

S2E6: Watersheds: Writing An Ending to the Baffin Bay (Texas) Story

The Gulf Podcast

<<a few musical notes as a short interlude¹>>

Introduction

[Brown]: You're listening to The Gulf, a podcast devoted to telling stories of people and nature on the Texas Gulf Coast. This season, in our Watersheds series, we've explored coastal water issues. Since the last two episodes were devoted to Baffin Bay, I wanted to give you all an update on some of the restoration efforts currently taking place.

This is Jen, by the way, and I'm the writer and producer of The Gulf Podcast. What I find interesting about the Baffin Bay story is that it's a story in which the ending is still being written.

Can Baffin be restored? Well, the watershed itself is very large at 1.5 million acres. That's, uh, bigger than the state of Rhode Island; it's about the size of Delaware. So this South Texas watershed is big. It's very rural and poor and there's not a whole lot of money for infrastructure improvements and change takes place slowly. The watershed is also home to a toxic landfill that sits near a main tributary to Baffin and there are more large industries planning to move in—all with the potential to dump even more pollution into the streams that flow into the bay.

But, Texas bays are fairly resilient. If we look to the other side of the Gulf, in Florida, Tampa Bay offers an example of success. The history of Tampa Bay is much like the history all around the Gulf of Mexico: booming post-World War II development, air conditioning, lots of dredging, and poor wastewater treatment. The nutrients flowing into Tampa Bay created a big, stinky algae problem. You know, that rotting algae smell? Once the watershed upgraded wastewater treatment plants, though, water quality improved dramatically. Since the 1990s, restoration efforts further improved habitat, to the point that they have now restored 40,000 acres of seagrass in Tampa Bay.² So the lesson learned is that restoration can be done with time, money and, most importantly, grassroots community support.

Baffin Bay, Texas, has all a whole lot of watershed citizens who are invested in restoring the bay. People like Scott Murray and the other volunteers from the last episode. They got the ball rolling by gathering the data needed for science-driven solutions.

<<musical interlude³>>

¹ Lee Rosevere, "Curiosity," *Music for Podcasts – The Complete Collection*, April 6, 2021, <https://leerosevere.bandcamp.com/track/curiosity-2>. This song is licensed under a Creative Commons attribution license (CC-BY).

² Hannah Waters, "Bringing Back Tampa Bay's Seagrass," *Smithsonian Ocean*, January 2017, <https://ocean.si.edu/ocean-life/plants-algae/bringing-back-tampa-bays-seagrass>.

³ Lee Rosevere, "Curiosity."

Chapter One: Bringing Baffin Back

[Wetz]: There was a small group of about ten of us that got together and realized, you know, we have the data, let's do something with it. Let's figure out what's going on and how we can solve some of the problems in the bay. So, we started off small, just a group of ten of us or so in a room, and that stakeholder group has really blossomed. So, now it's grown to about two hundred and fifty people from the community, representing community leaders, landowners, you name it, a real cross section of the community, and so we meet probably twice a year and talk about Baffin Bay issues and try to find solutions to the water quality problems down there.

[Brown]: That's Dr. Mike Wetz, he's the Chair for Coastal Ecosystem Processes at the Harte Research Institute. This stakeholder group is currently looking to expand participation as they explore solutions.

[Wetz]: It's a very diverse group, so we have members from the angler community, ranchers down there, farmers, ordinary, everyday citizens. Um, right now, we're really focused on a lot of landowner outreach and engagement to try and reach people who might not live near the bay but who might live further up in the watershed, and we're also trying to do some work reaching some of the colonias down there as well.

[Brown]: With the Baffin Bay Stakeholder Group, Mike's helped launch the [Bringing Baffin Back](#) initiative, along with the Harte Research Institute and the Coastal Bend Bays and Estuaries Program.

[Wetz]: It represents a commitment on our behalf and behalf of the stakeholder group to address the issues in the bay and improve the health of the bay, so it includes the monitoring and data collection component, which then feeds into the watershed restoration component, and eventually that's going to lead to work in the bay to restore habitat that's been lost.

