Stephanie Scull-DeArmey: Here we go. Testing, testing. There we go. This is an interview for the Maritime and Seafood Industry Museum and the University of Southern Mississippi. The interview is with Mr. Wilber Seidel. It is taking place on Wednesday, April 21, 2010, at 10:30 AM in Ocean Springs, Mississippi. I'm the interviewer, Stephanie Scull-DeArmey. First, I'd like to thank you, Mr. Seidel, for taking time to talk to me today. I'm going to get some background information about you, which is what we usually do in our oral history interviews. So I'll ask you, for the record, to state your name, please.

WS: My name is Wilber – W-I-L-B-E-R, Seidel – S-E-I-D-E-L.

SSD: When were you born?

WS: August 15, 1939.

SSD: Where were you born?

WS: In Luling, Texas.

SSD: How do you spell that?

WS: L-U-L-I-N-G. I lived most of my initial years in Beeville, Texas, which is north of Corpus Christi, so I was near the coast.

SSD: Just like the bees that –

WS: B-double-E-V-I-L-L-E – [inaudible].

SSD: – that fly in your [inaudible].

WS: General Bee from the Confederacy.

SSD: [laughter] I thought maybe there were a lot of bees there.

WS: No.

SSD: So, how far from Corpus Christi?

WS: Forty miles, I guess.

SSD: Sounds like a beautiful place to grow up.

WS: It was quiet. It was ranching country, mostly, so large ranches.

SSD: And your current position?

WS: I'm retired.

SSD: Great. When you retired, what was your position?

WS: I was the division director at the laboratory in Pascagoula, Mississippi. We have actually three divisions, and I was one of the three division directors in charge of the gear research and fishing surveys division.

SSD: That was for the National Marine Fisheries Service.

WS: For National Marine Fisheries, the Southeast Fisheries Research Center.

SSD: Well, we'll just jump into the questions that the museum asked us to cover. I meant to ask you before we got started how much time you have today.

WS: Whatever you need.

SSD: Well, great. That's one of the joys of retirement, I guess.

WS: Yeah, it is. I'm not on any schedule anymore.

SSD: [laughter] What role did you play in introducing TEDs [turtle excluder devices] to the shrimping industry?

WS: I was the director of the research program to develop and introduce TEDs. I was given the program from the very beginning, organized and set up the program, and conducted a lot of the early research on TEDs and its testing and evaluation on commercial shrimp boats. So, I was the director throughout the TED program.

SSD: Can you kind of paint a picture of what a typical day would have been like for you during that time?

WS: It's a while back. [laughter] The group that I supervised was composed of fishery biologists, gear specialists – which were generally ex-commercial fishermen from different backgrounds – and some technical people – engineers. We were organized into a group that could dive, do underwater photography, remote-control vehicles, whatever, to evaluate fishing gear underwater, where you could actually see its performance and how it's working and what you needed to do to improve it. So we dealt with a variety of issues. You want me to go into the early days?

SSD: Sure. Yes.

WS: When I first went to work for the Fisheries – National Marine Fisheries Service lab, the base was called Exploratory Fishing and Gear Research, and it was oriented toward the commercial fishing industry to assist them in finding new resources that weren't being utilized, expanding the fishing grounds – we did surveys all the way down to South America – and overall doing gear research to improve the gear. So we worked on things like electric shrimp

trawls, high-voltage electrical attraction systems to attract fish and some of the higher-technology stuff at the time, as well as looking at normal gear efficiency – how to improve nets and doors and the overall performance of fishing trawls did some midwater trawling to try to catch some species in the Gulf of Mexico that weren't being utilized. So the day pretty much revolved around one of those kinds of subjects. Then we did everything from designing things in the laboratory to conducting diving operations where we actually put out the fishing gear and dropped down on it and crawled around on it, looked at it, and photographed it, so we could better see how it actually worked underwater, so we could make the modifications, changes – whatever we needed to make.

SSD: Did you do any diving yourself?

WS: I did.

SSD: Yeah?

WS: Yes.

SSD: Out here, in this murky water of the Mississippi Gulf Coast?

WS: Yes, we did some out here. But most of the real evaluation-type stuff, we would go to clearer water, usually around Panama City, Florida, or someplace. It was pretty easy to operate there. We could take our boats and gear and everything over. We had a laboratory there in Panama City. So we did a lot of the photography and clearwater evaluation of the gear in clearwater areas rather than out here in the dirty water.

SSD: Where you can't really see?

WS: You can't really see. So when you need to make a change or improve something, you really wouldn't be able to evaluate it very well, so we did use acoustics, like sonar and stuff, to look at the gear. But an actual view or photograph of what's going on is much better.

SSD: So the sonar would not be anything but representatives dots or blobs on –

WS: Well, over time, the sonar got better. It actually was scanning sonar, and it would actually paint out the whole net, and so you could see a silhouette of the gear and the net. We used it a lot in the midwater trawling work to position the net in the water column so it could intersect a fish school as well as to maintain a monitor of how the gear was performing.

SSD: Now, for the record, what is a water column?

WS: Water column's from the surface to the bottom. Regardless of where it's at and how deep it is, you basically call that the water column.

SSD: Anything else about the role you played in introducing TEDs that you'd like to put on the record?

WS: As the director, then my boss was Harvey Bullis, who was the Research Center Director in Miami. We all knew the fishing industry representatives pretty well from working with them on fishing gear. So when this issue of the turtles came about – along about 1977, it started to become an issue because the Endangered Species Act had been passed in 1976, I think it was. The shrimping, unfortunately, occurs – or certainly, the opening of the shrimp season generally occurs when turtles are nesting on beaches. Shrimping's a relatively shallow-water operation, so the large female turtles come in to lay their eggs, and that's when they're most vulnerable to the shrimp trawls. So environmentalists' solution at the time was simply to close those shrimping grounds to shrimping during the seasons when the female turtles were coming in to nest. That certainly would have been a major impact on the shrimp industry. So we had this gear research group. There were two others in the country oriented toward the problems of those regions, one in Seattle and one in Woods Hole in the Northeast, and we had one here in the Southeast to look at these kinds of issues. So the Southeastern Fisheries Association and the Texas Shrimp Association approached us and said, "You guys do a lot of work. It seems like you ought to be able to come up with a way to keep a turtle out of a net." Turtles that are vulnerable to shrimp trawls usually are quite large in the normal shrimping grounds as opposed to a small shrimp. So we felt like we could solve the problem. So, Mr. Bullis said go ahead and organize the program, get it set up and funded. So, I did. We started to work cooperatively with these two associations. The approach that it took was to do all the testing on commercial shrimp boats because that way, the data – whatever is collected on the turtles and/or the shrimp loss, if there was any, or whatever impact our devices had on the operation of the shrimpers would be representative of what's happening on a commercial boat. So we would develop the gear, whatever it is, whatever kind of turtle excluder device we were wanting to test, and then put it on a cooperating commercial shrimp boat and hire observers to live on that boat and collect the data. We trained them on the data we needed collected on shrimp catch, bycatch, sea turtles, and the overall operational problems. We didn't have much problem getting cooperating commercial boats back then. The Texas Shrimp Association and the Southeastern Fisheries Association then were quite supportive, so they had a number of members that worked with us and didn't mind working with us. We would install then – some of the boats towed two nets, some boats towed four, and so the captain would choose which side we would put our test gear on. We would modify the nets on that side to exclude the sea turtles and leave the other side unaffected, and he would operate like normal. During the first three years, when we were testing a variety of approaches, we did guarantee there would be no monetary loss to the boat, so we set up funding through those two associations. If the catch was less on our test thing, we paid the difference between what the boat caught on their unmodified nets and compensating them for that difference. So they didn't have any monetary loss during that period of time.

SSD: For the record, a couple of things.

WS: Sure.

SSD: We were talking about associations and commercial fishing. For the record, what was the purpose of those associations? Who organized them, and who belonged?

WS: They're representative organizations – just like a teachers' organization or anything else – to deal with issues that would impact that industry. They tended to be regional. The Texas Shrimp Association represented shrimpers off Texas, and their membership was purely Texas shrimpers. The Southeastern Fisheries Association represented Georgia, South Carolina, a little bit of North Carolina, a little bit of Florida. They had more fisheries than just shrimping. Of course, we do in the Gulf, too, with oysters and things like that. But in any case, they would then deal with whatever issue might impact their membership. So in this case –

SSD: And this was one? [laughter]

WS: And this was one. It was going to be a big one if it was – when they started the legal actions and all after the Endangered Species Act was passed, they were largely successful, whether it was Tellico dams or snail darters or porpoises, whales, whatever, the law said you shouldn't do it. So potentially, they may very well have been able to close some shrimping grounds, seasonally, at least, to protect sea turtles. So we felt like there was a gear solution to that as opposed to a regulatory solution to that, and we could solve it.

