

**TRANSCRIPT**

**INTERVIEWEE:** Larry D. McKinney

**INTERVIEWER:** David Todd

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**Google Voice** [00:00:01] This call is now being recorded.

**David Todd** [00:00:04] Okay. All right, my apologies for the break. They're always a little fragile here. But anyway...

**Larry McKinney** [00:00:11] We can start over on oil if you want to.

**David Todd** [00:00:13] No, no. I think that you are in good shape. You were just talking about the risks of the oil and gas industry, whether it's production or pipeline breaks or barge wrecks.

**Larry McKinney** [00:00:25] OK.

**David Todd** [00:00:25] You know, coming and going in the, in the bays and estuaries. And if you could pick it up from there, I think we'll be good.

**Larry McKinney** [00:00:31] Okay. And so as with all of this oil and gas moving in both directions, passing over our bays, that makes anything in those bays somewhat vulnerable to a situation where there is the leakage of oil, be it from broken pipelines, or ship collisions, or whatever there might be, or just pollution coming out of the actual refineries that are located along the coast. Well, oysters, unlike fish and shrimp and crabs, they can't move out of the way of an, of an oil spill. They are, they are fixed. And so they are particularly vulnerable to oil spills because there's no way to move.

**Larry McKinney** [00:01:15] Now, the one thing that they can do and, and they they can close up and stop filtering, and they can survive for many, many days - that this capacity actually came about because of fresh water. You know, we would have floods into our bays, you know, in, say, in the spring, sometime, sometime in the fall, and the bays would turn from salt, very salty to almost freshwater ponds for many days on end. Well, an oyster can survive, and I can't remember the exact number of days, maybe anywhere from five to 10 days easily, by just closing up and not filtering. So they can survive oil spills if they in fact, can detect them.

**Larry McKinney** [00:01:57] But in many cases, the oil is interspersed in the water, such that they can't detect that when they have an oil spill. And so, of course, oil slicks and that actually coats the oysters themselves. But they can, if they filter in oil particles, the substance they can, they can obviously be directly affected by the chemicals in the oil itself and killed. So oyster reefs are particularly susceptible to oil spills. And we have lost many oysters because of that, in those situations.

**David Todd** [00:02:34] I think one of the other things that I guess would fall under the, the pollution risks for oysters is red tide and nutrient impacts and heavy metals in some portions of the coast. Do you have any thoughts about those aspects of, you know, issues that confront oysters.

**Larry McKinney** [00:02:55] They certainly have happened? Yes, the, now there are what you would call acute, acute issues that obviously directly kill oysters, which could be an oil spill, which could be an oil spill. Then there's the more chronic types of issues. And for example, here in Texas, somewhere between 30 and 40 percent of our coastal waters are closed to shellfish harvest because of pollution, that the oysters are too polluted. They have too many bacteria. They may have heavy metals, too many heavy metals that they can accumulate that doesn't kill them, but they accumulate because they are filter-feeders, so they can hold such that if you were to eat them of mercury, for example, and other heavy metals that they could be unhealthy for you, particularly pregnant women and children, for example. And so the Health Department here in Texas obviously monitors this and they are a sample all of our coastline. And as I said, because of that pollution, you know, almost between 30 and 40 percent of our, our waters are closed, that have oysters in them, are closed to harvest. They cannot be harvested because of that, that problem.

**David Todd** [00:04:10] I see. So one thought that I'd love to hear your remarks about is just the impact of of storms. I think you mentioned that oysters are somewhat adapted to, you know, big freshwater pulses that come through the bays and they can close up. But my understanding that at least some of the bigger storms, like Hurricane Ike and then also the inland storms like the Memorial Day flood and the Tax Day flood, not too long ago in the Houston area, had a major impact on oysters, and maybe you can help us understand why that is.

