TRANSCRIPT
INTERVIEWEE: Dr. Raymond Tarpley
INTERVIEWER: David Todd
DATE: April 16, 2020
LOCATION: College Station, Texas, by telephone
TRANSCRIBER: Trint, David Todd
SOURCE MEDIA: Google Voice, MP3 audio file
REEL: 4007
FILE:
BottlenoseDolphin_Tarpley_Raymond_ByTelephone_16April2020_Voicemail_19795711505_ReducedNoise_AudioMP3.mp3

Google Voice [00:00:00] This call is now being recorded.

David Todd [00:00:03] Good morning.

Raymond Tarpley [00:00:05] Good morning, how are you?

David Todd [00:00:07] All right, well, thank you for taking time to do this. And if you don't mind, let me just read off a little bit of a disclaimer or request. And it goes like this. See, with your approval, Dr. Tarpley, we plan on recording this interview for research and educational work on behalf of the Conservation History Association of Texas for a book and a Web site for Texas A&M University Press and for an archive at the Briscoe Center for American History at the University of Texas at Austin. You will have all the rights to use the recording as well. But I wanted to just give that sort of notice of disclaimer and ask if that's OK with you.

Raymond Tarpley [00:01:03] OK. That sounds good.

David Todd [00:01:05] All right, well, let's let's get started then. It is April 16th, 2020. We are conducting a phone interview with Dr. Raymond Tarpley, veterinarian and professor who retired from teaching at Texas A&M University and lives, as I understand it, in College Station Texas.

David Todd [00:01:30] And basically what we're hoping to learn today, at least get a primer, is about marine mammal strandings on the Texas coast and particularly those involving bottlenose dolphins. And towards that, I thought it'd be good to learn, as, as a start at least about your role in setting up the Marine Mammal Stranding Network so we can understand and improve the situation there. So maybe you could tell us a little bit about your career in veterinary medicine and teaching and marine mammal protection.

Raymond Tarpley [00:02:09] Oh, thanks. Thanks very much.

Raymond Tarpley [00:02:12] Yeah, my, my role with this Texas Stranding Network goes back quite a ways, to the early 80s and it only extends during the early 80s, so I haven't been involved with it for quite some time now. So I can only sort of talk to recall about my early, early experiences with it. My, my interest as a veterinarian really goes back to, like a lot of people interested in the marine environment, in the mystery there and I was always interested in it was in veterinary school and about the time I was graduating from Veterinary School in 1971, a real classic book came out by Dr. Sam Ridgway, called Mammals of the Sea: Biology and Medicine, and he's actually a graduate of the Veterinary School at A&M, in 1960. And that was sort of inspiring to me, and during the 60s there was a lot going on with dolphin

research that was new and exciting and a lot of mystery surrounding it. So after coming back to A&M as a graduate student, my intent was to do something with marine mammals, particularly the bottlenose dolphins, and had a lot of interest in the, in the brain because everyone was wondering, what they do with such a large brain? The mystery still goes on. But that was sort of an inspiration for me. And I began my graduate work, actually looking at the bowhead whale in Alaska, where I had the opportunity when a call came in November 1980 to investigate a live stranding in Corpus Christi region of a dolphin. And that's how the Stranding Network, as we conceived it, began. However, there had been this the Stranding Network, through Texas A&M for a couple of years in the mid 70s, run by Dr. David Smidley, who's an excellent mammalogist and wildlife and fisheries scientist. He had done that for a couple years, but he got busy with a lot of other things and Stranding Network was not very well funded, so it's hard to do too much work with them outside of pure interest in volunteering. So he had to discontinue his efforts with Stranding Network. And then I got that call in 1980, it was an opportunity to start it back up. But really, it was a piece of a larger effort because stranding networks already existed in the U.S., sort of under the mandate of the National Marine Fisheries Service, National Oceanographic and Atmospheric Administration, as a part of their over, oversight of the Marine Mammal Protection Act of 1972. So there was various degrees of development of stranding networks throughout the US, regionally, that plugged in to a national system that was sort of over, overseen by Dr. Jim Mead at the Smithsonian Institution in Washington, D.C.

Raymond Tarpley [00:05:45] So there was already a Southeastern marine Mammal Stranding Network. It was headquartered at the Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, with Dr. Van Odell. And he was very active of course in the Florida region. But there wasn't too much going on in, along the Texas coast and of course it represents a lengthy bit of coastline. So in November 1980, I had the opportunity go down and look at this one dolphin that was actually a live stranding. And it piqued a lot of interest because it was alive. However, it had died by the time we got there and had some mysterious wound in the side, that was thought to be a gunshot. It actually had succumbed before we got there because a local veterinarian had given it a tranquilizer because of the erratic behavior it was demonstrating. And unfortunately, the unique physiology of dolphins is such that they can't handle the same types of medicines as terrestrial mammals might, so because of some brain mechanisms in the brain stem that prevents the dolphins from breathing if they lose consciousness. And this tranquilizer put the animal below consciousness level and it died from asphyxiation.

Raymond Tarpley [00:07:30] But I brought that dolphin all the way up to A&M at College Station for necropsy and investigate this supposed gunshot wound. However, there was evidence that this was not a fresh one because there was scar tissue around it. I had no idea what was causing it, but I called Dr. Dan Odell in Miami and he knew immediately what it was and it had to do with a little shark bite called cookie cutter shark, that turned out to be very common, really, in these dolphins, particularly that are, have a habitat, a pelagic habitat that is a little off-shore.