SSD: Yes. A lot less loss with a gear solution than no shrimping.

WS: And it was acceptable to both groups. Environmentalists didn't care how we protected the turtles. The shrimpers didn't want to lose their livelihood.

SSD: Now, off the record, we were talking about how the smaller turtles don't live on the bottom as much as the larger turtles. Could you just kind of put that on the record that kind of narrative that –

WS: Sure. One of the reasons we felt that we should be able to solve this problem with shrimp grounds is that the turtles that are normally caught in shrimp trawls are the larger adult turtles. The small turtles, when they're very small, I'm told by the turtle biologists – now, I'm an engineer, but the very little turtles stay near the surface of the water, within maybe three feet of the surface, for the first year of their life. Then, even the next several years, they're more pelagic, meaning they're closer to the surface. They feed on things near the surface. They don't go to the bottom. But as they get older, particularly turtles like the loggerhead and the Kemp's ridley and green turtles to some degree, they tend to get on the bottom and feed on whatever's on the bottom. Then they become vulnerable to shrimp trawls dragging there. So, as an engineer, that's my knowledge of it. But we didn't have to deal with small turtles in shrimp trawls. We had to deal with the larger ones offshore. Occasionally, in the state inshore waters, you might catch a smaller turtle in the shallow water. But most of the TED research was oriented to offshore and federal waters when we started this program.

SSD: For the record, what exactly is the difference in offshore and inshore?

WS: Most states have jurisdiction over the resources out to three miles. Texas is an exception. They have nine miles. The west coast of Florida has nine miles, going back to the republic days or whatever. The rest of it is a three-mile limit. Beyond that is federal waters.

SSD: Considered offshore?

WS: Considered offshore, correct.

SSD: Great. Well, how were TEDs viewed in the early days? The third question is specifically about how they were viewed by the shrimping industry. Generally, how were TEDs viewed in the early days, say, by your organization, by conservationists?

WS: From that viewpoint, they were very supportive because it felt like this was a non-confrontational solution if we could allow shrimping to continue and still protect sea turtles. So both the agency was all for it, the environmental groups supported it, and really, the major shrimp organizations did as well. So the proposal to work on this and develop the TEDs was not a problem in the beginning. We had a lot of support, had a lot of funding support from Congress. We, at times, had almost too much money.

SSD: Good problem.

WS: Well, it takes time to train people to deal with this. It takes time to train divers, different people to be able to crawl on nets and evaluate them, who know stuff about the fishing industry and their gear and all. You just can't go hire them from GE [General Electric] or someplace. So it takes a while. You have to get observers. I contracted for observers from Texas A&M and the University of Georgia, and the University of Florida. They provided mainly biology students under their contracts so that those observers then would live on the boats and collect the data. So it took a while to get it all set up so that we could evaluate our test gear at sea and collect the data we needed to show it worked or didn't work and how it impacted the shrimpers on their shrimp loss or whether there wasn't any loss. Then it took time to conduct that because the seasons are – I mean, the shrimping things are seasonal. You got a season off Georgia; you got a season off Florida; you got a season off Texas, a season off Louisiana. So you're limited to working during those seasons. You can't work year-round in those areas. South Carolina, North Carolina – it's all the same way. But we had no problem in the early days, had no problem getting boats to cooperate and allow the observers to live on them full-time and collect the data and test it. Like I said, early on, we did make sure there wasn't any monetary loss to the boat, so they had no reason to object to that. Now, that changed [laughter] as it looked like regulations were imminent.

SSD: So, was it voluntary in the beginning?

WS: All voluntary, yes.

SSD: All voluntary in the beginning?

WS: And we had the assistance of those directors of those associations that said, "Look, guys, you know, we need some boats to work on." They would do it. There's always leaders that are willing to do it. Then, in fact, after we had the TEDs sufficiently well-developed to show they were protecting sea turtles and they didn't have any real significant impact on the shrimp catch, we did pursue a voluntary acceptance program for about two or three years, and with the help of

the associations – and environmental groups supported that, too. They said, "We don't care whether you regulate it into use or whether they use it voluntarily." But it was more of a delaying action than anything. But a few boats tried it. We even built TEDs and gave them to some of them or let them use them for free. It wasn't pursued in any large numbers. So finally, environmental groups said you're either regulating it in place, or we're going to have to go to court and force the agency to enforce this because the TEDs work. We have the data to prove it works. It'll stand up in court because it was all collected on commercial shrimp boats. We actually had thousands of tows finally of data. It wasn't a small dataset. It was in the major shrimping areas, from South Carolina on around to Texas.

SSD: Well, how were the TEDs viewed by the shrimping industry?

WS: The ones that worked with us and had observers on boats and tested the gear and eventually evolved to the better TEDs, the ones that became the models that worked, they really didn't have any problem with it. We never had the resistance to accepting TEDs on the East Coast that we eventually had in Louisiana and parts of Texas. So those areas didn't create a lot of grief in accepting TEDs. They didn't want to use the TEDs because it was an added expense, and it was something else that they had to pay attention to with their fishing gear to make it work right. So it was an imposition in that way. But overall, they didn't object. It wasn't until it looked like the regulations were coming and the Concerned Shrimpers of Louisiana director decided it was in his/their best interest to resist the TEDs and then it became a problem.

SSD: Do you remember his name?

WS: Tee John Mialjevich. Yes. I presented progress reports to his organization's annual meetings in Thibodaux and places. And we had shrimpers in Louisiana finally test TEDs for us – a few of them. But Tee John became convinced he could stop the TEDs and wouldn't have to use them for whatever reason. The directors of those other two main associations told him – I was there – and they said, "Tee John, this is the government that won the war in World War II." They didn't put it that politely, but they said, "If they decide we're going to have to, we'll have to use these." "Oh, no, I'm not going to use TEDs." He successfully put together a large organization – a lot of shrimpers from Louisiana, but the other areas too. So these other associations said, "Look, if we take advantage of this, maybe we can get some tax incentives, maybe we can get some financial assistance with these TEDs and all." "No, I'm not going to use TEDs." So rather than take a cooperative approach of some sort and try to get it minimized into the areas where they would have to use TEDs and/or get some assistance tax-wise or otherwise, he fought it to the bitter end and ended up getting nothing out of it, unfortunately, because I think the shrimpers should have had some incentive provided because it was a major change in their operation. You can either have a cheap TED, or you have one that costs a little more. The ones usually that work the best cost a little more. So it impacts your operation. Why not? We have tax breaks, certainly for a few years, to introduce things. So it's unfortunate, but that created this attitude of we're not going to use TEDs. It still wasn't bad on the East Coast, but it began to spread through the Gulf. So then, we had to go through all the public hearings and information sessions. I provided gear specialists to go to these towns and show them how the gear was built and how it's installed, how it's used. We'd troubleshoot it. We'd go out on commercial boats if they had problems and just did everything we could to try and ease it into the industry and make

the transition as easy as possible. Eventually, it became an enforcement issue to make it work, unfortunately. So it was an interesting process. It could have gone better, I think, except for – the Concerned Shrimpers of America they became.

SSD: Concerned Shrimpers of America?

WS: It was originally the Concerned Shrimpers of Louisiana.

SSD: Now, some people think that Mialjevich was motivated by making a salary by being the head of that organization. What do you think about that?

WS: I'd just as soon not get into that. He wasn't the most successful shrimper. We'll put it that way. I don't know. I'm not getting into that.

SSD: That's fine. You can decline any question that you wish to.

WS: [laughter] Yes. I don't want to go on the record criticizing him. I don't even know where he's at anymore. I don't know whatever happened. I think his organization's dwindled to pretty much a very, very small one if it still exists.

SSD: Right. Well, how do you think they're viewed today by the shrimping industry, the TEDs?

WS: My guess is – I've been retired eleven years. I kept up with it a little bit until Hurricane Katrina almost washed us away, and then I spent the next two and half years rebuilding. So I got separated, and I didn't keep up with it as much. I think it's probably resignation more than anything. If you drive into Ocean Springs harbor, the Biloxi harbor and all, you'll see TEDs in the nets. There are some boats exempted from TEDs for the inshore waters and –

SSD: Now, why would they be exempted?

WS: Generally, they're boats that tow these things called butterfly rigs. They evolved from the Vietnamese chopstick rigs – they call them – where they push the net, sort of.

SSD: Oh, I've heard them called skimmer nets too?

WS: And skimmer nets and whatever. But the nets are used differently than the regular towed trawls. And you can pick up the bag, the codend, the catch, and dump it anytime you want, without picking up the rest of the gear.