[Brown]: One of their biggest feats was to get together with some experts at Texas SeaGrant, the Texas Water Resources Institute, and elsewhere to develop a Watershed Protection Plan. The plan lists a variety of action items for communities to improve water quality.

[Wetz]: It really runs the gamut of possibilities. So, for people that have houses on or near the bay, it includes things like having your septic tank checked regularly to make sure it's functioning properly and if it's not, replacing the septic tank or having it pumped out or whatever needs to be done there because some of the more recent studies have shown that sewage is a big contributor to the pollution in the bay. So, aside from septic tanks, we're working with communities on dealing with wastewater treatment infrastructure down there. For farmers, it can be things like maintaining a healthy riparian buffer on the edge of creeks or maybe not over-spraying fertilizers. For ranchers, it's things like not having grazing happen right up to the edge of the creeks or doing more best practices in terms of grazing practices that can reduce sediment runoff and things like that. There's just a whole gamut of things. We just had an interesting conversation the other day about feral hog management and, you know, feral hogs are a big issue in the state for a lot of reasons, but it turns out they actually can have a

pretty big impact on water quality because the hogs will go and root around right on the creek banks and it destabilizes the banks and so then you get sediment runoff, you get nutrient runoff, and, of course, when they're defecating in the water than that creates pollution problems, too. So, a lot of different options and things that we're looking at for addressing issues down in the bay.

[Brown]: They also hired a new Watershed Restoration Coordinator in July, who just started and is planning a big stakeholder group meeting for fall 2023.

[Athena Frasca]: My name is Athena Frasca, and I just began here at Harte as the Baffin Bay Watershed Coordinator.

[Brown]: Athena's been impressed by the involvement of the many anglers and community members in the stewardship of Baffin Bay.

[Frasca]: I think it's just a really good example of how science can be accessible and really community minded, and in a place like Texas where so much of the land is privately owned, it seems like extra important to get the people who actually own it and live on it and utilize the properties to, you know, just be involved and invested in what's happening.

[Brown]: And I think with her background, Athena will fit right in here in South Texas.

[Frasca]: So I grew up in Kentucky on a small family farm, and I just spent so much time outside and always felt really connected with the environment around me and then went to school in Iowa and studied biology at Grinnell College and had a really wonderful experience there and loved working in the field for a lot of those biology classes, and Iowa has really poor water quality from agricultural runoff, and it's not like it's anyone's fault specifically. It just has a long history of general pollution in the area, so that's something that a lot of people in the state are working towards, but it was always a consistent factor in the classes that I was taking and then eventually took an aquatic specific biology class that really sealed my interest in water, and...I feel really personally invested in doing something to improve water quality, um, just in all these places that are special to people.

<<musical interlude⁴>>

[Brown]: There's a lot of momentum currently. Other scientists have started studying different aspects of the bay, multiple organizations have provided support or funded small projects, and Dr. Wetz now has a new group of volunteers for a water quality monitoring project.

[Wetz]: I'm really excited. I feel like this group, this stakeholder group, has made some incredible progress over the last couple of years, and there's some pretty big initiatives that are

⁴ Lee Rosevere, "Curiosity."

about to get off the ground over the coming year that I think is really going to ramp up our ability to address the pollution issues.

[Brown]: To restore the bay, they are looking to the future.

[Wetz]: I think we need a long term commitment in terms of funding. We need to also reach landowners and educate community members on how they're connected and how their land connects to the water, what they do on their land, how that connects to the water. Stewardship is a big thing, fostering that next generation of stewards who care about the bay as well, so I feel like we're making good progress in terms of addressing the pollution sources now but, you know, if we don't have that next generation of anglers and folks that care about the bay then who knows, we may end up back in the same situation twenty years from now, thirty years from now, so within Bringing Baffin Back, we also are focused on reaching that next generation of kids who might take an interest in the bay and the bay's health.