Raymond Tarpley [00:08:17] So that was sort of the beginning. And it just went on from there. So we decided to divide up the Texas coastline into several regions, so that we could develop a mechanism by which people on the coast could call us and let us know if they saw a stranding, and we named it then the Texas Marine Mammal Stranding Network, that was a part of the Southeastern U.S. Marine Mammal Stranding Network at the University of Miami, and as I said, funneled data into the Smithsonian.

Raymond Tarpley [00:08:57] But it is all under the government auspices of the National Marine Fisheries Service, and it still is. So we divided up the coast in about seven regions, starting at the Sabine River in the North all the way down to Brownsville, South Padre Island. So we tried to have each one of these regions shepherded by a biologist of one sort or another, someone who is interested in this and well-positioned along the coast to be alerted to strandings that occurred.

[00:09:36] So it might be a biologist associated with the U.S. Fish and Wildlife Service or with the Texas Parks and Wildlife Service or someone associated with a university, Texas A&M or, or the University of Texas. And the activities that we saw in various regions would, would vary depending on observer pressure, really. But it reflected the topography of the coast and the type of strandings that we had during that time. So we might have, I'd say, I've been away from the statistics a long time, but probably about 89% of the marine mammals (I'm talking about cetaceans here) that stranded along the Texas coast were the bottlenose dolphins.

Raymond Tarpley [00:10:32] But we had many, many species. I was always amazed at the variety of cetaceans that we had come up, all the way from the bottlenose dolphin, to the great sperm whale and even whale boned whale, like the minke whale. So probably like 15 to 20 different species, cetaceans, were recorded during, during that time.

Raymond Tarpley [00:10:57] And during this period in the 1980s, we were just trying to set up a mechanism for a response for the network. It's hard to gather as much data as you want to, as far as the causes. Though we started to learn a little bit about the species variety that we might see coming up along the Texas coast. So we had a region called Sabine Pass, up North. Galveston was a very active region, Galveston-Freeport region. Going farther south, we had Port O'Connor, Rockport. Port Aransas - Port Aransas had University of Texas Marine Science Institute. Had a little facility there. Corpus Christi, South Padre Island with the National Park Service. So we tried to have someone that was familiar with general biology and marine biology along the coast, helping us form a network that could then funnel information into, to our central entity, which is A&M in, in College Station.

David Todd [00:12:18] And so tell me more about what you discovered. You said you were both trying to, I guess, care for any live animals, but also collect data on, on dead animals and maybe figure out what the causes might be?

Raymond Tarpley [00:12:32] Yeah, that primarily is an exercise in recovering animals that had died. Most animals were not alive when they stranded. And of those who were alive, most of them were not the bottlenose dolphins. The bottlenose dolphins usually didn't make the mistake of ending up on the beach alive and mainly we were looking at the coastal bottlenose dolphins and therefore they live along the coast. And our idea was that because they lived along the coast, they were very familiar with the topography of the coast, and were not likely to make the mistake of being washed up on the beach while they were still alive, because that was, of course, a death sentence for an animal like this to end up out of the water for any length of time, particularly along the long, hot Texas coast. So very rarely did we have a live bottlenose dolphin.

Raymond Tarpley [00:13:39] But some of the other species were off-shore species: they were pelagic, and they really, perhaps, sort of theorizing on our part, didn't have the familiarity with the coastal topography and therefore, if for whatever reason they ended up near the coast and were in bad shape, illness-wise, they might succumb to the, to the waves and the powers that be to push them up on the beach alive. So it's usually not the bottlenose

dolphins that we had strand alive, and most of the live strandings occurred in the lower part of the coast, let's say, down around Port Aransas, and below. At that point, the continental shelf of the state is more narrow. Up around Galveston we had a wide expanse of continental shelf that goes out a good ways, so they have relatively shallow water for a good ways out to sea. But down south, because of the narrow continental shelf, we have deep waters coming closer to shore and therefore the deep water animals, deep water cetaceans, pelagic cetaceans, are more likely to come closer to shore in pursuit of what they normally would do with their lifestyle, such as eating. So when we have storms or we have El Nino events going on, perhaps that might redistribute their food supply. They follow their food supply closer into shore, and if they happen to be in bad shape or sick for one reason or another, they might be more likely to make a mistake and ended up on the beach alive, like the pygmy sperm whale was a common strander. And it's a deep water, deep water cetacean that feeds primarily on squid.

Raymond Tarpley [00:15:41] So most of the time we'd be responding to animals that were not alive. And the Smithsonian had a code for the animals that came up to sort of characterize their stae of, their condition when we found them. And that code would run from a 1 to a 5. One was a live animal and two was one that was so fresh it looked to be alive, but wasn't. And three, starting to get a little bit of bloating. And that can go on for a while and then on four you have soft tissue just falling apart and then five is the skeletal remains.

Raymond Tarpley [00:16:30] So it depended on the condition of the animal that came up, and of course, this Smithsonian code, what we could hope to learn from the animal. So one objective was, if if the animal condition allowed it, we would do the best we could to try to determine the cause of death. In some cases, in a lot of cases, we were just collecting zoological information that was documenting the animal that came up. So as we had an animal come up on the beach, we would walk up to it and start asking questions of the animal. What species are you? What sex are you? Where are you in terms of latitude and longitude? We'd pull one or more teeth, that we could take the teeth and process them for aging, to get an idea of what the age of the animal was when it came up. And these are all, you know, how long the animal is, different things that we could ask even before we really dove into things.