SSD: So you can actually pick it up while you're still catching shrimp in the front?

WS: Still catching shrimp – right – which is a clever idea. So the Americans adapted it into the butterfly rigs – they call it – off the outriggers as opposed to two telephone poles crossed in front of the boat like the Vietnamese started with. I don't even think they use that anymore. But in any case, they had what they called a lazy line or a line you could snag and pick the bag up and

dump it anytime you wanted. So generally, boats in shallow water are smaller boats. They don't want big catches to have to try to pick up. Their gear's not as robust. So they do pick their gear up frequently. Generally, if you make tows less than an hour-long, we found that the mortality on sea turtles was pretty low. So they basically say we pick up the nets every thirty minutes or so and dump them. So they're exempted from TEDs. But that particular fishing method is limited to pretty shallow water – twelve, fifteen feet of water depth.

SSD: Probably not three miles out?

WS: Very rarely would the water be shallow enough that you could use that kind of a rig. So we felt like they would have a minimum impact on sea turtles. Sea turtles, as a rule, aren't inside in these shallow waters very much anyway, inside the islands. They do come in, but not very much. So we felt like that could be exempted.

SSD: Now, for the record, what is the bag? What part of the net is the bag?

WS: Very tail end of the thing, where the catch accumulates. Fishing industry term – it's called sometimes a codend, from the old cod-fishing days, I guess – those nets. But it's generally just known as the bag. That's where the catch accumulates, and you dump it.

SSD: All right. You've talked about some of the challenges faced in developing TEDs. Can you think of anything else you'd like to add to that?

WS: No, I think that covers it pretty good. There were a lot of challenges. But like I said, we had pretty good cooperation with those two major shrimping associations, and eventually, the South Carolina Shrimping Association as well. We met regularly with the Louisiana Shrimp Association, which was a separate group from the Concerned Shrimpers of Louisiana. Some of their members tested our gear, and we put observers on a couple of those boats. It was harder to get cooperation in Louisiana, but we did get some. Then, just over time, the change in the attitude with this little bit more militant approach that we aren't going to use them, along with a few other expressions. [laughter] But in any case, it kind of had to happen, I think, because the Endangered Species law is a pretty strong law and pretty much says, "Thou shalt not." So, as a result, you can't interpret it too many ways, legally or otherwise, and so it's been pretty successful. So far, they haven't weakened the law very much in Congress. So I think it was going to happen, one way or another. This was a solution that could be reached that kind of satisfied the two interest groups initially – the shrimpers and the sea turtle protection people. So, as a result, it was a good solution. It was a long process, and a lot of people thought it would never happen, but it did. It's, I think, an indication of you can solve some of these fishery problems through gear modification or other means as opposed to simply closing areas and saying, "You can't do this, and you can't do that." You can't solve all of them with the gear thing, but you can solve a lot. Unfortunately, the government's the only one in a position to fund and maintain that kind of group that's trained to do that over a long period of time. So, as a result, the Northeast region and the northwestern region have disbanded their gear group over time. The one here in Pascagoula is the only one left.

SSD: That is still funded by the government?

WS: It's still funded and still conducting this research. For how much longer, I don't know. Since I retired, they have dealt with the bycatch problems for red snapper and all and the longline issues of catching sea turtles on long lines – pretty successfully on the long lines, I understand. There's some issues with the bycatch. But unfortunately, there's been devices approved that aren't that good at separating some of the species, like red snapper. You can put in a position where – some of these holes and approaches that they use – where it doesn't lose shrimp, but then it doesn't get rid of the snapper either, so they can't find it to get out. So if you get rid of some of these other species of fish that you're targeting, like red snapper, you may have – they're small, they're in a very juvenile state – and it gets a little more complicated to not have some shrimp loss. So there's been some issues with that. I don't know the status today. But I think they're still pursuing some bycatch-reduction devices in nets. But gear can solve it. I don't know. Eventually, I guess, you solve most of the issues, and you don't need it anymore. But the Gulf of Mexico had a broader mix of species and all to deal with. So we dealt with it longer, and the government maintained this gear research to do that with.

SSD: I had a question.

WS: By the way, all this TED stuff that I had to deal with wasn't just domestic. Along in this process, the shrimpers went to their congressmen and said, look, if we're going to have to use TEDs, people – countries that sell shrimp to the United States should also have to use them if they have sea turtles. Congress agreed and passed a law that says, if you're going to export shrimp to the United States and you catch sea turtles in your waters doing so, you're going to have to protect them at least equal to what the United States does. So that basically said you're going to have to use TEDs.

So then we worked with the State Department in setting up – the State Department said, "This isn't fair to just dump this on these countries. They don't know anything about TEDs and how they're built and how they're used." So they said, "Could you set up a program to introduce them? Train them and show them how they're built and get them started in the countries." And we did so – I don't know – fifteen or sixteen countries.

SSD: Can you remember some of them? Which ones?

WS: Some of the big ones that did pretty well were Thailand. Thailand has a good enforcement group. We worked with China, Indonesia, India, in Asia, even went to Africa, Australia. Australia is probably using TEDs. They've got some really good fishery programs. In Central America, from Mexico down – Mexico, Guatemala, Nicaragua, Belize, Honduras, Panama, and then Venezuela, Colombia, Guyana, Suriname, Brazil – all these countries that have sea turtle problems. Sea turtles are generally found, I'm told, in waters inside the latitude thirty degrees. They stay within thirty degrees of the equator because it's warm water. North and south of thirty degrees, you don't find sea turtles, and the water's too cold. So the countries that are in that zone – not all countries have shrimping, but the ones that do tend to have a problem with sea turtles. Some of them use sea turtles as a resource to eat and all, like Nicaragua and Honduras, and some of those. It wasn't as hard dealing with the foreign owners and governments because they pretty

much saw how the TEDs worked. Most of the owners of boats in those countries are pretty well educated, and you could explain it to –

SSD: Is that right?

WS: They own fleets or several boats, and you don't have the same ownership/operator structure you do in the United States. But enforcement's a different issue. Unless a country has good enforcement and good intentions, they can cheat real easily. We made a lot of trips, and I suspect the gear guys still make a few – checking on these countries. I think the State Department actually embargoed several countries over time. They've lifted the embargos when they go back and say, "We're now using them again," and they show they are. But enforcement's a different issue. Today, with the Homeland Security stuff and all, I don't know how much is being done for it.

SSD: Now, just for the record, can you say why Homeland Security would have an effect?

WS: Well, we're focused, in the United States, more on that problem and drugs. The Coast Guard worked with the National Marine Fisheries Service enforcement agents in enforcing the TED regulations. The Coast Guard had a major role in it. We did training programs for their people so they'd know how the TEDs worked and what to look for and all. Then, cooperatively, our agents and their boats and all would board boats – shrimp boats and all – and enforce the TED regulations. I would imagine the Coast Guard has a pretty big role in this Homeland Security stuff now and probably putting a little less effort into enforcing fishing regulations, whatever they are. We're being a little less – a little more restrictive, I guess, on imports and a little less oversight on things like fisheries as opposed to worrying about whether there's a bomb and things and all. So I doubt that the State Department – and I don't know this for a fact. I doubt the State Department is putting as much effort into checking countries to see if they're using TEDs properly.

SSD: Maybe just a matter of manpower, you think?

WS: Manpower, money, interest – whatever. They're worried now about terrorism instead of turtles, so just that's the way it is.

SSD: Yes. Poor turtles. They're under so much pressure.

WS: They are. It's a shame because some country – one of the main areas where lots of turtles were killed was India. That east coast of India – I forget the name of the beach – Gahirmatha or something like that it was called – they have thousands of Olive ridleys nest there every year. There's these small shrimp boats that operate there continuously. Turtles wash up on the beaches by the hundreds there. We did workshops there a couple of times and – but India doesn't have the resources to enforce it and push it.

SSD: You'd think they'd market them. I mean, there're a lot of hungry people in India.

WS: Well, the Hindu religion [inaudible] –

SSD: They're vegetarians, aren't they?

WS: Well, that and sea turtles are one of their forms of reincarnation, so they don't technically want to kill a sea turtle. But what do you do when it's out at sea? So they don't eat them.

SSD: Well, they're sending them on to a higher life form, maybe, by killing them – but they don't eat them.

WS: But they don't eat them. So they don't eat sea turtles very much. Now, some of the other religions in India would. But they're the minority as opposed to the Hindu, so you have the religious issue there then.

SSD: That's so sad. Well, I've heard some people complain – why do the shrimpers of the US have to take the brunt of responsibility for the turtles' existence? But really and truly, it may come down to the United States being the last refuge.

WS: That could be.

SSD: Being their last hope, being the last hope of the turtles.