**Larry McKinney** [00:04:50] Well, oysters, of course, have been part of Texas bays since, you know, since the bays have been here and they seem to have survived. We've had the oyster reefs coming and going and moving about, in other words, growing in response, in response to changing physical characteristics of bays. But what we're seeing in our lifetime and part of it is, is, I think, driven by climate change, in that our hurricanes are becoming more intense in several ways. One just what we're seeing, of course, is as these storms approach the coast, in the past, they would move on through inland at whatever strength they happen to be rated at. But now we're seeing storms approach the coast, and because the waters are so much warmer than they had been in the past, they quickly intensify, and so the storms are more, we have higher intensity storms than we had in the past.

**Larry McKinney** [00:05:51] This, for example, one of the examples being what happened with Ike, that when Ike came ashore in Galveston, came into the bay in Galveston, it was so violent and it stirred the bays up so much, so much of the mud, it, it buried more than half of the oyster reefs, just buried them to the point where they, it would not, the subsequent currents and tides would not cleaning them off. So we lost more than half of our oysters there in Ike.

**Larry McKinney** [00:06:17] And the other storm of note, related to oysters - Harvey, what that did was it produced so much rain, so much freshwater. Of course, we know about the impacts on the City of Houston and the tremendous flooding that they had never seen before the largest, the largest continuous rainfall ever recorded. I can't even remember the numbers of inches of rain that fell - in the 50s or something - that produced so much fresh water that the bays stayed fresh so long that not even oysters, which over time had evolved for floods,

they had evolved to stand floods, this was beyond, this was beyond the scope of what they had evolved to, so they lost many oysters that way.

**Larry McKinney** [00:07:04] So this is, these are the pressures that, that we're, we're seeing now that we have not seen in the past that are not, they're spelling tremendous problems for oysters altogether.

**David Todd** [00:07:17] I see. Okay. Well, you know, you've tracked the importance of oysters and then some of the risks that, you know, they've confronted over the past number of decades. Maybe this would be a time to switch tack and talk a little bit about efforts to bring the oyster back. I believe that the Harte Research Institute has been involved in research to understand how to do oyster aquaculture sustainably, and then also, you've been heavily involved in oyster restoration outside of mariculture. Perhaps you could give us the word on that as well.

**Larry McKinney** [00:07:58] Well, as I kind of started from the beginning of my story. My career started with oysters 50 years ago and, and it's going to end with oysters, as a matter of fact. I've retired from the Director of the Harte Research Institute to this Chair for Gulf Strategies and to finish up a few projects before I fully retire. But the last project that I'm trying to make sure it gets launched is a, is the largest oyster restoration effort to ever be put together, and I'm fortunate to be associated with, with the folks that are, that want to do this. I, when I, when I made my last hires at, for chairs at the Institute, I brought in two scientists, Dr. Joe Fox and Dr. Jennifer Pollack. Dr. Pollack is a well-known and young but, but really has great, exciting research work on oyster ecology and restoration and conservation. And then Dr. Fox, who is one of the world's leading experts on, on oysters and oyster aquaculture. And so they joined a couple of years ago, almost two years ago, joined the Institute and have taken off of that.

**Larry McKinney** [00:09:12] And so what evolved out of that is a program with, with the Ed Rachal Foundation to form what's called the Palacios Marine Agricultural Research Organization, which is an entity related to the foundations, that, that it's an IRS designation that allows them to do research and work closely with, with these foundations. And, and we are in the process of, of constructing one of the largest, the only oyster hatchery in the state of Texas, building it in Palacios. We're building a research center and a secondary hatchery in Corpus Christi to, to support this oyster restoration program. And the idea that had come from this is that, that through genetics and others, we think we can, we can, in each of our bays, find oysters that can begin to do better under the conditions that we're seeing changing now because there's oysters everywhere, many of them are just not forming oyster reefs, but they're, but they are there in the bays.