[Brown]: Restoration will bring more money and solutions to the rural communities in the watershed. If the process is inclusive, it will provide a win-win for everyone who lives, works, and plays in Baffin Bay. Plus, once the water quality improves, more scientists can get to work on habitat restoration.

<<musical interlude⁵>>

Chapter Two: Bringing Baffin's Serpulid Reefs Back

[Brown]: Okay, so, show me the worms, I guess.

[Breaux]: Oh boy, okay...so when we get a sample of reef, it's very, very, very small. This would be about a typical sample so about three centimeters cubed is what we look for. We put something like this into hydrochloric acid to dissolve the carbonates and so what we're left with is something like this, it's the other tissues that are not carbonate tissues, we lose the outsides of the barnacles, the shells of any mussels, but what you're left with is really the worms and the tiny crustaceans, the amphipods that live on the reef. At that point, we sort through what's left and count and sort and in just a tiny, tiny, tiny piece, we get thousands and thousands of amphipods, of these tiny little crustaceans, so it's insane to look at. It's really labor intensive to work on these samples, so we have a lot of work to do when it comes to this stuff, but I will show—I'll zoom in on. ~~So,~~ there's a lot going on in here, so we would take everything from this and sort it out by species, count everything, weigh everything. It's a lot of work, but that's a serpulid.

[Brown]: They just look like gnarly little worms, but it's fascinating (both laugh).

[Breaux]: Sometimes we'll bring back a small chunk of reef and observe it under the microscope and just watching those things when they're still alive is the most incredible thing

⁵ Lee Rosevere, "Curiosity."

because every single hole is moving with some living thing, so it's like a tiny little metropolis, and you can just watch everything buzzing and moving and eating each other and digging, and it's really fun (laughs).

[Brown]: That's Tasha Breaux, a Project Manager in the Coastal Conservation and Restoration lab led by Dr. Jenni Pollack at the Harte Research Institute. Recently, we had a lot of fun looking at tiny worms through a microscope. The lab itself is like any other busy science lab. It's full of scientists and students working at different stations, with the ever present exhaust fan humming in the background. Tasha and other scientists in the lab have been [investigating the serpulid reefs of Baffin Bay](#). The rocks, as the locals call them, are a defining feature of Baffin Bay and are unique to the entire Gulf Coast.

[Breaux]: They look like, a lot like a rock, and I'm sure that when your boat hits one, it feels a lot like rock unfortunately (both laugh), but so these are little, um, calcium carbonate structures. Each, when you look at the larger structure, it does look like a rock and out in the bay, what we have in front of us is a very, very, very small piece of one of these but out in the bay, they can be the size of a building. They're quite large. So, it's a rock of sorts, but it's made up of probably millions of tiny little calcium carbonate tubes. As the serpulid worm grows and lives, it builds a calcareous tube around itself, and that structure built layer upon layer upon layer probably generation upon generation upon generation creates a larger structure that does look like a rock.

[Brown]: And those reefs are home to billions of those tiny crustaceans that we saw in the microscope. There were some that looked like mini centipedes; some that looked like a bouquet of tentacles; some that looked like shrimp with boxing gloves; and other fascinating little creatures that would be absolutely horrifying if they were larger than the tip of a pen.

[Breaux]: There are at least thirty different species and that's just the things living directly in there. We aren't even sampling for the things that like, the pinfish, the gobies, the stone crabs, the slightly larger, more mobile species that are living in and around the reef because our sampling is very targeted for what's in the reef.

[Brown]: Now, you might remember Dr. Jenni Pollack's oyster restoration work from Season One. In the last decade, her lab has restored forty-five acres of oyster reefs on the Texas Coast. While oyster reefs and serpulid worm reefs are totally different structures and organisms, they actually have a lot in common.