Raymond Tarpley [00:17:39] And then if the animal was in fairly bad shape, we could do a rough necropsy, postmortem exam there on the beach. If it was a little bit better, we could take it into a local lab, Texas A&M University, at Galveston. If it was in really good shape it, we would be justified in bringing it back to Texas Veterinary medical diagnostic lab in College Station, where we had a a board-certified pathologist with an interest in exotic species who could do a much more thorough necropsy than we could out in the field.

Raymond Tarpley [00:18:24] So there was a choice to be made with respect to its condition as to how thorough examination would be and necropsy and what we might hope to find. But it was always a challenge, even even with a board-certified pathologist and a very, fairly fresh animal. Probably a determination of death can be made only about half the time from a gross necropsy and a lot of the postmortem examination depends on various tests. If it's really done more thoroughly, a sample histopathology and things that were starting to get out of the realm of what the animal lent itself to in terms of its condition. So, we were usually limited to a gross, gross exam and not as much histopathology and chemical analysis in those kinds of things as we would like to do. So it very much depended on the condition of the animal as to what we, what our protocol would be in terms of trying to determine what the cause of death was and what level of expertise we saw in the finding from that.

Raymond Tarpley [00:19:42] For the live animals we had very crude facilities to try to administer first aid, first of all, and then medicine to try to reclaim it, and the goal would always be to return it to the sea. But those attempts were largely unsuccessful. We, there was there was an old marine facility, commercial marine facility called SeaArama in the early days on Galveston Island. And they, they had some facilities and the pools. We would sometimes take the animals to their pools. University of Texas Marine Sciences Institute, in Port Aransas, had concrete schools there that we could use there.

Raymond Tarpley [00:20:43] But for the most part, it was very difficult to take your live animals to go to a place where they can be properly cared for. And the truth is that cetaceans, unlike some other marine mammals like pinnipeds, don't do very well out of water for any length of time. And if they made a mistake, had the misfortune of ending up on the beach and they were in bad shape even though they were alive, they were pretty far down the line in terms of any hope of reclaiming them, in terms of shock, and just the heat stress and that sort of thing. So most of them didn't make it. So they ended up being a sort of a code 2 where we had a fairly fresh animal to do an necropsy on. There were some exceptions where we even had a live animal that was taken to a marine lab in Florida and lived there for many years - a Stenella species. But that was, that was the exception. Cetaceans just don't do well once they've been found up on on the beach in terms of recovering them and putting them back out to sea.

David Todd [00:22:08] Well, for those that you were able to recover in adequate shape to do a necropsy, what did you learn about why they might have come ashore and eventually die?

Raymond Tarpley [00:22:23] It's probably multiple factors. And if you could almost bet that once you did the necropsy - and we did a lot of them, particularly in Galveston - pneumonia was a very common finding. But it's almost as if the pulmonary system of cetaceans is sort of an Achille's heel - they're breathing very close to the water's surface, and so it sort of lend itself to those kinds of frailties, of taking water into the lungs and that sort of thing. So even though we find very predictably pneumonia in these animals, there were deeper questions that unfortunately we often couldn't pursue.

Raymond Tarpley [00:23:15] And that was asking why they had pneumonia in the first place. And so it's this whole question of getting to root causes of death. In other words, we might be able to isolate a bacteria such as pseudomonas from, from the lung and say with some confidence that the animals succumbed to bacterial pneumonia. But the real cause of the problem doesn't necessarily stop there. So it might step back into asking why did the animal get a bacterial pneumonia in the first place? Was it preceded by a viral pneumonia? Why did it get a viral pneumonia? Was it because of immunological pressures and incompetence? And if there was an immunosuppression, what was the cause of that? What was it? Immunosuppressant chemicals or contaminations in the water like PCBs. You know, the questions go on and on and become increasingly hard to, hard to determine. So oftentimes we would at best be able to determine the proximate cause of death, but not be able to get to the more intriguing, maybe more population-wide and environmental questions as to what was the ultimate cause of death.

Raymond Tarpley [00:24:43] Sometimes it was obvious. A large Kogia breviceps, a pygmy sperm whale, turned up in Galveston, who actually had a calf with her and and was pregnant. And we brought her all the way back to A&M in College Station. Found tremendous erosion in the stomach, causing quite a bit of bleeding. But that was a gross finding, and we couldn't determine what was the cause of that erosion. Was it some sort of metal toxicity? We we did,

what we could in terms of metal testing, but very cursory with those. Many scenarios that would lead to that kind of kind of lesion. But her , she died very quickly, but the calf at her side was alive. And we thought at last, here's one that actually is healthy and could survive and it was taken to the little pool at SeaArama. There were no marine mammal veterinarians, trained as such, in those days and there's a veterinarian who is on call, a private veterinarian, that had an interest in such things, from Dallas, that was able to prescribe some antibiotics and some steroids. From a distance, it looked like that was helping at first. The little calf perked up. But then then all of a sudden took a dive and died.

Raymond Tarpley [00:26:46] We brought that one up today in A&M College Station, the veterinary school, and did a necropsy and what we found in that case was the stomach was full of plastic bags and bread wrappers, Frito bags and this animal had been in Galveston Bay - imagine the detritus and that sort of thing in the bottom and suspended in the water column. And this particular species is a squid eater. So the only kind of thing you can do is theorize. And the idea was that this little calf was mistaking, even though it was still nursing to a certain extent, was mistaking some of the trash in the water as plastic moving around, was maybe something to eat, like squid, and really worked hard to ingest all this trash to the point that it was causing a peritonitis which they were able to demonstrate from smears of the peritoneal fluid and combination of the blockage in the stomach and the raging peritonitis - killed it, you know, despite our cursory medical attempts with steroids and antibiotics.