**Larry McKinney** [00:10:25] And so we want to get in a situation where we restore oyster reefs on an industrial-type scale, larger than it has been attempted. And working with partners: it will take partners and collaborators to do this. But we think if we can, if we can reestablish these reefs strategically, we can begin to improve the water quality of these bays and exploit that relationship between oyster reefs and wetlands, emergent wetlands, and seagrass to begin to bring water quality back up and, and serve all the functions that, that, that we have seen them in the past.

**Larry McKinney** [00:11:04] So, and our, in order to achieve that, of course, we have to convince the Texas Parks and Wildlife Department that manages oysters and our Legislature that, that oysters are just too valuable to eat. We, we need to preserve oyster reefs for all

those benefits that we talked about - as habitat, as storm surge protection, to improve water quality. So it's a, it's a big, a big task we're undertaking, but we have lots of partners. And one of the first steps we took, for example, and did this during the last legislative session, Dr. Fox worked closely with legislators to create the legislation that allowed us aquaculture to be established in the state of Texas. We, as we say, we don't have, there's many other oyster farms all around, in many states, and all the states in the Gulf, except for Texas. And in Texas, we're not going to have oyster farm, we're going to have oyster ranches - that's appropriate for Texas.

**Larry McKinney** [00:12:03] But one way to supply the food we need for oysters, for restaurants and so forth, is to grow it, rather than to dredge it off the top of living oyster reefs. Because right now, when we and other conservation organizations restored oyster reefs, within two to three years after being restored, they are available, if they're in open waters, they're available to be dredged. And the oyster industry is so desperate for oysters they destroy these reefs in, in weeks, if not days.

**Larry McKinney** [00:12:35] So we have to come up with ways to make sure that these oyster reefs that we restore for the health of the bay remain so. So one way to do that is to provide the oyster industry with another way of securing oysters, which is aquaculture. So that's one thing we're doing.

**Larry McKinney** [00:12:50] And the other is trying to figure out are our long-term goal, for example, in the first five to 10 years of this program is to put a billion new oysters in every Texas bay that is dedicated strictly to conservation. And the Ed Rachal Foundation is investing an initial \$15 to \$20 million to, to launch that program. So it's very exciting to be part of that. And that's, I intend to work with them for another few years before I retire fully to fishing and eating oysters, I guess. But, but for now, that's, that's there.

**Larry McKinney** [00:13:26] And what I what really pleases me is that is that all up and down the state, throughout the Gulf of Mexico too, the recognition of the value of oysters beyond that of eating them at a restaurant has been recognized. And so I see a groundswell of support for restoring oyster reefs as a means of restoring the health and quality of all of our bays and turning this tide around. And I think oysters are just the animals to do it, if we give them the chance. So that's my story.

**David Todd** [00:13:59] Wow, that's a powerful one. So I have a question come up that's sort of related. One thing that you mentioned earlier that, that some of these restored reefs, you know, protected for two to three years, they get established and then they're quickly damaged or eliminated, I guess, very quickly. I'm curious, is this new effort with the Rachal Foundation, how will you manage to protect these reefs once they're restored?

**Larry McKinney** [00:14:35] Well, that's part of my job, I mean, I, I and this is where I've been fortunate that I have, you know, 23 years, half my career, experience as a resource manager at Parks and Wildlife. I worked directly with the Legislature throughout that time and the agency. So I have a good feel for how to go about working in the area of regulation and legislation. And so one of my jobs is to, is to work with our political leadership and our agencies to come up with ways to allow us to protect these restored oyster reefs going forward. That's part of my, will be part of my job. And, and organizations like the Coastal Conservation Association and even some of the oyster, oyster operators, themselves, recognize that they can't sustain this. So there's just this growing awareness that we have to do something. So that's very positive. So that's part of my job.

**Larry McKinney** [00:15:32] I'm trying to make a situation so that our oyster experts, the ones that are producing, that are building our hatcheries and growing the oysters can, can put these reefs into place knowing that they will last. And so there are several options to make that happen. And I'm going to be working on those as we go forward to allow us to, for example, build oyster reefs in those closed waters I talked about. There are waters that, you know, 30 to 40 percent of our waters, you can't harvest them because of the health condition. Well, we can still build oyster reefs there. They can still provide habitat and they can begin to filter the water and improve those conditions so they are protected from harvest because they are in polluted areas. That's one place.