WS: That was certainly true of the one species. The Kemp's ridley is – it only nests, really – there's been some efforts to introduce new nesting on Padre Island and on Rancho Nuevo in Mexico. It's a Gulf of Mexico and South Atlantic turtle. So it was being killed in shrimp trawls and – as much as anything – eggs poached and all in Mexico and the turtles on the beach. But the numbers got down into the few hundreds left nesting. So every mature female Kemp's ridley that was drowned in a shrimp net was a significant part of the recovery. So that was the motivation of environmentalists and also the sea turtle researchers like Dr. Archie Carr and all them. They wanted to protect that Kemp's ridley turtle so that it could recover. And that had to be a US problem – I mean solution – because we were the problem, basically, our shrimping industry, and it's been successful.

SSD: Very successful.

WS: Yes. So then, together with the beach protection, the egg protection, and all the other stuff – species is coming back. So that one there was no choice; I think the US had to do that one. It may be true of the rest of them in a way, because of problems in the world. But some of the countries took this fairly seriously and introduced some management practices. Even Nicaragua limited the number of turtles that can be taken a year. I don't know how seriously they enforce it, but they do try some.

SSD: Do you think they market them there and eat them in Nicaragua?

WS: It was supposedly a subsistence fishery for the Miskito Indians, I think, or whatever.

SSD: For the record, what would subsistence mean?

WS: People that live off the land kind of existence.

SSD: And the sea.

WS: Land and sea, right. A lot of those villages near the water rely on the sea a lot for protein and stuff. But you still, I'm sure, see hawksbill turtle shell jewelry and stuff like that in some of the (islands?), but I don't think near to the extent that you used to see. And I don't know how many other countries limit the imports, but the US limits the imports of that kind of jewelry and stuff.

SSD: Gosh. We shouldn't be importing it at all.

WS: Well, we've stopped it if you catch it here.

SSD: Stopped it? Great.

WS: Yes. Right. But there's always this pre-act stuff that's still allowed a little bit. But mostly, it stopped, and so I think that, overall, that's had a positive effect on some of the sea turtle populations. But some of the areas that are really poor, these countries, that turtle represents income or food, and so it's hard to change that. So I don't know. At least, if we protect a large part of the populations in some of the areas – you may not have them everywhere, but you'd have a pretty good population still.

SSD: It's pretty exciting to have been a part of that, huh?

WS: It was fun. It's a little different career than a mechanical engineer usually pursues.

SSD: Yeah. Well, if I were you, I'd be very gratified that I could have –

WS: I was.

SSD: – worked to prevent the extinction of a species that's been around for so long.

WS: I was. I enjoyed working with the shrimp industry. We kind of became opponents as time went on. Even a couple – with the Sea Grant a little bit because they're closely aligned with the fishing industry, and they need to be. We used to be too. We really didn't get in this to take sides. The agency's taken sides, I guess, in a way, with regulations. But my particular group wasn't in it to take sides because we felt like we could find a solution, and we did.

SSD: You were the compromise makers.

WS: Compromise. That's right. So as such, then that was gratifying because we were successful in doing that.

SSD: So you save an industry and the turtle. That's so good.

WS: Well, yes, the shrimping industry has a lot of problems from fuel costs and whatever else, so I feel sorry for them because they struggle. Even when they have good years, it's like one in four or five. So it's a tough way to make a living. They all have competition from imports and aquaculture shrimp and all now. So there's a lot of issues they have to deal with besides sea turtles, so we're trying to make this one as easy as possible. I think, ultimately, it is. If you pay a hundred-and-fifty dollars a TED or something, [and] you got four nets, that's six hundred dollars. Well, you could put that on something else. You have to have a spare, probably. It is an aggravation. But as opposed to what was potentially the solution in the '70s and '80s of closing shrimp grounds, then it was a fairly small cost, I think. But nobody wants to spend money on something they don't want. [laughter]

SSD: Right. I'm thinking about how it spread throughout the world. If you had actually closed the shrimping grounds, that would not have spread throughout the world.

WS: No. No, that wouldn't have been a solution. Yes.

SSD: So that's a good thing too.

WS: It is. From the standpoint of the shrimper, sometimes the TED's helping. Some of the areas, like the Tortugas – the pink shrimp fishery there – they get into a lot of sponge and all. It actually dumps that sponge and all as well. So they have cleaner catches, and they actually can shrimp in areas they used to couldn't shrimp because of high densities of trash. So there is some benefit – not every area, but some areas. Yes, the TED can get clogged with a log – something gets caught in it, and they have to get it out, but the net gets clogged – a net without a TED gets clogged with that log too, so it isn't like it's that much different. But it does expel some other large objects, which is a benefit, in a way. You get a cleaner catch, and you don't have as much mashed or whatever when you dump the catch.

SSD: Right. The shrimp are in better shape.

WS: Better quality. So overall, I think it wasn't a bad solution. It kind of depends on your perspective, but I think, overall, it wasn't, really. I think most objective people will agree.

SSD: Well, one of the shrimpers I interviewed, Frank Parker, said that he thinks he actually catches more shrimp with the TED. He's an inshore fisherman and often was carrying stuff around in his net that he didn't want – debris and other species – and so he really thinks that it helps.

WS: Sometimes, when you get quite a bit, it will create an increased drag in the net. The drag closes up the doors, and you don't cover as much ground, so actually, you aren't catching as much shrimp. So it's possible, in certain circumstances, that it does allow you, under those conditions, to catch a little more shrimp.

SSD: For the record, what are the doors?

WS: That's the part that spreads the net open. They act as a kite. But they're large wood and metal structures. They can be made out of aluminum. They're rigged to function as a kite, and they spread and pull the net open.

SSD: As the boat pulls it through the water.

WS: Through the water – the water pressure and the drag on the bottom. They dig in, and they spread the net, and they hold it on the bottom so that it fishes properly.

SSD: Well, I think that we've thoroughly covered the challenges faced in getting the shrimping industry to use TEDs unless there's something you want to add.

WS: I think we've covered it pretty well.

SSD: So number six is how did the early TED models compare to later models?

WS: There were two approaches. Our first approach was to keep sea turtles out of the net completely. And that was with a webbing barrier installed across the mouth of the net, the opening of the net, and felt like fishermen were familiar with webbing, and we knew we could probably keep a turtle out. So if we could make that work, they wouldn't have anything inside the net. The sea turtle biologists that we talked to at first thought turtles might be a problem in a net; it'd get tangled up in there and get tangled up in the narrow parts of the net toward the bag and may have trouble getting the turtle out. So first year or so, we worked on barriers across the mouth of the net. It didn't work very well. It kept turtles out, but it was an operational problem. You had to fit each panel to each net and how the guy wanted to rig it to open and spread, and different sizes, and it was a tangling problem in rough seas and whatever. Those fishermen that tested that for us put up with a lot. We paid them for any loss, but they put up with a lot. So we scrapped that approach completely and said, "That's not going to work." So we started looking at this grid-style approach in the back of the net before the stuff gets to the bag or codend. With all the diving and everything, we actually released some turtles into the net, and we happened to fortuitously encounter a wild turtle one time while divers were on the net, and they found that the net's pretty rigid underwater. Just the water pressure against the webbing is quite rigid, and it wasn't a tangling problem. The scutes and all didn't get tangled in the net. So there was a thing called a jelly ball shooter in use in Georgia, and it was this grid-type device. They only put it in their nets probably around May. They have a white shrimp fishery over there, near shore, and it's open for three or four weeks, short period of time, but they [inaudible] over large shrimp, so they're valuable. The cannonball jellyfish show up at the same time, some seasons, in huge numbers, so they completely fill up a net. So they came up with that approach where they cut a hole in the back of the net and put this grid in there to shoot the jelly balls out. The way they did it, they were losing some shrimp, but they could shrimp.

SSD: And so they had some shrimp and some jelly balls, but not a net full of jelly balls?

