

S1E5: Texas-Style Oyster-tecture

The Gulf Podcast

Introduction

[Dr. Jen Brown]: (wind blowing) You're listening to The Gulf Podcast. Hi everyone, this is Jen. I am recording outside today, up on the bluff of Upper North Broadway in Corpus Christi and I'm standing next to the Centennial House, which is the oldest house existing today in Corpus Christi, and it's about 170 years old. The Centennial House looks like an old-timey southern plantation house. It has two stories, tall columns in the front with a porch and a second-story veranda, and if you look into the back, there's a tiny shack that appears to have been the slave or servants' quarters. It's nestled in between a parking lot and then two modern office buildings. And the Centennial House is really neat because it's made out of shellcrete, which was this process of—oh, great, now we got people walking by again—Okay, and shellcrete is the process of taking crushed up oyster shells as well as lime made from more oyster shells, mixing it together with gravel or clay and water, then putting it into these wooden molds where it dried into a large brick, and once it dried, it dried into this very hard material, and then those massive bricks were put together and then stuccoed or whitewashed on the outside, and you had a very durable home (sounds of an automobile passing by and traffic in the background). There's a truck going by, the hazards of recording in the field. <<light instrumental music very slowly fades in¹>> This structure from 1850 still stands, and it's withstood some of the massive hurricanes of the late-nineteenth century as well as the very damaging and deadly Hurricane of 1919. Hurricane Celia in 1970 had winds up to 160-170 miles per hour, and Centennial House had lasted through that storm as well as more recent tropical storms and hurricanes, and it's still standing today. It's really a monument to oysters in Corpus Christi Bay and to oysters in the surrounding area.

Okay, back in the studio. Centennial House weathered the storms of the Texas Coast. But the only reason the house still stands today is because of historic preservation efforts. During the 1960s, the Corpus Christi Area Heritage Society bought and restored the home. Ed Harte, by the way, was its president.² If you remember back to Episode 3, this is the same Ed Harte who helped create Padre Island National Seashore and whose endowment created the Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi. And, of course, they're the sponsor of this podcast.

¹ Blue Dot Sessions, "Lost Shoe," *Banana Cream*, August 16, 2019, https://freemusicarchive.org/music/Blue_Dot_Sessions/Banana_Cream/Lost_Shoe. This song is licensed under a Creative Commons Attribution-NonCommercial License (CC-BY-NC).

² Allison Ehrlich, "Centennial House Recalls Christmases, Years Past," *Corpus Christi Caller-Times*, December 3, 2015. NewsBank, <https://infoweb-newsbank-com.manowar.tamucc.edu/apps/news/document-view?p=WORLDNEWS&docref=news/1598095F86DC60D0>.

In this episode, we're going to explore the history—and the future—of oysters along the Texas Coast.

<<music fades out>>

Chapter One: Oyster Mania

[Brown]: Since oyster shells were readily available, many of the early brick homes in Corpus Christi—like the Centennial House—were made out of shellcrete. If they weren't, the home probably still had a shellcrete water cistern or shellcrete curbs and sidewalks. At least in the days before the city had a water system.³ Most Americans, however, would be more familiar with oysters as food not as construction material.

Oysters weren't just a popular food in the mid- to late-nineteenth century, it was more like a mania. The oyster “was once the best-loved food on the continent,” according to historian Paul Hedren. Oysters were eaten anywhere from street corners to fancy restaurants. On the East Coast, early Americans could buy oysters for only a penny. Oysters were cheap, plentiful, and healthy, which explains why they were such a “democratic” food.⁴

Today, due to oyster declines, eating oysters might not be considered a mania, but it's still popular. So when I heard that my production assistant Max had never eaten an oyster, I sensed a perfect opportunity for some field recording. And I promptly sent him down to the Water Street Oyster Bar where he and his wife Brianna got fried oysters curbside.

Let's roll the tape, then check in with Max over video chat.

Sidebar: Max and Bri Try Oysters for the First Time!

[Max McClure]: (chewing and munching sounds) It's actually pretty good. I like it. Give it a try. Do you want sauce on yours?