**Larry McKinney** [00:16:14] I think there's a, I think there's also the opportunity to work with the oyster industry to say, "Look, there are certain, you need these restored oyster reefs, productive to produce oysters, to basically feed the existing public reefs where you would, would dredge them. So let's do a trade-off. Let's protect some areas. Let them be seed sources and sanctuaries, if you will, while other areas are, are harvested and so that will sustain their industry.

**Larry McKinney** [00:16:45] And part of that is that we, and I did this for, for the shrimping industry. I put a, helped put a program and finish out a program that allowed us to buy back licenses from bay shrimpers. And over a 10-year period, I reduced the shrimp fleet in half and the existing shrimp fleet in the, in the bays now, are sustainable. They, the, the shrimpers there, the fishermen can make a living because they're not competing against one another and they can sustain themselves. We need to do the same thing for the oyster dredging industry to help, help reduce that fleet by converting those oystermen, for example, to aquaculture, or to just simply buying them out and having them use that money to go into other industries. So that's a strategy I've used in the shrimping industry successfully. I would like to have the opportunity to help do that in the oyster industry. So that gives you kind of an oversight of what I'm thinking from that regard.

**David Todd** [00:17:47] That's fascinating. Well, thanks for explaining. It's a tricky wicket. Oh, I'm sure.

**Larry McKinney** [00:17:56] If it was easy, anybody would do it as they said. So, so I'm giving it a try.

**David Todd** [00:18:00] Well, great. Well, I just had a couple more questions and I should let you go. I think you've been talking just in the last few minutes about this, the future of the oyster industry and one of the things I've been interested in myself, and I think you've thought about a lot - just the importance of oysters for carbon sequestration. I think you talked not too long ago to the folks at the Baker Institute at Rice. And maybe can you explain to us a little bit about how oysters can play a role there?

**Larry McKinney** [00:18:31] Yeah, and that's a, that's a really good question, and it's a fascinating one that, that as I began to get into this, I had not thought about it as much as I should have, but as I've gone into this, this program looking for ways to attract partners to help us, obviously, the idea of carbon sequestration and carbon markets has been high on the list. And, and so you've seen efforts developing for developing carbon markets so that you can offset your whatever carbon footprint you might have, you can offset it by, by supporting something that would sequester carbon in a way that didn't make it, you know, made it not

available to, to be a pollutant, basically to add to the warming and that type of thing. So lots of things are considered that way.

**Larry McKinney** [00:19:20] But I started looking at oysters as a carbon sink. Now, first, it made sense to me when I looked at an oyster, an oyster shell, and particularly these old fossil oysters, you know, there's a lot of carbon in the oyster shell. It makes a lot of sense. And those oyster shells and again, I'm looking at one sitting here on my desk right now that I took out of my backyard in Austin. I have a home in Austin where there's old fossil reef. This oyster shell is 35 million years old. So it, when you sequester carbon that way, it's sequestered forever.

**Larry McKinney** [00:19:54] So I got to thinking about that and started looking up, what was that potential? And many scientists have looked at it. And one of the first things I found was that, well, the idea of oysters, oyster shell as a carbon sink, or sequestration, has a bit of a problem because the oysters have to release so much carbon. You know, it takes so much energy to produce that shell that they may produce more carbon dioxide than they would sequester in the shell itself. So that, that is a bit of an issue. So I'm working with Dr. Pollack and some other scientists who understand this thing to try to figure that out.