Raymond Tarpley [00:28:16] Subsequently, we had a minke whale, Balaenoptera acutorostrata, which is one of the great whales, a whalebone whale, up in a more remote area on Matagorda. And found plastic in its stomach as well. Probably not a fatal situation in that case, but another indication of human interaction, you might say, with animals swallowing plastic out there in increasing numbers. And really, this was certainly the interest in looking at these animals in the first place in a methodical way, trying to treat them as sentinels of the marine environment. These animals are very interesting in their own right. But we are also thinking in terms of them giving us some sort of measure of what was going on in the marine environment.

Raymond Tarpley [00:29:25] And knowing that they feed fairly high on the food chain: fish, squid, shrimp, just like what we do, sort of the same level. And are they taking in any contaminants, you know, through their food? Are some of the ailments that we're seeing indicative of a habitat that is, that is on the decline? And really in those early days, things were not as obvious as they might be now. So data that might have accumulated since then might be more indicative of environmental stressors, including such things as the Deepwater Horizon oil spill out in the Gulf, where a number of mortalities, as I understand it, you know, were seen along, all around the Gulf, maybe including Texas, that were related to destruction of the environment, pollution of the environment with excess petroleum.

Raymond Tarpley [00:30:41] So that was part of the general idea that maybe these animals could, were sort of little sentinels that were washing up from nature, were kind of giving us an indicator of what might be going on in terms of the health of the marine, marine environment. But pneumonia was, even though it was often found and we might expect it, there were probably a lot of underlying pathological mechanisms that were going on. Oftentimes we would see animals that would be devoid of anything in their stomach, indicating that they hadn't eaten for a while. Not always the case, but when you have an animal, ihat has an empty stomach and has a very thin blubber layer, then you start thinking you're dealing with an ill animal. So the bottlenose dolphin, for example, has a couple of fatty layers, an outer one and an inner one. And the inner one is fat that may be mobilized more quickly as a food source and

that particular fat layer was oftentimes almost nonexistent, suggesting that there were synchronicity to the illness of the animal. And finally, it washed up.

Raymond Tarpley [00:32:10] So in that sense, the strandings that we had along the Texas coast were not a mystery, in the conceptual sense. Because they tended to be individual strandings and individuals within any population is going to have a certain number of mortalities, regardless, and the coastal bottlenose dolphins live close to,close to the coast, so as I was saying earlier and therefore if they die, they are just as likely to be washed up on shore, as not. So the fact that we had mortalities in a population was natural. It wasn't mysterious in that sense. The only question is what are the individual causes of this animal being sick.

Raymond Tarpley [00:33:09] In 1983, we did have three animals come up at once. We just did not tend to have mass stranding on our Texas coast, but we had these three - one turned out and this came up to the University of Texas Marine Science Institute in 1983. Live stranding. All three were alive.

Raymond Tarpley [00:33:33] The first one we looked at was the mother, and she apparently had two younger whales with her that were apparently calves. She was still, she was still lactating. And they seemed to be sort of lively and healthy. But she didn't. And, well, we tried to feed her and nurse along for, for a number of days, with the help of Tony Amos there at UTMSI. Tube-feeding and microbial work, trying to determine the best antibiotic and all that sort of thing. But she eventually died and we did the necropsy there and found that she actually had had a parasite called megatrima that had entered, her behavior, and in its life-cycle aberrant migration, and had involved her brain. And so she, she was a victim of parasite and it look like her cause of death that we sometimes see in a pelagic animals, where they are overwhelmed by the number of parasites and the young, were healthy, but they died too in time. So we lost all all three of those animals. That's the closest to a mass stranding that I experienced here in the 80s when I was doing the Stranding Network.

Raymond Tarpley [00:35:14] Subsequently there was a little bit of a mass stranding along the Matagorda area. It was attributed to unusually cold water temperatures. But for the most part, stranding along the Texas coast are a reflection of animals that are sick for one, one reason or another. We didn't see a lot of parasitism in coastal bottlenose dolphins, but we saw a lot in the pelagic animals, whether they be the megatrima worm, that this pygmy killer whale that I was mentioning had three come up, succumb to, or any tapeworm, intermediate stage of the tapeworm, were common and sometimes food irregularities probably put the whole thing out of balance and allow these parasites to take over. So the parasites might become the proximate cause of the illness, but it might be something else like an El Nino event that was causing a lot of warming on a particular year and redistributing the food supply and moving their whole natural history around so that animals that would normally be way out to sea and die out there never, never produce a record, happen to be closer to shore and strand alive or not, but were close enough to shore, that the waves brought them in.

Raymond Tarpley [00:36:52] So there's just a lot of possibilities with the animals. And the difficulty has to do with determining proximate cause of death versus ultimate cause of death. What we really like to get to, of course, the ultimate cause of death, because at that point, the animals become a true sentinel of the environment, and tell us something about the health of the habitat. And increasingly, with marine concern of climate change and this sort of thing, global warming, acidification of the ocean, increasing the temperature, we're looking at global

phenomena that are going on. And we look at some of these species to tell us something about what the impacts are with respect to these, these huge global issues.