[Brianna Hurst]: I don't know (chewing). It is really good.

[McClure]: Yeah. I was expecting it to be very like gooey, kind of like creamy, I don't know (laughs). Maybe raw oysters are more like that, but it's pretty good.

[Hurst]: Yeah, it almost has like a hushpuppy texture—

³ See Murphy Givens, “Q&A—Cisterns Made of Shellcrete,” *Corpus Christi Caller-Times*, April 2, 2004. NewsBank, <https://infoweb-newsbank-com.manowar.tamucc.edu/apps/news/document-view?p=WORLDNEWS&docref=news/101B7CDB973A0557>.

⁴ Paul L. Hedren, “The West Loved Oysters Too! A Look at That Time in America When Those Briny Bivalves Were All the Rage, Even beyond the Missouri River” *Montana: The Magazine of Western History* 61, no. 4 (Winter 2011): 4. See also Mark Kurlansky, *The Big Oyster: History on the Half Shell* (New York: Random House, 2006).

[McClure]: (speaking over each other)—You’re right, you’re right.

[Hurst]: I’ve never had it before.

[McClure]: Yeah. Cheers.

[Hurst]: Cheers.

[Jen Brown via video conference]: (video chat beep) Hi Max. How are you?

[McClure]: Uh, you’re muted (laughs).

[Brown]: (laughter) Okay, sorry about that. So how were your first oysters?

[McClure]: They were good actually. I was expecting—I don’t know, I was expecting them to be really like creamy and gooey. My wife said she was honestly expecting it to taste like a salty booger (laughter). So I didn’t have very high expectations, but I went in with an open mind because while I’m pretty selective with seafood, I’m always willing to try new things. Yeah, so it was definitely really good. I was pleasantly surprised...I think that the coolest part about it, though, was pulling up there and realizing that this was one of the places that Harte was partners with in their oyster recycling program.

<<musical interlude⁵>>

Chapter Two: Shell Dredging and the Decline of Oyster Reefs

[Brown]: I’m glad Max and Brianna enjoyed the oysters, although I have to admit, I was kind of secretly hoping that one of them didn’t like oysters, just for the podcast listening experience. We’ll come back to that oyster recycling program that Max mentioned.

First, though, I want to talk about why the program was needed. Once abundant oysters fed early Americans, but oyster populations plummeted since then. Today, oyster reefs are one of the world’s most threatened habitats.⁶ Oysters grow together in estuaries on top of previous generations of oysters. Over time, this created reef structures along shorelines. And by over “time,” I’m talking about thousands of years.⁷ The oyster reefs that once lined Texas shores were formed around the time of Jesus of Nazareth. They’re as old as the Roman Empire or China’s terracotta army or maybe even the pyramids of Giza.

⁵ Blue Dot Sessions, “Lost Shoe.”

⁶ Pollack, Jennifer Beseres, Andrew Cleveland, Terence A. Palmer, Anthony S. Reisinger, and Paul A. Montagna. “A Restoration Suitability Index Model for the Eastern Oyster (*Crassostrea virginica*) in the Mission-Aransas Estuary, TX, USA.” *PLoS One* 7, no. 7 (July 2012): e40839. <https://dx.doi.org/10.1371/journal.pone.0040839>.

⁷ Edwin Doran, Jr., “Shell Roads in Texas,” *Geographical Review* 55, no. 2 (Apr. 1965): 227.

<<sound of a clock ticking fades in⁸>>

But it only took less than a century for oyster reefs to almost disappear. “In the modern world,” Rachel Carson once observed, “there is no time.”⁹

<<clock ticking fades out>>

Starting in the early twentieth century, the Texas shell dredging industry dug up much of the state’s massive oyster reefs. They used hydraulic dredges and big barges to haul what they called “mudshell” to the shore. The reef shell became roads, following the coast from Corpus Christi all the way to Beaumont.¹⁰ By the 1930s and 1940s, the industry grew. The demand came from chemical plants that popped up along the coast in that era like bluebells in the springtime. Even more reef shell became caustic soda or lime. Caustic soda was used in household products and in the refining of petroleum. Lime was used to make magnesium out of seawater. In the next two decades, shell dredging reached its height. They took ten to twelve million cubic yards from Texas bays each year.¹¹ To put that in comparison, that’s like digging up the volume of the Dallas Cowboys stadium every eight to ten years.