[Breaux]: In a bay, places that have some sort of structure tend to serve as refuge for other animals, so these kinds of things, an oyster, a serpulid worm reef, we call them like an ecosystem engineer, so an oyster creates habitat for other animals. Serpulid reefs really function in the same way, so we see much higher abundance of other fauna on any kind of reef, any kind of biogenic reef like these are, and then we see lots of areas—so when you look at a serpulid reef, for instance, when you pick it up, you see nooks and crannies everywhere you kind of look, and you can imagine that in every one of those nooks and crannies, it's a place for

something to live, to forage, to breed, to hide. It creates a little, you know, kind of a little city for other things.

[Brown]: Like oysters, serpulid worms are also filter feeders, which clean the water as they feed. And both oyster reefs and serpulid reefs have declined over time. But unlike oysters, serpulid worms have adapted to the higher salinities in Baffin. They're a significant part of bay, and once water quality improves, the Coastal Conservation and Restoration lab at HRI already has a head start on restoration.

[Breaux]: We started realizing that this hard structure has got to be a really important key to the way that Baffin Bay functions and keeps going as an ecosystem, the way that it continues to produce and provide this amazing fishing habitat even though we are seeing very little food for those fish in the soft sediments where we think that they would be feeding...so we began getting really curious about these reefs. Kind of our first step was we did some exploratory work just trying to understand the communities on the reefs and trying to understand how those compare to the soft sediments. There hasn't been a lot of work done out there on these reefs...and then the next step was, okay, we know what's there to a degree, at least, but how do we, you know, we're a restoration group. We know that there are supposed to be shrinking in size also and when you go out to a lot of these reefs, you can literally feel they're just kind of crumbling. A lot of them, um, there are chunks of reef just kind of sitting on the bottom. They seem to be degrading. So that's a big problem, given the amount of fauna that we're seeing on these reefs, like they are really important to the system. So, next step was let's look at when and where serpulid worms are recruiting if they're even recruiting because some people have said, "Oh, there aren't current serpulid worms there." We found a few in the samples of the existing reef, we assumed that they would still be recruiting there, so we set out recruitment tiles in the bay, and we set them out for three month periods to try and understand, okay, when is the big recruitment pulse, when would be a good time to set some kind of substrate out there so that worms would be most likely to recruit to them, and so we started looking at that.

[Brown]: For two years, their science team tried to find the best season to grow serpulid worms. They needed to make sure that barnacles or algae didn't take over like weeds in a garden. They also wanted to see if black drum would eat the worms on the recruitment tiles so they put cages over some of them and left some open, and then found out that the worms grew very well on the cages themselves. That's a great example of how the scientific process sometimes unfolds. And then they discovered that worms also grew on the larger trays that housed all of the smaller tiles and cages.

<<musical interlude⁶>>

[Breaux]: One of the ways that we sample frequently is by using Pepsi trays...It's a plastic tray that is uniform. They used to be easy to come by. They're inexpensive, so they're the perfect

⁶ Lee Rosevere, "Curiosity."

sampling tool. Thanks Pepsi (Brown laughs)...So, we put these upside down, and they would have four tiles attached to it, two caged, two uncaged, and what we found when we pulled these up at just the right time of year, the entire Pepsi tray was full of serpulid worm reef, it's like, "Okay, well, we found the perfect thing to restore with, but it's not what we (laughs)"—so, the next step is to try to find a material that will be good for restoration for them. You know, with oysters it's fairly simple. We put, you know, they'll grow on rocks. They'll grow on limestone. They'll grow on concrete under the right conditions, in the right area. With these guys, the serpulid worms like to grow on the bottoms of things so that makes our job a little bit more complicated particularly if we want to scale up from the small little pieces that we've had out there in the past so that's our next phase, is figure out materials, get them out there.

[Brown]: Like Athena and Mike working on water quality, Tasha is excited about the future of Baffin.

[Breux]: I hope it's really bright. I mean, with all the efforts being put toward that bay right now, I'm really, really hopeful, and I think once they are able to really work at the water quality there, everything else really follows, so I look forward to when we're able to start restoring the benthic habitat there, but a lot of that does come down to the water quality, so it's going to be really exciting to see what happens out there in the next few years and beyond, but really I think soon. It's really soon that things will, I hope, start to improve.