Raymond Tarpley [00:37:47] We would see the occasional unusual human interaction such as a gunshot, even the harpooning of dolphins. One instance where the National Fisheries Service, a law enforcement division, found some shark hunters up from Mexico actually were harpooning dolphins in U.S. waters to get the meat, which is very rich on these dolphins, can use that as bait to catch sharks. And of course, sharks had a market, in part, the dorsal fin for shark fin soup.

Raymond Tarpley [00:38:46] So you have, sometimes the competition between dolphins and the shrimpers, like getting caught in shrimp nets and that sort of thing. So there was were some anthropomorphic, anthropogenic, causes of dolphin mortality sometimes. And sometimes it was more subtle than that and may be associated with chemical pollution along the coast. We were are always interested in agricultural runoff, chemical industry runoff, and those sorts of things. But it was something that we couldn't pursue as we want to, collecting number of species of relevant tissues, but running those tissues - very expensive. And it's hard to separate point-source pollution from general source pollution. So it's very, very hard to get the precise answer that you want to get.

Raymond Tarpley [00:39:47] But we thought that setting up the network allowed at least an infrastructure that was in place that should events conspire, whether it be chronic events or acute event, that we might have a way to get a more organized situation, to analyze the response of the marine mammal population to the insults or whatever hit.

Raymond Tarpley [00:40:21] At that time, the dead zone was not as big as it is now, at the mouth of the Mississippi River, so we weren't able to make any link there to the dead zone. So it is probably more likely now to happen at the dead zone, increasing about the size of New Jersey every year as the Mississippi and Missouri River watershed collect from the big farm belt as well as urban centers drain in excess nitrite, nitrates and phosphates, causing algal blooms and deoxygenate the water and have a knock-on effect on the marine life in lower Louisiana and spanning all the way around the Gulf, including over to our side in Texas. But that has increased over time. It wasn't quite as bad in those days and we never picked up a link between those two.

David Todd [00:41:30] So it sounds like a a real puzzle, a riddle of, that you were doing forensics where oftentimes it was difficult to get beyond that the first evidence of what might have happened, and then hard to get back to some of the root causes. Is that fair to say?

Raymond Tarpley [00:41:50] Yeah, that's absolutely true. This is multifactorial like, like a lot of things. That's what, you know, we're finding these knock-on effects that trace back to root causes. And there's the concept of One Health, which has evolved in recent years, started going in 2003, One Health being this exploration of the links between human health, animal health, ecosystem health and involves a lot of complexity. But one of the tenets of One Health is to get at root causes. And that's really the primary goal, because the more you can know about what the inciting cause of something, the farther upstream you can work in mitigating that that effect.

Raymond Tarpley [00:42:49] The usual example is in human medicine would be diabetes, for example. We spend a lot of, a lot of money and then time and effort treating type 2 diabetes in humans with insulin. And that's, that's very expensive. And it occurs after the

disease has manifested itself so that the person that is diabetic is suffering and having a lot of effect. But if, to the extent you could control the development of that diabetes by exercise, and food, you know, lifestyle choices, and prevent that expression of the disease, then you spend less money and you achieve less suffering. So the whole idea of One Health is to look at some of the complexity of holistic aspects of disease cascade and try to do something about it early on before it manifests itself, and becomes a clinical triage, emergency situation.

Raymond Tarpley [00:44:00] So that that concept can be spread across the world right now as we look at what, what is, what is the cause of climate change. Is it excess emissions of greenhouse gases and what does that do to the atmosphere? What does it do to the ocean and heating the ocean, or lowering the pH of the ocean? What's it doing to coral reefs? It just has these chain effects all the way around. So it may be that our best hope of trying, if we're interested in trying to maintain a stable ecological environment, is to look at canaries in the mine and dolphins coming up on the Texas coast or wherever might be looked at as canaries in the mine. But the ideas cannot say, well, this animal had pneumonia and drop it and walk off. The idea is to continue to ask probing questions and try to start picking up patterns. Take it, it's almost like crowdsourcing. It takes a lot of data to pick up the patterns, sometimes. Well, what's really going on here, the root causes precipitating what we're seeing here and analyzing on the front line so that, you put it very well, that's exactly what's going on, trying to pick up patterns by looking at little snapshots of things and trying to reason them back to root causes. If there are any, there might be several root causes. But if among those root causes are things that we as humans are doing that we shouldn't be doing, then we need to have data to, to underwrite that assumption and try to remedy what we're, what we're doing that needs to be improved on, if we don't want to have these knock-on effects. So when we have animals come up that are reflective of something that's going on anthropogenically, then we need to pay attention. Like a lot of times it takes a lot a lot of data over a number of years to really realize what that canary in the mine is, is telling you, and this is what we're trying to encourage veterinary students, I guess, to become a part of now, is this bigger team of global forensics, if you want to put it that way, or verterinarians call it, to try to understand how we can maintain an ecosystem that otherwise seems to be wobbling right now, destabilizing because of human activity.

Raymond Tarpley [00:46:52] So when we began our workshops called MARVET, Marine Veterinary Medicine, the initial idea was looking at marine mammals as individuals because not many of the courses were looking at that. And then as we went along, we realized that, well, these animals are actually part of a bigger environment and ecosystem and they are expressions of that ecosystem, and that ecosystem has to be intact, if they are to thrive. So we started looking at sea turtles and sharks and other species that are part of this. And it becomes increasingly complex and nuanced. And that's when you have to, as you say, start getting data and data and data to pick up patterns that lead us back to the ultimate cause of health dysfunction, whether it be to human health dysfunction or animal health dysfunction or ecosystem help dysfunction.