No wonder why the Gulf has lost 50 to 80 percent of its historic oyster populations. But shell dredging wasn’t the only reason for decline. Poor water quality, the lack of freshwater inflow, oil spills, hurricanes, and diseases are among the other causes.¹² Oysters can live within a range of temperatures and salinities, but too much salinity or too much freshwater kills them. That’s why rain-drenched hurricanes OR the lack of freshwater inflow both kill oysters. In the last episode, we focused on the importance of freshwater inflow. We heard from Dr. Paul Montagna, who’s an expert in coastal ecosystems. Studying freshwater inflow drew Paul to oysters.

[Dr. Paul Montagna]: I wanted to start this shellfish initiative and start looking at shellfish in general, because I realized that shellfish were important indicators of freshwater inflow effects (Montagna laughs). Oysters, shrimp, blue crab. Okay? And we started out with oysters, and when we started looking at oysters, we discovered a whole bunch of disturbing things. Number one is that it’s the most degraded habitat in the world. Everyone’s worried about mangroves and coral reefs, and it’s true, we’ve lost about 30 percent of our mangroves and coral reefs

⁸ BonnyOrbit, “Clock Ticks Close to Mic,” February 14, 2017, <https://freesound.org/people/BonnyOrbit/sounds/380782/>. This sound is licensed under a Creative Commons 0 license.

⁹ Rachel Carson, *Silent Spring* (1962; repr., New York: Houghton Mifflin, 2002), 6.

¹⁰ Doran, “Shell Roads in Texas,” 236–238, Kim Withers, “Shells in Texas Coastal History,” in *Encyclopedia of Texas Seashells: Identification, Ecology, Distribution, and History* (College Station: Texas A&M University Press, 2010), 14–15.

¹¹ Bureau of Business Research, *The Texas Reef Shell Industry*, by Alex Kerr. Texas Industry Series No. 11 (Austin: University of Texas, 1967), 6–39. For the magnesium industry in Texas, see E. N. Brandt, *We Called It Magnificent: Dow Chemical and Magnesium, 1916–1998* (East Lansing: Michigan State University Press, 2013).

¹² Pollack, et al., “Restoration Suitability Index Model,” e40839.

worldwide. But we've lost 85 percent of our oysters worldwide, and in the U.S., it's been particularly devastating.

<<musical interlude¹³>>

Chapter Three: Rebuilding Oyster Reefs

[Brown]: Along the Texas Coast, the Harte Research Institute has become a leader in oyster recovery. I recently video chatted with Dr. Jenni Pollack about her work with oysters. Dr. Pollack is the Chair for Coastal Conservation and Restoration at the Harte Research Institute. She leads a team of scientists and students on oyster reef restoration, among other projects. I would describe her as a go-getter. She's really a shining star at our university. And when we sat down, she explained to me why we should focus on rebuilding reefs.

[Dr. Jenni Pollack]: Oyster reef restoration is important for the numerous benefits that are provided by oyster reefs. Historically, oyster reefs have been valued almost primarily just because it's a food source, right? But now we've started to learn that biodiversity is enhanced greatly by the presence of reefs in the bay. We know that water clarity and water quality can be substantially influenced by oysters because they're filter feeders and they're removing phytoplankton, and excess nutrients, and waste, and things from the water, and making it cleaner and cleaner. We know that extends to things like nitrogen regulation. So instead of having to pay a certain amount of money to put, say, tertiary treatment on a wastewater treatment plant, we know that oysters were already removing that nitrogen just naturally being in the bay. Things like shoreline protections, we know that the oyster reefs, if they're oriented near a shoreline, can provide really good wave buffering benefit. Recreational fishing support, so we know that, you know, recreational is such an important, iconic part of our coastal communities and we know that fishermen target those reefs because those reefs have nooks and crannies where the prey critters live and the sport fish come in there and feed on those reefs, and it's a great place for recreational fishing. And another benefit that we're just kind of the tip of the iceberg at starting to learn about is carbon sequestration. So, there's a lot of interest in planting forests or protecting coastal marshes and things because we know that they can capture and store atmospheric CO₂. We're just starting to learn about the role of oysters in doing the same thing. So they are, like I was saying, they're filter feeders, so they are consuming those phytoplankton that are taking CO₂ out of the atmosphere and then they're transferring that, essentially, to the sediments at the bottom of the bay. So, it's outside of circulation with the atmosphere. And so, oysters, their role, which can be really potentially significant in doing this, we're just starting to learn about. There's a real strong area of research on a topic called ecosystem services. And these are sort of these non-monetary benefits that the environment can provide humans. And for oysters, the list is just very long of these additional benefits that can be provided.¹⁴