WS: Full of jelly balls. Sometimes, five minutes, you couldn't lift the net; they'd be so thick with jelly. So we thought, "Well, that's not a bad approach to try with a turtle. Maybe we can rig it where the holes minimally open, and we don't have shrimp loss." That's when we switched

to the TED that's in existence today. The next things that have happened since then have just been variation. One guy thinks it should be bent this way, and somebody thinks it should be bent that way. But we collected thousands of hours of dragging data on the ones that we developed and had very little shrimp loss. The shrimp industry finally told us, at one point, "We're experts on the shrimp loss. You all stay out of that. You just show that it keeps the turtles out so that it'll pass that part of the regulation." So we did. We set up a program where, once every summer, any shrimper that wanted to bring his idea to our gear group – we'd install it in a net and take it to Panama City in the clear water and photograph it for him and show him how it worked and whatever and test it with turtles. We started the head start program – you've probably heard of it – in Galveston. They would grow turtles to one year old, sometimes two years old – a couple hundred – and we would exercise them, get them in shape, and then we'd take them and would release them in front of the net and see how they behaved, performed in the net, and test the TEDs. Well, those are small turtles that you actually rarely encounter in offshore shrimping. So if it works on a small turtle, it's going to work on a big turtle. Well, we had proven that pretty much with our offshore data. So we tested these devices and stopped worrying about shrimp loss with any of those devices. So there are some probably out there being used – the angle on the grid's too steep and whatever – and they probably cut the hole wrong; they don't put a flap over it, and they don't keep it tight – whatever. They probably have some shrimp loss. But properly used, they'll work well. They're all then a variation of that grid-style approach. So that's basically the two approaches – keep them out of the net with some kind of barrier, which wasn't too practical, or separate them out after they get in the thing, with this grid-like device, and that's where they are today.

SSD: How did you exercise the turtles?

WS: Put them in lagoons. I think the Galveston people even flopped the water around and whatever to help make sure – they'd put them in there a month or so, so they could swim around. They raised them in tanks – relatively small, restrictive tanks. So they eventually wanted them to be exercised a little bit anyway, so when they released them in the wild, they were in better shape to survive anyway. So they started putting them in larger lagoons and letting them swim around and just kind of feed them and naturally get in a little bit better condition swimming and all.

SSD: Oh, that's great.

WS: Then we would use those turtles. I don't know if they're even still doing that. Since Katrina, I haven't been up there and talked to them very much. We may be beyond that phase now, where we're not doing it anymore. But we did for seven or eight years. We offered this to any fisherman that wanted to come with a different idea and would let him tell us how to install it and use it and whatever – film it and show it to him and let him evaluate his idea.

SSD: So then, if it worked out, he had a copyright on it or a patent and could produce it?

WS: No, you couldn't patent this anymore. It was public information for so long – the basic approach – that if he wanted to go manufacturer one and successfully claim it was different, he could. There was one guy that had one – I forget what he called that one – it wasn't a patent, but

it was like a copyright. One guy did try to patent the TEDs, but well after all this was going – a guy from Georgia, and he wasn't –

SSD: Is it Sinkey Boone?

WS: That was him.

SSD: I'm doing an interview with Sinky on the phone on Thursday.

WS: Well, Sinkey claimed he invented the world. But he's all right. He sold quite a few TEDs. He went to a lot of meetings and all. But whether he pursued the jelly ball shooter, we pursued the jelly ball shooter didn't matter because it was not patentable anymore after that.

SSD: Yes. Not really intellectual property – something that's kind of infinitely reproducible?

WS: Yes. And it's already been demonstrated public knowledge for – I think the patent regulations say a year, then you can't patent.

SSD: Interesting. Now you have talked about experiences with protests against TEDs regulations. That's the seventh question. Is there anything you wanted to add to that?

WS: Not really. Like I said earlier, we did decide that we wanted to have public hearings. We'd go – somebody from the gear group – and we went everywhere from North Carolina to Brownsville and had meetings all over fishing villages to present the TEDs, how they worked, what we'd done with them, data and whatever, and hear the complaints and hear the concerns. There are always a lot of those, particularly after the Concerned Shrimpers got things pumped up. So some of those public hearings were pretty contentious – and some large crowds. I was at one in Thibodaux, Louisiana, at the community center there. Governor [Edwin W] Edwards, at the time, came flying in on a helicopter and ran and jumped on the stage and said, "Well, if it comes to coonasses or turtles, it's bye-bye turtle." [laughter]

SSD: That got him reelected.

WS: It did. [laughter] That wasn't the only thing. Anyway, it was kind of humorous. It was a lot of contention, but it was kind of unfortunate. Some of that didn't have to happen, but it did. So we endured it, and over time, it died out.

SSD: Did you ever feel threatened or frightened by it?

WS: I didn't personally, so much, because we were always fairly close to the shrimping industry. I hired people to be our fisheries method and equipment specialists from fishing backgrounds – Texas, Bayou La Batre, Alabama, Georgia. They had grown up in the fishing industry, owned boats – most of them – and knew the people. So they were still young enough to be known around. We didn't have too much on an individual basis. Then we worked with the boats directly, and they knew we were developing movies and a lot of stuff that they liked and could use. So no, I never felt too much. But there were a couple of times that there were some

people that did feel threatened, I'm sure. And there were people – a couple of those meetings, the enforcement agents unloaded guns off some of them at the meetings – and such as that – but personally, I never really felt too threatened. But they got pretty loud and boisterous at times. [laughter]

SSD: So maybe they were just venting, getting it off their chest?

WS: They were. It never came to any physical confrontation, so I think it was more venting and venting anger at government telling them what they had to do and that kind of stuff.

SSD: Yes. Fishermen seem to be a very independent lot.

WS: They are, and they want to be left alone. They like that lifestyle out there.

SSD: It's them and the sea.

WS: That's it. So I can't blame them, I guess.

SSD: Anything else you want to add to that?

WS: No, I think that's enough.

SSD: Have you ever been involved in enforcing compliance regarding using TEDs?

WS: Personally?

SSD: Right.

WS: Not really. My gear guys have. Like I said, we trained the Coast Guard people on how TEDs should work and what to look for. We provided [inaudible] to go on Coast Guard boats, also on the National Marine Fisheries Service enforcement agent boats – and evaluated TEDs at sea. The only place I've ever gotten involved with enforcing the compliance was in foreign countries, where I did go on commercial boats in foreign countries and look at the nets and see if they were cheating or had TEDs in, to begin with, and, if they did, how were they in, and all that kind of stuff.

SSD: Did you find much noncompliance when you were in other countries?

WS: Oh, yes. Fishermen always think, well, these are dumb government people. They don't really know what's going on out there. But there's telltale signs whether the thing's actually being used properly and all, and so you can tell. So, yes, we found quite a bit of it – some countries more than others. Thailand, for instance, has a pretty good military presence. If they want to enforce it, they will. El Salvador is the same way. They have a pretty strong navy, yet from all that conflict they had back – and so, they can enforce theirs if they want to.

SSD: So what happens if you make a boarding – say, you're in another country, you make a boarding, and there's noncompliance, what happens then?

WS: If there was enough of it, the State Department actually embargoed the country.

SSD: Wow, just for one fishermen or –

WS: No. No, that's why I say if there was enough of it.

SSD: I see. Okay.

WS: One, we'd write up the violation and would note it. And we'd usually go on quite a few boats when we were in one of these countries at sea, usually or – and check them. You can check them at the dock and tell. So they'd get recommended for an embargo. Honduras has been a couple of times. I think Brazil, finally, and I think Thailand, finally, one time after I retired. There may have been some others. Then the country usually gets after their enforcement people to go out and make sure they were using them. Then, the State Department will send somebody – a follow-up visit – to look and see and see if they are. They usually do, for a while. Thailand even went so far as they bought every shrimp fisherman – a TED. They paid for it and had a workshop, where we were there. We showed them how to install them, installed a lot of them. Their secretary of defense was there with his command boats and helicopters and all that, and a lot of enforcement agents. So they did a lot for their fishermen. Most other countries didn't do that. But Thailand also exports a lot of shrimp to the United States.

SSD: That's what I was wondering. These other countries are highly motivated to comply because it hurts them when they can't sell shrimp in the United States?

WS: Yes. Some of the countries are pretty dependent on the shrimp as one of their major exports, so they take it –

SSD: We're the ones eating all the shrimp, more than anybody else in the world?

WS: Well, Europe takes a fair amount. But realistically, something like eighty percent or more now of the shrimp consumed in the United States comes from foreign countries. So a lot of our shrimp – a lot of it is raised in aquaculture operations, but a lot of it is wild-caught. So these countries like Honduras, that's a major export item, their wild-caught shrimp. Panama ships us quite a bit. A lot of these countries do.

SSD: How would we know if it was wild-caught or aquaculture, really?

WS: As an engineer, I don't know the exact answer, but I know there has been some assessment of that through DNA-type analysis.

SSD: So they sample it and do a DNA test?

WS: And if you want to go to that extent, you can do it and check. But countries that have big aquaculture operations – then you know that most of theirs is probably aquaculture. They could stamp some aquaculture, and it's wild-caught or vice versa. But even the countries that we worked with – every once in a while, let's say, the economic officer from the US embassy would make a little trip down to the fishing villages and just check things. Whether they do that now anymore, I don't know. They may not. But they did. But yeah, you can check if you want to go that far. They do that sometimes on red snapper and things like that, where there's kind of restrictive regulations. They have been sampled to check and make sure they're not wild-caught.

