where we're going to be working with the state agencies and the plastics folks on what data gaps there are and what we need to know to be able to strengthen policy.

**Rebecca Zerlin** [00:33:53] Good. Wow. We we asked you about human health, but what do we know about the marine life? Have nurdles specifically? We you know, we all have seen the pictures of plastics stuck, you know, and on dolphins faces and things like that, but and in their bellies. But what about nurdles specifically? Have those been found, like in the higher organisms?

**Jace Tunnell** [00:34:17] Yeah, so. And that's probably the. Biggest impact that we know about right now, and that is with wildlife and so fish, sea turtles, birds. And so back in 1992, the Environmental Protection Agency came out with a technical report. It basically combined a bunch of scientific reports that had been done in the late 80s and early 90s, and it was called plastic pellets in the aquatic environment sources and recommendations. And in there, it describes over 80 species of shorebirds that they knew about at the time that were eating these pellets. It also talks about the different sea turtles that were eating pellets that had been necropsy and then the fish. So this was back in 1992. I mean, you can open up that report and they've got black and white photo of an intestinal track of a bird. And there's about, I don't know, 10 or so pellets in there. And it talks about the hazards. So, you know, if these animals eat one or two, it probably just passes through. But if they eat enough of them, you know, it can clog their intestinal tract. There's no nutritional value. They could end up starving to death. It can twist their intestinal tract to where then, you know, no matter what they eat, nothing's going through it. And then they end up starving to death. You know, there's all kinds of papers out there that'll talk about endocrine disruptors, behavior changes when they eat the plastic and stuff like that. So, yeah, by far, the biggest impact is wildlife.

**Dr. Sandra Rideout-Hanzak** [00:35:43] Wow! That's so so birds are just mistaking them for something edible or maybe for a pellet that they might eat to help grind up food, or...?

**Jace Tunnell** [00:35:52] You know, one of the methodologies we have when people go out and they do their ten minute surveys, they have to take a picture and they have to upload the picture to the database. Because what we find is that lots of times they think they're picking up, you know, humans think they're picking up pellets, but they're actually seeds or they're they're bulbs off of sargassum or something like that. They look like a natural product and the animals think the same thing.

**Dr. Sandra Rideout-Hanzak** [00:36:22] Wow. So so if we're not you know, we're not running one of these companies, we're just average folks, what can we can just average people do to help? You know, with this issue to help prevent it on the one hand and then clean it up on the other?

**Jace Tunnell** [00:36:40] A reduction of the use of plastic is number one, because...

**Dr. Sandra Rideout-Hanzak** [00:36:44] Could you could you repeat that for me, please? I hear that one more time. What was that?

**Jace Tunnell** [00:36:48] Reduce your use of plastic. OK, it's got to be number one because, you know, and it's hard because you go into the store every almost everything is in plastic. And but if we reduce our use of plastic, it reduces the demand of plastic to be made, which reduces the possibility of these nurdles getting out into the environment. And so that's the number one is reducing our use.

**Dr. Sandra Rideout-Hanzak** [00:37:15] Number one...OK, yeah. And unfortunately, I think covid just made that worse because everything became disposable with covid. So that was that was sort of heartbreaking for me when everything went to a disposable one time use. Yeah. Wow.

**Jace Tunnell** [00:37:29] Right. We I know that personally I had gone into, you know, any store you'd go into, even the gas station, you could look on the ground and see masks.

**Dr. Sandra Rideout-Hanzak** [00:37:41] Yes. Everywhere! oh, yeah.

**Jace Tunnell** [00:37:43] And so we I know at the Mission Aransas Reserve, we ended up doing a weekend long mask maniac challenge. And so for a whole weekend, we had people all over the Gulf of Mexico that were going out and we ended up having like nine. It was like three different states and nine different cities. And we collected like 350 masks just in a three day period. This was just out in the environment. And that was that's I mean, even locally here you go to a big box store. I don't I won't say which one it is. Right. But I found about 50 masks there and it was crazy. And the bad thing about the masks, they're made of polypropylene. They have a they have a fabric covering on it. But in the middle of is that polypropylene? And then they have the the bands that go on the outside. And and there's a lot of pictures out there now with, you know, those things just wrapped around birds.

**Dr. Sandra Rideout-Hanzak** [00:38:35] It's heartbreaking. So, yes. So how does somebody get involved with the nurdle patrol if they would like to help you?