¹³ Blue Dot Sessions, "Lost Shoe."

¹⁴ This and other clips come from Oral History Interview of Dr. Jennifer Beseres Pollack, interviewed by Jen Brown, January 8, 2021. This oral history is currently in processing and the audio and transcript will be uploaded to <https://library.tamucc.edu/exhibits/s/thegulf/page/OH>.

[Brown]: Those ecosystem services are pretty amazing. One oyster alone filters fifty gallons of water every day.¹⁵ And when oyster reefs are rebuilt for storm protection and all of those other benefits, that's been called green architecture or oyster-tecture. The most famous example of this is the Billion Oyster Project in New York. High school students and other volunteers help rebuild oyster reefs in New York Harbor. Their goal, as you might be able to tell from the name, is to restore a billion oysters.¹⁶ Here on the Texas Coast, Harte's goal is *five* billion oysters, according to Dr. Larry McKinney, the Chair for Gulf Strategies at the Harte Research Institute and its former director.¹⁷ It's ambitious, but they've been restoring reefs for almost a decade. The program started by partnering with local businesses. Here's Dr. Pollack again:

[Pollack]: The oyster shell recycling program has been a really important part of what we do. Brad Lomax, who is a local restaurateur in town, approached Paul with this question, and another colleague of mine, Joe Fox, was involved in this early conversation as well. Essentially, he said, "I have all this shell in my restaurants, shucked shells from, you know, the Raw Bar. And it's very expensive for us to deal with because they get charged by the weight and the volume of their trash removal services. And the oyster shells are obviously heavy and they're bulky, you can't really compress that in your trash bags. So, he said "There must be something that you can do with the oyster shells. Like, is there a need for oyster shells?" On the East Coast in the Carolinas, there are really well-established oyster shell recycling programs there. We took that idea and we wanted to create something here on the Coastal Bend that made more sense for the way that the shells are produced, which is the majority of it is from restaurants. Although, we do work with some seafood festivals as well. And so, along with Gail Sutton, who is the Associate Director here at the Harte Research Institute, we got together. We identified a partner within the Port of Corpus Christi where we could stockpile the shells and we developed this program, which is essentially the oysters are harvested. They go to the restaurants. At the restaurants, people eat the oysters and they separate, then, the shell from the trash. So, they put it in a separate special bin. They put those bins outside, and then as often as once a day, if they need us to, we go out there and we pick up those oyster shell bins and then take them to the Port of Corpus Christi where we stockpile the oyster shells, which has to be done for six months in Texas just in case of invasive species or anything that could have been present on those shells. And then once we've stockpiled enough of them, that's the substrate that we can then use to restore reefs. So, you know, Brad Lomax a long time ago said, um, "This is oyster shells in the landfill are a resource out of place." And that's exactly how we feel...We've been doing that since 2009, and we've restored over 25 acres of reef now using those shells.

[Brown]: Now, if you're like me, you're probably wondering who gets the pleasant job picking up all the shells.

¹⁵ See "Sink Your Shucks" Oyster Recycling Program, <https://www.harte.org/oysterrecycling>.

¹⁶ See Emmett Fitzgerald, producer, "Oyster-tecture," 99 Percent Invisible podcast, mp3 audio, October 31, 2017, <https://99percentinvisible.org/episode/oyster-tecture/>.