SSD: Yes. Anything else you want to add to that?

WS: No.

SSD: Do you know how compliance regarding the use of TEDs may have changed over the years? Is it getting better, is it getting worse, or about the same?

WS: I don't know. Enforcement was fairly active when I retired. Between the Coast Guard – the Coast Guard was boarding a lot of boats. They weren't boarding boats to just look for TEDs. They boarded boats to look for the whole range of violations that can occur on a boat, from drugs to illegal fishing to whatever. So TEDs were simply a checkoff item for them. We maintained a training program so their agents would know what to look for on TEDs. So it was pretty active. There were some attempts at cheating so, but over time, like I said earlier, I think it's become more of a resignation attitude to this thing, that we're going to have them; they're not going away. I don't know that it's as involved now. I'm sure our National Marine Fisheries Service enforcement agents still board boats at sea, and they check and whatever. But how active it is, I don't know. I suspect it's less than it was ten years ago.

SSD: We've talked about eleven a little bit. Did your agency engage with other agencies involved with enforcement? The Coast Guard was one that you mentioned. Is there anything else?

WS: Well, in foreign stuff, the United States Department of State – we worked with them a lot. Every country we went to, we worked through the State Department. We've worked with a number of the state marine fisheries agencies with TEDs in inshore waters and whatever and in-state waters – worked with them quite a bit. So yes, those particularly. The Department of Interior – they had responsibility for protecting sea turtles on the beach – is how eventually it was divided up. So in Rancho Nuevo, Mexico, they would go down and work with the Mexican people to protect the beaches. So we interfaced with them in certain cases in certain areas.

SSD: Interesting. How have TEDs affected the shrimp industry?

WS: Bad and good. [laughter] The bad part, I think, is it's an increased cost, and it takes an effort to maintain the TEDs. So it was an imposition. But the good side of it is I think they're not catching sea turtles. The sea turtle populations have been increasing, again, some dramatically, like the Kemp's ridley. They get cleaner catches, so the catches are probably of higher quality. It avoided the only other proposed solution – to close shrimp grounds, which

would have been a major impact on them. So it's good and bad. There's probably some subtle things one way or another.

SSD: You said that TEDs have helped the sea turtle populations recover. Is there anything you want to add to that?

WS: Well, I think that's the primary thing they have had for the sea turtles. It protects the adult nesting female so that she can go back and lay eggs. You've certainly seen the increase in the Kemp's ridley in Mexico and the loggerhead sea turtles up and down the East Coast. I don't know. At some point, the population gets big enough, and there are other mortality factors. It's not just shrimpers that kill turtles. So what all that becomes, I don't know. But it certainly has had that – and just the fact of enforcing this has stopped a lot of poaching of eggs on the beach. It used to be fairly common around Mayport, Florida, and Fernandina Beach and whatever to get eggs and put them in bars. Even bakeries used them because they were a good egg to use in pastries. They didn't coagulate, and so they stayed moist.

SSD: How does a bar use a turtle egg? Why would they do that?

WS: The Asians think too that somehow it's a male enhancement. [laughter]

SSD: Oh, yes. That's why they eat dogs, too, stuff like that.

WS: Yes, those kinds of things and bear parts and whatever. That helps. Of course, there's a lot of beach protection now for even predation from raccoons and pigs and everything else.

SSD: Right. Yeah, there's an effort to create a barrier to keep those pests away from the eggs.

WS: Yes, particularly on beaches that the numbers were reduced way down to try to give them a chance to recover. So overall, this whole thing got a movement started, I think. After we started the TED thing, the environmental groups started putting together this annual sea turtle meeting. The TED thing didn't start the process, but it started the process of getting people together from the different view groups to meet and deal with the issues.

SSD: There's an anecdote from one of those meetings about Sinkey Boone's trawl, that he set it up in the oak trees so people could see it; they could see the whole net and how the turtle excluder device worked. Have you heard this story?

WS: I'd heard that particular story, but I've seen him do it.

SSD: Well, one night, several inebriated PhDs decided that they should prove that the turtles could get through by crawling through themselves. [laughter]

WS: [laughter] And Sinkey led them through.

SSD: Probably. I love that story.

WS: I can imagine. We had an educational process, where our Pascagoula group – a different group – put together some educational materials and a turtle exhibit with a TED net, and they would go to schools and set it up. They did that very thing. They would crawl through the net, through the TEDs and everything, and the little kids would line up and go through – kindergarten, second, third graders – and they did a lot of that. They put out a coloring book that had anecdotal-type information on protecting sea turtles and whatever and passed them out in schools and all. I don't know if they still do that or not. I don't think they do. So yes, we did the same thing.

SSD: Yes. Educate the younger generation to protect the turtles, and they grow up with that idea.

WS: Yes. And some of the other countries started doing the same thing, started an education program in the younger, early grades so that the kids would become [inaudible] toward protecting resources, so there's been a lot of effort to try to change attitudes and practices.

SSD: A sea change.

WS: Yes.

SSD: You talked about other things that kill turtles in the seas. Just for the record, could you name a few of those?

WS: I don't know. There was a problem with longlining. But I think they largely solved most of that. Boats run over turtles.

SSD: Propellers?

WS: Propellers and stuff – and kill them. There's certainly natural mortality on turtles. Sharks attack them and will kill them. They don't eat the whole turtle, but they'll eat off the flippers and whatever. So, I don't know. There are other fishing methods. There used to be some gillnet fisheries in North Carolina and the summer flounder fishery. We worked with them. They're putting, I think, TEDs on the nets up there now in those kinds of fisheries.

SSD: Somebody had said that there are machines that dredge sand up, and they'll also eat turtles up.

WS: That was a big problem in Cape Canaveral. The first time – the first place where we documented that, I was there. I invited Dr. Archie Carr to come over and see it. Those turtles don't – well, they're in that channel a lot, even if they're not hibernating. But there was always supposedly documentation of sea turtles nesting summer in – off Mexico and all – hibernating in the mud in the wintertime. So we started getting – we had a boat chartered from Fernandina Beach, Mayport. They said, "Hey, the fishermen over there claiming they're catching tons of turtles in the channel over at Cape Canaveral." It was a cold winter. So we went over. Sure enough, you drag ten minutes; there'd be fifty turtles in the net. They were all buried in the mud, and mud all over them, except for their rear end that they stick up out of the mud. So got Dr.

Carr to come over. I went over, picked him up, and we went out – and so they pretty much documented – that was the first time anyone had actually "observed" it in US waters. So that channel became protected pretty quickly because you had to choose when you dredged that channel for the nuclear submarines and all, or there'd be large numbers of turtles at times. They didn't always hibernate. It wasn't always – water didn't get cold enough some years. But they were in there a lot. Well, then they started finding – whether it was Savannah or Jacksonville or some of these others – there was a chance that these suction dredges – and they move pretty fast – could actually suck up turtles. So we had to start putting observers on those dredges and dealing with that and worked with the US Corps of Engineers in trying to modify their dredge heads and all those things to keep the turtle from going up in it. There's some number – I don't know what the other is – in the other channels that will get sucked up or impaled into those dredge heads. But yes, that does occur. I don't know for sure, but I think there's some management now of when they actually dredge those channels up and down the East Coast, so they avoid the main seasons when the turtles would be in there.

SSD: This is a question I've asked everyone. It's kind of a philosophical question that I thought would be interesting to get on the record. Why do you think sea turtles are important?

WS: I guess it's just part of the overall ecological balance of the ocean. People like porpoises, like whales. Some like sharks; some like whatever. A lot of people like sea turtles. There used to be – when I was a kid, you could buy little turtles and keep them in an aquarium. They were freshwater turtles. But people like these little turtles and stuff, so kids like them. So they're really mostly for observing now. There once were fisheries for sea turtles. Texas had a big fishery, Florida – small fisheries scattered around. I don't know that they could ever be a resource again. I doubt the population will ever get that big again. But they were once a resource. If they had been properly managed, I suspect they could have been for a long time. But they're a long-lived animal, so mortality on the young's real high, so you'd have to really watch them. So I guess it's mostly for aesthetic reasons and the balance of the ocean and that kind of stuff.

SSD: They have value to us just from their sheer beauty.

WS: Yes, like any creature. I built a little place up in the mountains, and we're watching turkeys and deer and all come feed there in the front yard.

SSD: My mother-in-law lived in Memphis most of her life, but she bought – I don't know – maybe a hundred acres in Walnut, Mississippi. She was working class. She had a job as a clerk for the federal government. They weren't wealthy people. But she bought it just because she likes the woods. She's never going to develop it. She's thinking about leaving it to the Nature Conservancy, and I find that it's very healing to walk around out there in the woods and even to be on the beach here. It's very healing.