Conclusion and Credits

[Brown]: As I mentioned before, the Baffin Bay story doesn't have an ending yet. With so many people working on restoration, though, it looks like we'll be able to read a fairy tale story soon. If you'd like to help, you can check out the [Bringing Baffin Back website](#). Thanks to Mike, Athena, and Tasha for the interviews, Lee Rosevere for the music, Alyssa Lucas for the production help, and thanks to you all for listening!

The Watersheds series of The Gulf Podcast is supported by the Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi. The views and opinions expressed on this podcast, however, do not represent the views and opinions of the Harte Research Institute or Texas A&M University-Corpus Christi.

<<musical interlude⁷>>

⁷ Lee Rosevere, "Curiosity."

Bibliography

- Besonen, Mark, Erin M. Hill, and Philippe Tissot. *Baffin Bay Sediment Core Profiling for Historical Water Quality*, Project 1514, Coastal Bend Bays and Estuaries Program, Publication #109 (April 2016): <https://www.cbbep.org/manager/wp-content/uploads/Baffin-Bay-Sediment-Core-Profiling-Final.pdf>.
- Bringing Baffin Back, <https://www.hartheresearch.org/collaboration/bringing-baffin-back>.
- Bringing Baffin Back StoryMap:
<https://storymaps.arcgis.com/stories/47d83387e5d841d3a7df92053fc9beca>.
- Darnell, Rezneat. *The American Sea: A Natural History of the Gulf of Mexico*. College Station: Texas A&M University Press, 2015.
- Murray, L. Scott. *World Class Texas Trout Tomorrow...With Best of the Best Fishers*. N.p.: Top Water Publishing, 2011.
- Palmer, Terence A., Natasha Breaux, Benoit Lebreton, Gaël Guillou, and Jennifer Beseres Pollack. "Importance of Serpulid Reef to the Functioning of a Hypersaline Estuary." *Estuaries and Coasts* 45, no. 2 (Mar. 2022): 603–618.
- Restoring Serpulid Reef Habitat in Baffin Bay.
<https://www.hartheresearch.org/project/restoring-serpulid-reef-habitat-baffin-bay>.
- Snyder, Gary. "Coming into the Watershed," in *A Place in Space: Ethics, Aesthetics, and Watersheds*, 219–235. Berkeley: Counterpoint, 1995.
- Waterman, Tim, Jane Wolff, and Ed Wall, eds. *Landscape Citizenships*. London: Routledge, 2021.
- Wetz, Michael S. *Baffin Bay Volunteer Water Quality Monitoring Study: Synthesis of May 2013–December 2019 Data*, Project 1913, Coastal Bend Bays and Estuaries Program, Publication #138 (March 2020): <https://www.cbbep.org/manager/wp-content/uploads/1913-Annual-Report-FINAL.pdf>.
- Wetz, Michael, and Scott Murray. "Baffin Bay: A Texas Treasure in Transition." *Texas Saltwater Fishing Magazine* 24, no. 4 (Aug. 2014): 44–47.
<https://www.texasaltwaterfishingmagazine.com/fishing/by-type/inshorenearshore-fishing/baffin-bay-a-texas-treasure-transition>.

Wetz, M. S., and D. A. Yoskowitz. "An Extreme Future for Estuaries? Effects of Extreme Climatic Events on Estuarine Water Quality and Ecosystem Dynamics." *Marine Pollution Bulletin* 69, no. 1-2 (Apr. 2013): 7–18.

Wetz, M. S., E. K. Cira, B. Sterba-Boatright, P. A. Montagna, T. A. Palmer, and K. C. Hayes, "Exceptionally High Organic Nitrogen Concentrations in a Semi-Arid South Texas Estuary Susceptible to Brown Tide Blooms." *Estuarine, Coastal and Shelf Science* 188 (Mar. 2017): 27–37.