

## S2E1: Watersheds: A Watershed Moment

The Gulf Podcast

### Watersheds Intro

<<rain drops becoming a heavy downpour, alongside slow piano music, the sounds of a thunderstorm<sup>1</sup>>>

**[Dr. Jen Brown]:** Watersheds, a series from The Gulf Podcast, devoted entirely to exploring the master variable for coastal ecosystems: freshwater inflow. <<rain and music fade out>>

<<a few musical notes as a short interlude<sup>2</sup>>>

### Introduction: The Third Thing

**[Brown]:** Hi everyone, this is Jen. I'm excited to be back for season two! In this series, I'm going to bring you monthly episodes about one of the most important factors for the coast. That is freshwater inflow. I love spending time in and on in the water, and I wanted to start by sharing a poem with you. The poem is called "The Third Thing," and it's by the English writer D. H. Lawrence.

Water is H<sub>2</sub>O, hydrogen two parts, oxygen one,  
But there is also a third thing, that makes it water  
And nobody knows what that is.<sup>3</sup>

Lawrence wrote that poem more than a century ago. Since then, we obviously know more about the molecular science that makes water possible. I read the poem, though, as the mystery of water. You know, the sensation of digging your toes into the wet sand at the beach. Or, the experience when you're fishing the gin clear water among the mangroves and oysters of the back bays. Or the feeling of water rushing over your body while swimming. To me, that's the third thing.

And it reminds me that much of what we love about the coast comes down to water. Estuaries create essential nursery habitats for fish, shrimp, crabs, and other marine resources. Their oyster reefs and wetlands protect us from storms and floods. And there are a lot of other benefits, as we'll see, to ensuring there's enough freshwater inflow making it to the coast. So

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

<sup>2</sup> 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).

<sup>3</sup> Quoted in Roger Deakin, *Waterlog: A Swimmer's Journey through Britain* (1999; repr., London: Vintage, 2008), 5.

that's why, this season, I'm going to dive deeper into how coastal ecosystems rely on fresh water. It's absolutely fascinating that the mix of fresh water and salt water in our bays and estuaries is essential for our coastal ecosystems and communities and economies.

<<musical interlude<sup>4</sup>>>

In today's episode, I'm going to give you an introduction to the changing water science and water law in Texas. Then, in all of the upcoming episodes, I'll examine anything from whooping cranes to those monster seatrout in Baffin Bay.

Our scientific guide for today is Dr. Paul Montagna, Chair for HydroEcology at the Harte Research Institute for Gulf of Mexico Studies. Paul's an expert on coastal water issues, and he was recently ranked in the top 2% of scientists in the world for research citations.<sup>5</sup> But he's also down to earth and quick to laugh. Paul is currently finishing up a new book for the publisher Springer Nature. It has the simple title *Freshwater Inflows to Texas Bays and Estuaries*.

This book synthesizes all of the new science and policy in the last three decades. A lot has changed since the last book was published on the topic and this was when Paul Montagna first started working on freshwater inflow.

**[Montagna]:** So, again, when I first moved to Texas, I was asked to study San Antonio Bay and Nueces Bay and try and determine how much freshwater it needs, and that work we did at the University of Texas at the time eventually was used by the Texas Water Development Board and Parks and Wildlife Department to create this book called *Freshwater Inflows to Texas Bays and Estuaries* and...we completed all the work in 1989, and it took Parks and Wildlife and the Water Board five years to get that volume out. So, when the book came out it was already five years out of date (laughs) and then of course it was the result of the laws that were passed in 1985. And in 2007, the state of Texas completely changed the way we do environmental flow regulations in the state and so now by time 2010 or so rolls around, these books are twenty, twenty-five years old, the data is thirty years old (laughs), the laws are completely different.

**[Brown]:** The old book clearly needed revisions.

**[Montagna]:** One of the days one of my students, um, looked up to me and he said, "You know," He was holding a copy of the book in his hands. He says, "You know, this is every one of your students' 'Bible,' but it's so horribly out of date and everything's wrong. You need to redo this," and, again, it's one of those lightbulb moments I thought to myself, "Yeah, we need to do a new volume of that because everything is so different today." So, that's what we're working on.

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<sup>4</sup> Lee Rosevere, "Curiosity."