WS: Yeah. That's why I like this here around the water. We may leave after getting kicked around by Katrina so bad. But I had thirty-one acres up in North Carolina since '85 and never did anything with it. After this, I said, you know, let's go up there. That's thirty-three-hundred feet. I don't think we'll ever flood again there.

SSD: [laughter] Unless the oceans warm up.

WS: Well, if they do, I don't think they'll rise that far. So we built a cabin, and we go up there now a lot. It's pleasant just to go up there, especially in the summertime, when it's so hot and sticky. Then, if this ever happened again, which it won't in my lifetime, but if it ever did, we're heading for the hills.

SSD: Yeah. It's happened twice in mine – Camille and Katrina.

WS: Yeah, mine too. Camille didn't get me. I lived in Pascagoula. But this one did. [laughter] The next time, it may go to Mexico or who knows where.

SSD: Well, Rita did, right? Rita went to Louisiana.

WS: Yeah. And Ike and all the other ones – Gustav and all the rest of them. They go someplace. Doesn't have to be Mississippi next time. But [inaudible].

SSD: When Mrs. DeArmey bought this property, there was a Memphis bus on it. That was the building. They'd taken some of the seats out. So they've slowly added onto the bus. But now you can't see the bus, because there are walls all around it. But when you walk into that room, there are still the lights from the bus. I think there used to be a sign that said something about seating.

WS: That's neat.

SSD: Yes, so they built their house around the bus. Now, if I had been interviewing you strictly for the Center for Oral History, I would have started with question number fifteen, because we like to put on the record what seems ordinary today because, in a hundred or two hundred years, people will find it interesting. If you have time, we can go on to those questions.

WS: You mean like the penalty for netting sea turtles?

SSD: I think I have a different set of questions than you.

WS: That's fifteen on mine.

SSD: Fifteen on mine is where did you grow up?

WS: Because I don't know a lot about the penalty today. You're not supposed to do it. [laughter] That's what I printed off. I don't know where it skipped or changed.

SSD: I think I probably just printed off the wrong set to bring with me.

WS: It doesn't matter.

SSD: So you don't even have these questions.

WS: I've got the rest of them. It starts with sixteen on mine.

SSD: Oh, I see. Sorry.

WS: There's just an extra question in there someplace.

SSD: I confused myself. So is there anything you want to say about the penalties?

WS: No, I don't know much about the penalties today and what they actually are. They were always changing. They were trying to get a little bit more rigid and trying to get our lawyer in St. Pete to actually take them to court, but I think, over time, they finally – it took quite a few – and I don't know what the actual penalty is today – how much the first fine, second fine would be type of thing.

SSD: But do you feel like the penalties when you were working were enough to be a deterrent?

WS: It would have been. Our problem was actually taking them in to court. Our lawyer at the time was afraid of judges. She didn't like to go to court. So she wouldn't take them. And it was very difficult to get – so a lot of cases that were cut and dried didn't get taken to court. But I don't know. Maybe they solve – I think they solved that problem. I heard she was transferred to Washington. [laughter] I don't know. But they would have been. The penalty – I forget what it was, but it jumped to five-thousand dollars pretty quick, and then it went twenty-five-thousand or something. They could seize gear.

SSD: For a repeat offender?

WS: Yes. So I think it would have been enough, with the problems the shrimp industry had, to keep them in line with the TEDs. So, over time I think they were fairly successful. They had to do things like –Louisiana was difficult to enforce because there's no beaches. It's all marsh and stuff, and it's hard to get to the boats. So I know the Coast Guard and the National Marine Fisheries Service people would – they'd go to Orange, Texas or someplace or somewhere over in that turn, and they'd have a boat hiding someplace, and they'd turn and go one direction because there's always people watching. They'd say, "They're going west." And then – *whoosh* – steam all night and come over the horizon and come up on a bunch of boats, [laughter] and grab two or three before they could all get their nets up and catch them without TEDs. So there's a lot of that kind of stuff. They put some effort into enforcing it. So over time, I think they got – I'm sure there's still not a hundred percent compliance, but it's probably pretty decent. That'd be my guess. I don't know.

SSD: I would guess that, as the old shrimpers retire, the younger shrimpers who've been pulling those TEDs all their lives just think it's routine.

WS: You're probably right. I went to Australia – and follow-up. The guys worked in there a lot. Australians manage their fisheries better than anybody in the world. So they all do quite

well financially – shrimpers and everybody else. So it's no problem to them. They said, "Well, even if a shrimp gets out, where's he going? It's our shrimp. We're going to catch him the next tow." [laughter] So they didn't worry with it, and, again, they could see how it works. So I think they're probably using them decently in some areas over there now. But it's perception, education, and whatever.

SSD: Well, do you want to tell me a little bit about where you grew up? What was that like?

WS: I grew up in south Texas. Beeville, Texas is where I grew up – big ranches around there, but it wasn't far from Corpus Christi, so I spent a lot of time in Corpus Christi – on the beach and bowling and dating and whatever. Then I went to the University of Texas and graduated in mechanical engineering, went in the Air Force, and I was a lieutenant. I was in a test squadron at the Tyndall Air Force Base in Panama City, Florida. We tested new systems for their defense command – air-to-air missiles and whatever. So I wasn't going to make a career out of the military. I had already accepted a job with McDonnell Douglas. And it was going to be one of those foreign missile sites someplace because I was going to have to go to school for a year and spend a year in the desert or something, and then they wouldn't tell me where I'd go and what I do. I was in charge of our fabrication engineering shops. And a guy walked in one day, and he said, "Hey, I'm a fishery biologist." They had a field station in Panama City doing this – some of this gear stuff. He said, "Man, the machine work around here is terrible in Panama City. Can't get underwater housing made for cameras or anything. They leak." I had a great shop. We modified airplanes and everything. So, he said, "Well, you're government. Can you all do some work for us?" "I don't see why not." I checked with the commander, and he said, "As long as it doesn't interfere with our work." So talking to him, he said, "We want to hire some engineers. We want to work on some of this. We feel like we need some engineers. Why don't you come down there?" So another guy and I went down there and talked to them. The other guy decided he would go to Virginia Tech or somewhere then, but the oceans were new – and all the publicity. I thought, "Well, diving would be fun."

SSD: What year was that?

WS: That was '65 – 1965. I thought, "I think I'll go do that." I took a lot less money than I would have made with McDonnell Douglas. I thought, "Well, I'll give it a shot." So I went to work for it and stayed with it. I thought I was going to quit several times. [laughter] But it was always kind of interesting – and rewarding in a way. We had a lot of independent freedom to work on things without somebody looking over your shoulder and –

SSD: A bit of creativity?

WS: Yes. Working with a lot of fishery biologists – not being critical, but I'm an engineer; I'm more technically oriented, so they didn't question things. And they had ideas, but they didn't know how to do it. So we worked together and started putting this group together to solve fishing gear problems.

SSD: As a think tank, huh?

WS: Yes, and application – the divers and the evaluation – and eventually had cameras of all sorts and stuff that we could put on gear and remote-control devices to survey things. So I've enjoyed it over the years. So I stuck with it. So, I ended up in the fisheries application as an engineer. We have a group – I don't know if you're familiar with the group, but it's Dennis [inaudible] – he's in charge of it. They're kind of dwindling down now, but they did remote sensing, both satellite and aircraft work with oceanographers to look at water patterns and color and clarities and all kinds of things to predict locations of fish from the big schooling things like herring and sardines and all that to longline stuff for bluefin tuna and swordfish and all that. So we have a group over there that were primarily engineers. So, we worked back and forth together. When I needed some help with some of the stuff, we drew on that. So that group's still there, but in smaller numbers, because the agency's moving more and more to being a regulatory agency – not so much a problem-solving agency anymore. The fundamental responsibility of the Pascagoula lab now is resource surveys, where they go out and do surveys on different species to try to do population estimates and use that information then for regulations. The fishery management councils and all use it for setting quotas or seasons or whatever they do with it.

SSD: Interesting. Well, thinking back over your career, rather than asking you about a typical day, would you consider putting on the record –? Just paint us a picture of a memorable day in the life of your work.