**Jace Tunnell** [00:38:43] It's really easy. And so, you know, a lot of this is an excuse for people to get out and go by the water, whether it's by a river or a lake or a beach. You know, they're going out there anyway. Spend 10 minutes and look in the high tide line and see if they see any nurdles and go, I'd say go to nurdlepatrol.org. We have a short training video. It's about four minutes long and it tells you what a nurdle is, why we're doing it, what the impacts are, and then what to do once you get your nurdle data and how it's going to be used.

**Dr. Sandra Rideout-Hanzak** [00:39:14] OK, great.

**Rebecca Zerlin** [00:39:15] I'll be sure to link your site to the podcast so people can easily find you.

**Dr. Sandra Rideout-Hanzak** [00:39:22] Yes, I'm glad it's something that anybody can do. Have you found anything really surprising in in your work, you've I mean, you've surprised me several times here, but... What's been the most surprising thing to you and your work?

**Jace Tunnell** [00:39:39] I'd say, well, early on, I think it was the realization that that the U.S. was one of the major causes of the high plastic pellets we're finding out on our beaches. Yeah. You know, the state agency that's supposed to be regulating the environment was saying that it was coming from another country.

**Dr. Sandra Rideout-Hanzak** [00:39:59] Yeah, we like to blame it on coming from other countries, don't we?

**Jace Tunnell** [00:40:04] Yeah, and so I think that was a real surprise. And that just sort of motivated, I think, volunteers, you know, citizen scientists going out saying, man, we're we're part of the problem. You know, the U.S. is part of the problem. Texas is by far the part of the problem. We need to do something about this. And so we've been able to, you know, create these what we call nurdle patrol startup kits, because there's groups that want to get involved. But they just didn't know, you know, how do we do it? You know, what do we present to people, to our volunteers that we're trying to get going? So we created this to send to organizations that want to start up their own nurdle patrol citizen science group, or they want to just incorporate nurdle surveys into their existing monitoring program. And so if any group is out there that wants to get involved, we will mail them a kit. They cost about 300 bucks each. But Formosa paying for it, I don't know that they you know, they got sued for that 50 million dollars in nurdle patrol gets a million of that. And so we're spending it the best way possible and spreading the word about Nordal patrol and what people can do to get involved.

**Dr. Sandra Rideout-Hanzak** [00:41:09] That's terrific. That's terrific. That sounds like something we should do with our SAFER club. Yes, that would be a great activity.

**Dr. Sandra Rideout-Hanzak** [00:41:19] An excuse to go to the beach, too.

**Jace Tunnell** [00:41:22] Now, one thing we found out was that there are...were Teachers. They said, you know, we don't need 100 glass sampling jars. We don't need tweezers. You know, we just want to teach our students about how plastics are getting into the waterways and going into the ocean, what the impacts are and maybe what some solutions are. So our education staff created an entire curriculum surrounding nurdles. So we put this kit together. It's in a metal box and it's got six jars in it of nurdles, plus a curriculum that's on a flash drive and presentations and articles about nurdles. And so students get into groups and they talk about, you know, how are these getting out to the environment? You know, what are some of the solutions? So they come up with their own solutions on how to fix the problem. And they learn about, you know, the impacts of plastics getting into the ocean. And so we've sent out we started these in February this year. We've already sent out over 400 of these to teachers across the country. And so that's one of our big pushes right now. And so if people go to nurdlepatrol.org, they go to news. There's an article there called "Teacher Nurdle Kits - Hit the Streets," and we put up a Google survey in that article. They just click on there and fill out a form and we check that form once a week and we're sending them out constantly. Thanks to Formosa.(Laughter).

**Dr. Sandra Rideout-Hanzak** [00:42:39] And what what grade level is it?

**Jace Tunnell** [00:42:44] So fifth through ninth is what it's geared towards, but it can be modified. We've sent it out to colleges and even, you know, home schools that are really young ages and so people can modify it to, you know, what their needs are.

**Dr. Sandra Rideout-Hanzak** [00:42:58] OK, OK. Yeah, that sounds like a great resource for teachers. We're going to change. Did you have another question? OK, we're going to we're going to lighten it up a little bit. I think we've we're all sufficiently depressed by now, so. (Laughter). You know, I love that you guys are cleaning it up and that you're sending out these teacher education kits. This is this is awesome. But no, in biology fields, we often find ourselves in sticky situations because we're working outside and things don't always go as planned. We have animals involved sometimes or weird weather. We're asking all of our guests to share what we're calling a biology blender with our with our listeners. Do you have a biology blender that you'd like to share?