David Todd [00:48:02] Well, when you looked at this pattern of data, these hints and clues from various strandings, back in the 80s, what were some of the things that you, the questions that you might ask as knock-on follow-up questions about why the ecosystem in the Gulf was maybe de-stabilizing, was wobbling, as you put it. Were there things that you were suspicious of or thought might be good things to explore further?

Raymond Tarpley [00:48:36] As far as human interactions, you know, climate change, wasn't on the radar of my awareness back in the time James Hansen was doing testimony to

Congress in 1988, when the idea of global warming really came before the public. So I wasn't looking that far, far upstream. I was just thinking about things that we might be doing to the environment that were detrimental and which might show up in a coastal animal such as the bottlenose dolphin. And one thing that's been going on for a long time has been the chemical industry in Texas, and our local industry in Texas, and we have a number of major river systems then along the coast that are reflective of what's going on farther inland. So I always, from the first was looking to these animals to tell us something about the environmental toxins that they might be pulling in. There are, of course, a number of those. Some are organic, some are inorganic. In theory, these would be excellent animals to serve as sentinels for that type of anthropogenic stress because they are, as I mentioned earlier, eating high on the food chain, as we are. So in one sense sharing the same food that we are, and it's sort of reflective of what we're taking in, when we see what the dolphins taken in. So depending on what toxin we were looking for, so what tissues we might analyze. So we might test liver. Or we might collect kidney. We might collect blubber or the fatty substance in the forehead of the dolphin, because these are going to attract, you know, fat-soluble compounds.

Raymond Tarpley [00:50:51] And we explored it a little bit, in terms of collecting the tissues. And that was not a problem so much, they were, they were collected and frozen. As I mentioned, the problem was lack of funding in terms of being able to analyze the tissues. We had toxicologists here at A&M and in private labs that could easily run the tests. But we couldn't afford them. So the answer lay in wait, you know, in freezers because we couldn't pursue the questions that we had, and thought legitimate to ask, which is, to what extent is human industry causing a chemical footprint that is detrimental along the Texas coast and to what extent do the animals that are feeding along the Texas coast, such as the bottom of Gulf and high on the food chain, serve as canaries in the coal mine, with respect to this chemical pollution.

Raymond Tarpley [00:51:59] So I think it it's a valid idea, and certainly been pursued in different places, in different parts of the world over time. But it is very expensive and it was too expensive for us to go beyond the infrastructure. We had, we had an infrastructure there that could collect the animals and collect the right tissues, and ask the right questions. But we didn't have the funding to take it as far as we needed to, to really come up with the answers, whether it be point-source pollution or more general pollution. Lot of shipping traffic, a lot of dumping of ships as they come into port and that sort of thing. A lot of opportunities to legitimately ask the question but the stranding networks were just woefully, woefully underfunded. So we didn't have the opportunities to do it like we'd like to.

David Todd [00:53:11] Well, this time that you're describing, I guess, would have been almost a generation ago, in the 80s. And I'm curious if, if you could speculate about how some of those factors and concerns then, might compare with those now for marine mammals like the bottlenose dolphins on the Texas coast.

Raymond Tarpley [00:53:40] Well, you know, it's common sense to say it's not only increased, we had, we had the Deepwater Horizon in terms of oil, come up. It was sure such an acute event with, with the oil, with the wellhead, spewing for months. It just put a lot of, overloaded the system with petroleum and in sort of an acute sort of way. And I think there have been those who have found some evidence that sea turtles, dolphins and certainly fisheries along the coast have suffered and that fisheries along the coast have suffered. And the dolphins are eating at that level. And it's very likely they are, they're going to suffer. So there's been a lot of mortality, but I've not followed it closely enough to know know the numbers. A lot of big data are being collected not only, I would hope, by the continuation of

the Marine Mammal Stranding Network but also archived to some extent with the National Marine Fisheries Service in Silver Spring, Maryland, where a lot of these data can be found in terms of numbers. It's working in Florida in the wake of this, there was a certain amount of funding that happened with respect to the court settlements with British Petroleum that funded projects that otherwise would never have seen the light of day because it was in the 80s with us. There was no money for it.

Raymond Tarpley [00:55:18] The sad part of it is that the money became available because there was an environmental disaster and there's always this problem of baseline data, so when you do the studies after the disasters occurred, you always say, well, what is it like, what would we have found, pre-disaster? Pre-disaster, there wasn't funding, so the science wasn't wasn't done to the extent to which it could have been. And then once the funding was available, then you have to say, well, what's the cause and effect relationships? So it gets really, really muddy because of the funding cycle is out of sequence with what we need to be doing in terms of ecological understanding. So had we had money in the 80s to establish baseline information in terms of these chemicals that the dolphins were accruing in their bodies, particularly the male, because at least in terms of leukocytic compounds and the males are going to accumulate those throughout life. Whereas the females tend to dump the leutocytic compounds into the milk, into the baby. So there's a gender difference in what we test. Since marine mammals are kind of few and far between, it takes a long time to build up patterns, but we didn't have that opportunity to establish some of that baseline data. So now there are more studies going on than ever before that might attest to environmental problems, whether it be oil spills or an enlargement of the dead zone at the mouth of the Mississippi River. But it's after the fact, in some ways. It makes it hard to make comparisons to data that don't exist because of funding prior to the disaster.