WS: [laughter] I don't know. A memorable day was some of the meetings that we had – public meetings, hearing meetings, pre-regulations with the environmentalists and their lawyers, and the shrimp industry was there. We were there with the gear and all – and the process of trying to solve the problem and compromise between the groups, knowing regulations were coming, but shrimp industry trying to keep them from being too big a burden and the environmentalists wanting to make sure they protected sea turtles and all. It was kind of interesting in the thing. I worked on some – from a different view, though – on one-of-a-kind electrical systems. At one point, we did some high-voltage [inaudible] generation in seawater. We were the only group's ever done it – with pulse generators that would fill up this kitchen plus some huge banks [inaudible] capacitors and all. That idea was, again, we were looking at trying to catch these pelagic fishes that aren't utilized at all in the Gulf of Mexico much. We finally got a butterfish fishery started. But the rest of them – herring and sardines and scads and all those other ones that are used in parts of the world – in the Gulf, they're a fast-swimming fish. The regular, standard midwater trawls that were used in Europe and all wouldn't catch them. They'd just swim off from the nets. So our early approach – we eventually were successful in catching them pretty good with a type of net that we developed, but our first approach was we knew the people in the menhaden industry – the pogie industry – pretty well.

SSD: Now, what's pogie?

WS: Menhaden.

SSD: That's a kind of fish?

WS: Yes, in shallow water, you see the spotter plane – they used spotter pilots and planes to find the schools of fish out here in the sound. The boats go out, and they circle them with a purse

seine, and they bring them in – huge number – million metric pounds a year or something like that – metric tons a year. They're made into fish meal and oil for feed and all. They used to be made into high-quality machine oil. They used to go in lipstick and stuff like that – margarine. Europe still allows those species to – some of them to be used in making margarine. There's a variety of products that – and there's some plants – reduction plants in Moss Point. There's some in Louisiana. There used to be some on the East Coast, in Delaware, and places. Anyway, menhaden's pretty easy to catch, but the related species weren't. So our lab director always felt like there was – supposedly, according to the estimates, there were ten times as many as these other species as there were menhaden. You could somewhat do the same thing with them – just couldn't catch them. So we decided that maybe we could catch them with electricity. And they congregate in huge schools under oil rigs and structures out there. So we thought, "Well, if we could control them electrically and get them out, we could suck them up with fish pumps – lead them into the pump." So there was a German physicist in Lewes, Delaware, who worked for Protein Products, the menhaden company up there, that had come from Germany, a PhD in silicon control rectifiers at the time – whole long story – and World War II and the Nazis and all that – but he eventually ended up – the reduction plants in Lewes, Delaware and all – the menhaden. The boats weren't real big, and the equipment wasn't real strong – the winches and nets, and I mean the thing – they were still hauling the nets by hand from these purse boats, like fifteen in a boat, and they'd pull them in. It would capsize the boats and stuff. They were having a problem. So I'd heard of Dr. (Kreuzer?), who did a lot of electrical nerve response studies. [laughter] I won't get into all that. But he also eventually applied to stay alive and to eat fish and clean the streams out when they were trying to starve the Germans to death after the war; they wouldn't let them fish in the streams at all, and they'd sneak down at night and electrically catch fish.

SSD: They just float to the top?

WS: In the freshwater, it was easy. They could use some of the equipment off old American fighter planes and whatever.

SSD: Wow.

WS: Anyway, he continued to do research on that and some in seawater because there was an interest in using electricity in seawater for a number of reasons. One was to protect bathing beaches off South Africa from sharks. A second one was to pump fish out of the sea. It's very difficult in seawater because seawater's a dead shore. It's not like freshwater, where you can get killed.

SSD: What does that mean – a dead shore?

WS: Well, if you fall in an electrical field in seawater, it might tingle you a little bit. It can be a hundred thousand volts or more, but the water's so conductive, it goes through the water and not your body.

SSD: So it gets attenuated as it travels down?

WS: And the whole [inaudible] gets it. But if you do that in freshwater with a hundred and ten volts in a bathtub, it'll kill you, so big difference. Anyway, it takes huge equipment, and you have to do it in pulses and all that. So Dr. (Kreuzer?) was hired by this Protein Products company to come over to Delaware and develop a fish-pumping system to pump the menhaden out of the nets rather than having to harden up those nets by hand and then, once in a while, get such a big catch the fish would smother and die and capsize the boat. Well, by the time he [telephone rings] – that's all right. The answering machine will get it. By the time he successfully solved all the problems to do this – and he was successful at it – the boats had gotten bigger. They're steel hulls, and they had purse seine blocks and all kinds of stuff, and they didn't really need it anymore. But they continued to pay him to do research in an old fishery warehouse up there. And once we got the idea of using that electricity on to the platforms to suck fish out from under there and harvest them on barges and whatever – our director, Harvey Bullis, knew the owner of the company real well. So I said, how about it – would you mind if we worked with Dr. (Kreuzer?) on this problem? And they said no, because they thought, "Well, that's a stupid idea. You're not going to be able to do that." [laughter] So he was happy to work with us because, for years, he'd just been sitting there piddling around the lab. Maybe they'd give him a boat to do a little testing for a couple of days. He had all these patents and stuff on things, and he could never do anything with it. The only thing – they did let him work with the South Africans on the shark control barrier for the beaches. So he was happy to work with us. Well, we actually got – built a one-of-a-kind electrical system that we could control. We could lead fish easily from here to that fireplace – oh, twice that far – through the water. Well, then we started doing studies on how to get them out from under the platform, so we didn't have to electrify the platform. He found that those fish leave the platforms, and they follow the sun. And so they follow the sunlight out on the west side of the platform. Well, we'd set up with nightlight arrays and stuff and tracked them to the boat. Fish like to come to lights. So we could get them around the boat, we could turn this thing – *whoosh* – suck them up. So then we were going to advance to the next phase, where we were actually going to get a reduction barge that was in Africa and put all this electrical equipment on it and go out and demonstrate it. Suddenly our funding dried up. We never knew why. Years later – you remember George Bush's Zapata oil company – Zapata also bought some of those menhaden companies. I knew one of the directors really well. We're the same age, and we'd go to meetings together and had a few drinks and whatever, so [inaudible] had told me one day – he said, "Did you ever figure out why all that got stopped?" Anyway, I said, "All I know is that suddenly the funding was stopped, and so then we had to stop doing it." He said, "Well, they all thought it was crazy what you're doing." He said, "All of a sudden, they said, 'Damn, this may work, and we can't have that.'" Because there was kind of an unwritten law with the sportfishing groups and all, that if you didn't aggravate us on menhaden – and they catch a lot menhaden, and it is a baitfish – we'll leave these other species alone, so there's still plenty of bait out there for sport fishing and all. He said, "You all were going to start harvesting those things. It would do that, and it'd become a competitor product for the menhaden." They didn't want that, so they got their congressional people to stop it. So did a lot of work on electrical fishing stuff and high-powered, one-of-a-kind pulse generation in seawater. That was interesting, but nothing ever came out of it, really.

SSD: So, does it work to keep sharks off beaches?

WS: Yeah. It could be used. Again, people perceive it as dangerous. But in seawater, it's not because, as long as it's saltwater and the salinity's fairly high, the water's so conductive that, even if you swim into the barrier and felt it – maybe a little tingle – it wouldn't harm you. But a shark's very – fish are very sensitive to electricity, more so than humans. A big shark gets it; he's leaving. And so (Kreuzer?) had taken it to the point where they installed three or four miles of it one place, and you could bury a big coax cable – it's like these big mining cables – and run it out, and you put an anode or cathode out in the water and the other ground back onshore. The field would wrap around that cable and follow it back, and you could create a barrier out there. And it worked. But then that apartheid stuff all started with South Africa. So Westinghouse was the only company that made the big ignitrons, which, at the time, was the only way you could switch these really big high-voltage, high-current pulses. Didn't have silicon-controlled rectifiers and all and the circuitry we have today that probably could do it. So I don't know if you saw horror movies – *Frankenstein* and all – and they always had those flashing lights – well, that's what they were; those big ignitron tubes they were called. So they couldn't sell them to South Africa anymore, so they had to stop. So that stopped that. We were the only ones that had them and were using that. Anyway, of no interest to the TED thing.

SSD: Very interesting in an oral history, though.

WS: Yeah. So that was kind of the reason – part of the thing – that I got into this field as an engineer and stayed in it as opposed to going to aerospace or something.

SSD: Yes. Well, it's really neat. I think it sounds like a good way to make a living.

WS: It was. Yes.

SSD: I love the sea and the beach.

WS: I do too. I grew up near enough, and we went to the beach a lot – went fishing at the beach down along the coast of Texas, so I always liked it.

SSD: The beaches have changed a lot. They're a lot more developed now than they were. I grew up in Gulfport.

WS: Oh, did you?

SSD: I was born in '54. It's changed a lot since then. And some of these guys who were born, like you were, in the '30s – it was even more charming – Biloxi and Gulfport back in the '40s and '50s. Well, is there anything that you'd like to put on the record that we have not talked about?

WS: No, I think we've covered quite a bit.

SSD: okay. Well, I'll say thank you, then, and I'll turn off the recorder.

WS: Sure.

----------END OF INTERVIEW----------
Reviewed by Molly Graham 10/24/2021