**Larry McKinney** [00:20:32] But what I have found in other research is that, it is not counterintuitive, but I talked about the fact that oysters filter 50 gallons of water a day. When they filter that water, they bring in anything that's in the water and there's lots of sediment and lots of carbon in that water. And what the oysters don't use to reproduce or to grow muscle tissue, they deposit in the bottom in the form of what's called pseudofeces. In other words, what they don't eat goes into the bottom sediment and is locked into that sediment. And it turns out that there's a lot of carbon in what they deposit in the bottom. In fact, one estimate by a research project showed that an acre of, an acre of oysters will sequester as much carbon as over 400 trees. And so that's, that's a pretty high level of it. And so even other estimates are higher than that, that, that I've seen where the carbon sequestration level of oysters will actually exceed things like seagrass and salt marsh, which are considered very high.

**Larry McKinney** [00:21:45] So we have a team as part of this project that we're talking about who is trying to lock that down because if you're going to sell carbon credits, for example, in oysters, you have to be able to very much prove what you're, what you're doing. You can't just say, well, oysters sequester so much carbon. You're going to have to prove it, because if people are going to put money into carbon sequestration, they have to be able to prove up that, in fact, it happened. So our idea is, is, if we're going to grow all these oyster reefs for other purposes, maybe we can attract partners that will contribute money as a, as a way of carbon market type of situation, we would use that money to build even more reefs. So that's where we're going with sequestration. So that's another avenue that we're looking at as well.

**David Todd** [00:22:32] Exciting times. Well, it must be encouraging to be involved in all this. I just wanted to ask you one last question then. Is there anything that you might like to add that we, we have not managed to cover during our time together?

**Larry McKinney** [00:22:49] Well, the thing I was thinking about, and didn't know it would come up, would be carbon sequestration. But you beat me, you beat me to it. So you asked that question, which is why, which I greatly appreciate.

**Larry McKinney** [00:22:59] No, I just, I appreciate the opportunity to talk with you about this. I had not, until you brought up, asked me to talk about oysters and how it related. And I

think you contacted me to talk about other people I knew about who had done oysters. I really not put all this together. I think I'm, I'm kind of stunned at how, you know, I guess I'm in one of those situations where, you know, I'm in the forest, you know, cutting trees and I haven't stepped back and looked at the forest. And you allowed me to do that and look back over my, my 50-year career as a biologist and really begin to link all these things. I just I actually had not made the connection to how important oysters have been to me personally in my career, for one thing. And so that was quite astonishing.

**Larry McKinney** [00:23:46] But also it helped me reflect on the privilege I've had of actually being part of, working with such famous individuals like Dr. Hopkins and, and Dr. Ray in, in this whole situation and watch over the period of my career to watch where we, where we have gone, that we are on the edge of something very exciting that, that the recognition of how important oysters are in the ecosystem and the fact that we, we, we might be able to do something on a scale that could help turn, help improve the health of our bays and estuaries using oysters. And so the fact that the possibility that that could occur is, is exciting for me.

**Larry McKinney** [00:24:37] And, and even though I probably should be retiring and fishing, it has given me the energy and enthusiasm to stay with it a little bit longer and see if I can spread the enthusiasm and actually launch something that could, could be a significant, could, could be a turning point for our bays and estuaries. I hope that it is. So thanks for that opportunity.

**David Todd** [00:24:59] Well, you've been kind to do this and, and your enthusiasm is really infectious. I can see why you you've been involved in a lot of big things. It's catching.

**David Todd** [00:25:09] So thank you so much for your time today, and I hope our paths cross and I do want to thank you for all your help, you know, not only with your own interview, but pointing us to other people that have been your colleagues and some of your recent hires who all seem like terrific people. So many thanks.

**Larry McKinney** [00:25:28] No, absolutely. I do hope that we get the chance to meet sometime and thank you for doing this project. I think it's quite wonderful and it needs to be done. I'm glad you came up with the idea to do so. I think we, this needs to be preserved, so thank you again.

**David Todd** [00:25:42] It's a good story. Thank you so much.

**Larry McKinney** [00:25:44] All right. Have a good holiday.

**David Todd** [00:25:46] Yeah, bye.