¹⁷ Oral History Interview of Dr. Larry McKinney (Part Two), interviewed by Jen Brown, December 18, 2020. This oral history is currently in processing and the audio and transcript will be uploaded to <https://library.tamucc.edu/exhibits/s/thegulf/page/OH>.

[Pollack]: It's a student job. We pay them well because, as you can imagine, in the summertime, going to pick up oyster shells (Brown laughs) that have been sitting outside is not a very desirable job. Yeah, so they'll go, they go really frequently. So, we have several restaurant partners all the way from Port Aransas to Padre Island and in Corpus Christi right now that we pick up from.

[Brown]: When I learned more about restoration from Dr. Pollack, I found out it's not as simple as throwing oyster shells back into the bay. Location is key.

[Pollack]: So that was one of the first questions that we started to ask: "Where do we restore?" You know, there's certainly better places where we can be more assured a success than other places. And, we want to put our money in those places. So, what we did was we took Texas Parks and Wildlife monitoring data for oysters and water quality. So, things like salinity, temperature. We brought in depth data, um, we looked at oyster recruits like the new baby oysters that were attaching onto reefs. We looked at the adult oysters, we looked at the size of the oysters. So, we took all of this Parks and Wildlife data, which at that time was maybe thirty years of data all up and down the coast. And then we basically layered all of the different variables on top of each other in a map and we were able to visualize, "These are the places that have the best conditions for oysters. These are the conditions that have the worst conditions for oysters." And we created this tool that could be available to anyone who wanted to restore oysters in that system. Say, "If you have money to restore, these are your best or sort of least risky places based on historical data, and these places would be, you know, there's higher uncertainty of our success." And then last year, we finalized, we scaled that up to the whole coast. So now all the way from Louisiana to Mexico, if you want to do oyster reef restoration, you can go on our freely available website, which is oysterrestoration.org and folks can pull out a map for any of the bay systems that is shaded like that. They can look at what the conditions on current oyster reefs are. They can look at the water quality conditions. And the idea is, "We want support anybody's efforts to restore habitat, and give them all the tools." That's another thing that's really been beneficial I think and has really allowed us to be successful in our habitat restoration efforts is that we know that site selection is critically important. You could do everything else right, but do it in the wrong site, and it's not going to work. And we've really spent so much effort and time looking at what those, um, fundamental conditions need to be, and, um, we want to share that with other people in the state as well.

[Brown]: Another issue with restoration is that there is still a commercial oyster industry in Texas. They use smaller dredges pulled behind boats to gather the oysters.

[Pollack]: You essentially have like the shells or the oldest oysters is in the center of the reef and then have a veneer of living younger oysters on the outside of the reef. That's the habitat that's necessary for sustainability of oysters, but we dredge that habitat to harvest the oysters. So, there's no way to get the oyster without taking the habitat of those shells with you. It really creates a much more complex challenge in terms of restoration, conservation management.

[Brown]: To deal with the destructiveness, other scientists at Harte are now working to establish oyster farming in Texas. And Dr. Jenni Pollack has spent over a decade restoring oyster reefs in the region. They have two different ways to put shells back in the water, one is a large-scale approach and the other uses volunteer labor.

[Pollack]: Let's say we have enough shells stockpiled and we want to restore an oyster reef. At the time of building the reef, there's typically two different approaches that we use. The large-scale approach that we use would be working with a marine contractor who would essentially barge all of our oyster shells out to the project sites and place them in the water according to our design specifications. The main drawback is that unless you happen to be on the shoreline that week that the reef is being constructed, you don't even know that it's happening because, again, it's below the water. It's a below the water feature. The other way that we restore reefs is using people. This is where we use our community habitat restoration events. We invite anybody who's interested from the community, tourists, schoolkids, anything, to come out and join us and have events that usually last about three hours. People come out. We use shovels to bag up some of that recycled oyster shell into mesh bags, and then those bags of oyster shells serve as those fundamental building blocks, so kind of the nucleus for the building blocks of the reef. We then carry those bags down and place them in an area of the water that we've predetermined and kind of pre-staked out, and we sort of build a reef, just like you would kind of put tile on the floor. You put bag after bag after bag and then build up the vertical reef that we want with those bags. The drawback of that one is that you're not getting very much acreage. You know, you're not able to restore a huge area. But the benefit of it is that you have hundreds of people who are involved who know what's happening. You have this stake in the success of that reef. It builds this sort of culture of environmental stewardship we've seen.