Raymond Tarpley [00:57:31] So I think there's some things to explore out there. I haven't kept abreast of a lot of them, since the since the late, late 80s. I had to leave the Network. It was mainly something I was doing as a graduate student at A&M, and then once I graduated then I needed to be on to do a post-doc, which interestingly, was with Dr. Ridgway, who's done that classic Marine Mammals: the Sea. About the time I was graduating from veterinary school, San Diego with the Navy, we were looking at anatomical, but particularly with the bottlenose dolphin, not necessarily associated with the environment, and certainly not the Texas environment, so.

Raymond Tarpley [00:58:30] Well, that makes me wonder when we first started this discussion, you said that that in the early 80s, and I guess maybe before, there was a lot of interest in dolphins, and maybe marine mammals in general, for their kind of higher-order physiology and mental abilities and social aspects, and I was wondering if you could maybe describe a little bit about what you see now, looking back, about their sort of, abilities and biology, that we didn't know a generation ago?

Raymond Tarpley [00:59:15] Well, they, they were an exciting group, during the, during the 60s, because so little was known and they were just coming before the awareness of the public. They already had some visibility within the scientific community, but there were a number of attributes with respect to their unique physiology, that probably plateaued off around 30 million years or more, but the cetaceans date back probably 60 million years, 55 or 60 million years ago, about the time the dinosaurs were going under, these guys were stepping back into the sea and evolved from there. So these are really, really ancient animals. Even the modern dolphin goes back a ways.

Raymond Tarpley [01:00:04] So it's been doing this fine dance with the, with the environment for a long time, fine-tuning some very exceptional properties in terms of physiology. And one of them, of course, was their echolocative ability, which was discovered in the 40s by a very astute biologist at Marine Studios in St. Augustine, in Florida, where they were actually trying to capture the dolphins and they were using nets and these nets would vary in the size of their mesh and this very astute person out there in Florida noticed that when the mesh in the net was narrow and it was a denser net, you might say, that the dolphins were able to avoid it. And when, when the mesh was wide and large that they seemed to get ensnared with the net, and he speculated that this, that they were actually able to put out a sonar signal to bounce off the net and detect its presence and the higher the mesh, the easier it was for them to do that. And so that was very prescient and turned out to be the case, and that was the initiation of our knowledge with respect to echolocation and dolphins.

Raymond Tarpley [01:01:45] And even in the 50s, more and more work was done on echolocation in dolphins. They were tended to be called porpoises in those days, rather than dolphins, because there was a fish called the dolphin and the scientific community wanted to, didn't want to confuse the two or conflate the two, so they were called porpoises. But in the late 50s and 60s, a neurologist named John, John Lilly published some books, one in 1960, "Man and Dolphin", was able to popularize the term dolphin in the public mind. And so eventually the public's perception of what a dolphin was, a name, won over. And we now call them dolphins and we reserve the term porpoise for about six species of cetaceans that are still extant in the world today.

Raymond Tarpley [01:02:54] But Dr. Lilly's fascination was with the large brain and his imagination may have run away with him a little bit. But he did create a lot of excitement. And during those sixties, sixties that Dr. Ridgway, who graduated from A&M, as I mentioned, in 1960, had gone out to California and was serving in the military, as air force veterinarian, when researchers at the Navy's facility at Point Mugu, California - missile researchers, torpedo researchers - became interested in dolphins, asking the question, why dolphins could swim as fast as they can, wanting to design torpedoes that could reflect that type of conpetency in the water with low friction. And when they had one that had gotten ill, they just reached the closest veterinarian that they could think of. And since they were military, they reached out to the military veterinarian, Dr. Ridgway and his whole career came about from that.

Raymond Tarpley [01:04:11] So he was interested in the dolphin brain. the the time, Dr. Lilly was also interested in that. So there was a lot of excitement and mystery going on with respect to the dolphin brain, what they use it for. We know their echolocation abilities are exceptional. But we still don't know, as far as I know, people have their theories as to why the brain is, needs, to be as large as it does. These are large animals, but the brain-to-body ratio is close to that of a human. Whereas you can have other marine animals like the whale shark. Huge, huge animal, 30, 40 feet in length, but has a brain the size of a macaque monkey. So the brain-body ratio is not being driven by necessity in the marine environment. So there's something unique about that. Nature just doesn't do anything spuriously, for fun. You know, there's usually some some very pragmatic reason that things evolve the way they are. So one thing we can be sure of is there is a very good reason that the dolphin has such, such a large brain. And people have speculated it might be for acoustic memory because they're operating at a genius level when it comes to echolocating ability. And maybe they are not only able to see the sound, but to be able to retain these memories and so on and so forth. But nothing has been completely elucidated on this.

Raymond Tarpley [01:05:56] One interesting aspect of their brain has come about is they're able to sleep one half of the brain at a time, which opens up all kinds of interesting questions. You know, how do they, how do they do that? But you can see one that might be adaptive in terms of nature in that these animals can't go down and take a nap. You know, they have to continually swim. So there has to be some sort of level of cognition even when they're resting. So the idea is that they can flip back and forth between one side of the brain or the other.

Raymond Tarpley [01:06:38] So a lot of those things were coming about and and being learned, and a lot of fascination. Dr. Ridgway continued to work on dolphin brain type, type issues, focused a lot of information on that. He's retired now from the Navy that he's still publishing out there in San Diego and is the first really full-time marine mammal veterinarian who has become famous for that.