**Jace Tunnell** [00:43:49] I'll tell you what, every day in the field (Laughter).

**Dr. Sandra Rideout-Hanzak** [00:43:54] This is becoming a common theme! (Laughter).

**Jace Tunnell** [00:43:58] Just in the last three months, you know, I'm on the on the beach doing surveys for turtles and birds and marine mammals, stuff like that. Usually every Thursday is my field day. And then, you know, I'm in the office, you know, the other days. But so just in the last three months, we use UTV to go up and down the beach. Right. And in the last three months, I sunk one of them and in the bay. Oh, no, it's still runs for whatever reason. I have no idea. But the other one. The other. So this same one, this was about two weeks ago. We have to go up this remote stretch of beach. And we made it about we usually go 20 miles up and 20 miles back. What we only made it about 10 miles up. And it started like giving us some trouble. And the only way it wouldn't give us trouble is if we went in reverse. (Laughter).

**Dr. Sandra Rideout-Hanzak** [00:44:53] I had happened to me once, two miles back in reverse, down the beach! (Laughter).

**Jace Tunnell** [00:44:58] 10 miles down the beach in reverse. And for once, I realized why we got those rearview mirrors. Finally, we can use this thing. (Laughter).

**Dr. Sandra Rideout-Hanzak** [00:45:08] Yeah, that's hilarious. Well, is there anything else you'd like to share with us today?

**Jace Tunnell** [00:45:15] I just appreciate the chance to talk about nurdles. And, you know, if you'll ever have a chance to spread the word about nurdles, I'll send you all a teacher's normal kit that has nurdles in their school. Show them to people. Yes, because that's one of the big things we have is like, OK, people say, I collected these nurdles . What do I do with them now? And I'm always like, put them in a cool jar, show them to people, you know, spread the word. So, well, that's my that's that's what I hope everybody gets a chance to do.

**Dr. Sandra Rideout-Hanzak** [00:45:44] Yes, well, that's a great message. And I appreciate you being here. Yes, I am. And I've learned a lot. I, I think I knew what nurdles were, but I didn't really know the impact and how many there were and all the. In's and outs, so thank you so much.

**Jace Tunnell** [00:46:00] Well, and I'll say one last thing here and you know, I got something else to say, but (Laughter). This because people always they say, you know, why hasn't this been taken care of before? I mean, this has been going on for 70 years. The EPA did an entire study on it where they looked at harbors around the country and Galveston was the highest concentration. Then they came up with this 1992 report that showed the problem on wildlife. You know, I think now it's to the point now to where, you know, these aren't going away. They're just accumulating. It's it's to us now for the next generation, we need to make the decision, do something about it so that we're not pushing it off to the next generation.

**Dr. Sandra Rideout-Hanzak** [00:46:47] Absolutely. They're going to inherit all of our mess. Yes. We have a responsibility. Absolutely. Well, thank you so much.

**Rebecca Zerlin** [00:46:57] Yes, thanks for coming!

**Jace Tunnell** [00:46:57] Thanks for having me!

**Rebecca Zerlin** [00:47:07] Well, I'm never eating seafood again. (Laughter).

**Dr. Sandra Rideout-Hanzak** [00:47:11] Yeah, it's really eye opening, it's really eye opening and a little bit depressing, but I'm glad that they're that they're working on it. I just want to I just want to wrap up today by saying louder for the people in the back who maybe weren't listening. We have got to reduce our plastic consumption! Because it's the demand that is driving the manufacturing. Yeah, it's that's that's going to be the key. Yeah.

**Rebecca Zerlin** [00:47:40] It's just crazy to think because just a little bit I did we were seeing a lot. And the idea that there's so much more, it's just it's, it's insane to think about!

**Dr. Sandra Rideout-Hanzak** [00:47:51] It is! It is... Well, I think I think we've done all we can do here. I hope people are hopeful now that people that that somebody is working on it. And if you're interested, please look up Nurdle Patrol and help them out with it. I'm really glad that somebody is working on this.

**Rebecca Zerlin** [00:48:12] Yes, me too! And on that note, remember, don't feed the wildlife.

**Dr. Sandra Rideout-Hanzak** [00:48:17] Don't feed the wildlife, plastic's!

**Rebecca Zerlin** [00:48:20] Especially nurdles!

**Dr. Sandra Rideout-Hanzak** [00:48:22] I'll Talk On the Wild Side is a production of the Caeser Kleburg Wildlife Research Institute of Texas A&M University-Kingsville Funding for this project is provided by the Harvey Weil Sportsmen and Conservationists Award. By the Rotary Club of Corpus Christi. Editing was completed by the talented Gabby Olivas, Andrew Lowery and Tre' Kendall. We thank the Team Distance Learning Lab for all their help and cooperation.