[Brown]: Dr. Pollack has found getting volunteers involved to be particularly worthwhile.

[Pollack]: You know, it's great. I'm somebody who has always kind of been curious and been an outdoor person, but there are lots of people who aren't like that as well. People can have grown up right here with the bay in their backyard, but if they didn't have a boat, or maybe don't have interest in fishing or something, they may not have a real personal connection to the bay. It just sort of is in the background. People have told me, "I've never gotten into the bay before. I've never gotten into the water before." People have told me, "I didn't realize that the oyster was an animal that living inside of the shell. I thought it was just the shell." Or they'll say, "I see these shells on the beach. These are oysters?" Or, we'll take some oyster reef out of the water and we'll put it into some clear tanks while we're out there so that people can see all of the fish and shrimp and crabs and things that are living in the reefs so that they understand it's a habitat. And I mean everybody, it's adults, kids, everybody just get such a kick out of seeing what's out there, and constantly people are telling me the excitement that they have. It sort of reveals this whole world that's been right there but hasn't been, um, something that they've had access to until now. It's super rewarding. I know it sounds like a cliché, but it is super rewarding because it's fun to kind of share your world and the things that you love with the people who are here and can experience it more on their own now that they've sort of seen what's possible and what's out there.

[Brown]: Like a true scientist, she also enjoys it when the oysters get put in the water.

[Pollack]: For me as a scientist, this is kind of the most exciting part because that's when we can start collecting some data. We've always really been focused on making sure that, if we're going to restore a reef, we want to create something that mimics that lost natural habitat as much as possible.

[Brown]: As a historian when I hear about "restoration," I wonder what time things are being restored back to. But in this case, it's not a matter of restoring to the past, but of setting present-day baselines connected to modern living reefs.

[Pollack]: The problem with that for oysters is that we know that there have been such severe declines in oyster populations that essentially, we could restore forever right now to get back up to where we were in the past. Anything in the positive direction is good right now. So instead of that, what we typically what we use are reference reefs. An ideal reference for us would be a natural reef located nearby that's subject to the same environmental conditions at the same time as our restored reef so we can compare what the best that we can expect would be, but we also use restoration targets. We typically constrain our success using those data points more than we do sort of a historical baseline just because so much has changed. One other thing about historical baselines that's a challenge is the places like Chesapeake Bay where you hear about, that was the oyster heart of the United States at the turn of the twentieth century. And the conditions there have changed so much because the oysters have been removed, but then the water quality changed, the hydrodynamics changed. The Chesapeake Bay of today is a very different system than the Chesapeake Bay that used to host that many oysters. So, it's also challenging to say, "If we just keep restoring oysters and putting them back, it can take us back in time." Yeah, so we use more kind of contemporary measures of success.

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Conclusion

[Brown]: Regardless of how you measure it, they have found success.¹⁹ The future of oysters on the Texas Coast looks particularly bright.

You've been listening to The Gulf Podcast. This podcast is made possible by the Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi. Special thanks to Dr. Jenni Pollack. To read the episode script and sources or listen to oral history interviews, please go to our website. Music in this episode came from the band Blue Dot Sessions. Thanks

¹⁸ Blue Dot Sessions, "Lost Shoe."

¹⁹ For studies of success, see among others, Brittany N. Blomberg, Terence A. Palmer, Paul A. Montagna, and Jennifer Beseres Pollack, "Habitat Assessment of a Restored Oyster Reef in South Texas," *Ecological Engineering* 122 (July 2018): 48–61.

also to my production assistant Max McClure for interview transcription, production help, and his adventurous taste. This is Dr. Jen Brown signing off.

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²⁰ Blue Dot Sessions, "Lost Shoe."

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