Raymond Tarpley [01:07:11] But despite all the studies that have been done, the mystery still sort of remains. So he has the big brain, he has this echolocation ability, even the exact place, anatomically, was at echolocative signal was being produced is still in question, and Dr. Ridgway is still working on some of the anatomy out there with respect to the unique nasal sac system that they have. A lot of people have worked on it and that was a mystery for a long time because a European school of thought was that these echolocative signals were being produced in the larynx. And that was sort of logical because that's where we, you know, other mammals, produce their sound. But Ridgeway and others maintained that the signal was actually coming from the forehead, from the skull. And that turned out to be the correct idea, but these specifics of that are still being worked out. So not only this genius ability that they have to to produce and interpret sounds, but what they're doing with the large brain is still, still a mystery.

Raymond Tarpley [01:08:40] They're very social animals and social animals oftentimes tend to seem, very crudely, to have larger brains for whatever reason, you know, might be, association might exist. But when it gets right down to it, the mystery is still there.

David Todd [01:09:03] Well, it seems like such a puzzle. Thank you so much for telling me just a small part of what you know. Is there anybody you might suggest that I should talk to, to to find out more about the dolphins on the Texas coast and their stranding history?

Raymond Tarpley [01:09:26] Well of course, the Texas Marine Mammal Stranding Network, as far as I know, is still going forward. You might contact them. I don't really have the contacts there myself anymore. This is, we know, you know, in the late 80s, we actually turned into a non-profit. So I guess it still exists as a non-profit. I really haven't kept up with it, but they would be one point of contact. And then, of course, as I stated, the national repository of all this information, is National Marine Fisheries Service, NOAA, the division of NOAA in Silver Spring, Maryland. And they would be an appropriate one to start with, which might feed back to the various sources. I'm looking now so far the data is just the raw data, point of stranding has occurred. And they keep up with the unusual mortality events, they call them.

[01:10:38] Irrespective of whether the mystery was ever, ever solved, there are, you know, many things that have gone on in the interim such as morbillivirus, that we didn't know about in the 80s, that turns out to be responsible for about mortality of about 50 percent of the bottlenose dolphins on the Eastern seaboard. And actually it was misdiagnosed at first as a biotoxin again, a flavotoxin. And although that could be a subcomponent what was going on, it was really some analysis by the Armed Forces Institute of Technology in D.C. looking at tissues that were put back in the lungs that actually uncovered this morbillivirus.

[01:11:38] So now we know that it's pretty widespread and it created a little bit of a difference in terms of logistics, the strandings, because now, for example, in SeaWorld in Florida, Orlando, would take in strandings. And when morbillivirus reared up, they didn't want to take the strandings anymore because of the contamination of their collection. So other entities like Mote Marine Lab started taking in the strandings. So it's a very nuanced and complex evolution of data gathering and finding that have occurred over the years. So one of the constants, fortunately, because of the Marine Mammal Protection Act of 1972, has been this mandate to gather information nationwide on marine mammal stranding events, primarily cetaceans, and so fortunately there is a database that has some reach back in time. It's being housed in a National Marine Fishery Service.

David Todd [01:12:50] OK, well, this has been super helpful. Is there anything you'd like to add about, you know, your, the lessons that you took away from your activity with dolphins in the stranding studies and necropsies and rescues?

Raymond Tarpley [01:13:08] Well, for me, it's just the way leads on the way, and for me, the pathway has led to an increasing appreciation of natural ecology and the fragility of it and knowing that there can be global events, some of which humans are precipitating, that can have downstream effects that are expressed finally in one species, species or the other. Coronavirus coming out, you know, toxic emerging infectious diseases can disrupt the environment. So, the lesson to me, it was sort of my doorway into appreciate, appreciate the fragility of global ecosystems and how black swan events, you might say, can come in and prove disruptive and have impacts globally.

Raymond Tarpley [01:14:17] So I still believe strongly that the stranding network can serve as a window into ecological disruption and dysfunction. And if that disruption turns out to have human causation, then it gives us reason to want to try to remedy it through smart policies that reflect the science and of what we know, whether it be biodiversity loss, global warming, agricultural practices that are not sustainable and not regenerative of the soil. That's been the biggest lesson to me, how interrelated all these things are and they're really not regional anymore. They're, they're global. And the bottlenose dolphin, since it is largely a coastal, coastal group, it is well positioned to tell us something about the health of the coast. And we know that the health of the coast has declined over time with increasing pathogenic inputs, whether it be farming, chemical, ships, blowouts. It's all, it's all related and we look to various species to tell us what we're doing, right or wrong. And the bottlenose dolphin is one of the best canaries in the mine, I think, with respect to our coastal environment, perhaps lead us to more informed policies going forward.

David Todd [01:16:27] That's really helpful. Good insight and so useful for me and I'm sure a great addition to the archive. So thank you, Dr. Tarpley for this. This has really been a wonderful thing you have done. Thank you for your time and I wish you well. And I'll get back in touch with you. We will prepare a transcript and share that with you. And again, best wishes and many thanks.

Raymond Tarpley [01:16:55] Yeah. Yeah. Thank you for taking the time and for the interest. If there is any anything specific you can think of that I might be able to track down that I just can't recall or don't have the data myself, well, please let me know.

David Todd [01:17:11] Thank you so much. All right.

Raymond Tarpley [01:17:14] OK.

David Todd [01:17:14] You take care.

Raymond Tarpley [01:17:15] OK. Bye bye.