<sup>5</sup> Olivia Santos and Nikki Buskey, "Dr. Paul Montagna Internationally Ranked Among Top Scientists for Research Citations," Texas A&M University-Corpus Christi, July 20, 2021, <https://www.tamucc.edu/news/2021/07/072021-dr.-paul-montagna-internationally-ranked-among-top-scientists-for-research-citations>.

<<musical interlude<sup>6</sup>>>

## **Chapter One: Drought and Water Plans**

**[Brown]:** Before we get into those scientific discoveries, I want to go back in time. I'm a historian by training, and I think if we want to understand the present, we need to learn a little more about the past. What's noticeable about Texas water history is that the state actually became a national leader in maintaining freshwater inflow to our bays and estuaries. In this episode, I want to talk about three important moments in the history of water in Texas.

The first is the drought of the fifties and the water planning that came after it. That's the drought of record for the state. It was transformative event, and we're going to come back to it in an upcoming episode. The drought made many people realize the need to take care of our natural resources and to have freshwater flowing into our bays and estuaries. It also set the state on a path of large-scale reservoir building and water plans.

One of those water plans was a pretty crazy and ambitious scheme. It was first proposed in 1968. Here's Dr. Ken Kramer to tell us more about the plan. He's now retired and living on his grandparents' cotton farm in central Texas, but before that, he served as the longtime Director of the Lone Star Chapter of the Sierra Club. In that position, Kramer worked on Texas water issues for decades.

**[Kramer]:** I started my graduate work around the time that Texans were voting on a major constitutional amendment defined as what was known as the 1968 Texas Water Plan. And that Texas Water Plan was, among other things, proposing to bring water from the Mississippi River across Louisiana to East Texas, and then send it by pipeline or canal to different parts of the state of Texas, like the Panhandle, El Paso, South Texas, and Corpus Christi. It was considered to be a major environmental boondoggle, if you will, that would cost way too much money, require too much energy, impact natural habitats and environments, and really be an environmental disaster.

**[Brown]:** The 1968 water plan was so grandiose that the developers who proposed the plan were sometimes called "water hustlers."<sup>7</sup>

**[Kramer]:** There was a great satirical piece in the *Texas Observer* about this so-called Texas Mountain Plan, and the premise of that satirical piece was that Texas didn't have any ski mountains and we needed to import ski mountains into Texas, so that we'd have the opportunity to develop a skiing industry for snow skiing. I thought that was the perfect parody, trying to bring all this water from the Mississippi River to Texas.

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<sup>6</sup> Lee Rosevere, "Curiosity."

<sup>7</sup> See Robert H. Boyle, John Graves, and T. H. Watkins, *The Water Hustlers* (San Francisco: Sierra Club, 1971).

**[Brown]:** Texans, however, voted against financing the plan. Over the next decade, they opposed other propositions to pay for water development. The plans were just too expensive and had too many environmental impacts.<sup>8</sup> That gets us to the 1980s and the need for a new approach.

<<a few musical notes as a short interlude<sup>9</sup>>>

### Chapter Two: House Bill 2 Era

**[Kramer]:** Those three proposed constitutional amendments in 1969, 1976, and 1981 all went down to defeat, in large measure, because the opposition of environmental groups and fiscal conservatives. And so one of the responses to that was in 1982, Lieutenant Governor [Bill] Hobby wanted to come up with a more, I think, sort of compromise-oriented water proposal...So, he basically encouraged people to come together with a consensus of water policy for the state that would include financing and more of what I would term management aspects to water policy, not just building new reservoirs or new water supplies, but more actively managing our existing water supplies for conservation and for environmental protection and things like that.

**[Brown]:** The lieutenant governor put together a policy group, which had some stakeholder advisory committees, and they recommended some policy changes.

**[Kramer]:** And that set of recommendations turned into what was known as the 1983 Senate water package...that would have done various things like provide new money for water development, but also set in place some conservation requirements for people getting financial assistance from the state for water projects. It would have required some specific provisions for protecting freshwater inflows to bays and estuaries to protect sea life in our bays, and it would also promote agricultural water conservation and some things of that nature like groundwater management. That 1983 water package made it through the Senate, but eventually it was passed in a different form by the House, but a much weaker version went to conference committee at the end of the 1983 legislative session. They could not reach agreement on a compromise between the House and Senate versions. And so that basically, however, laid groundwork for the 1985 water package.

**[Brown]:** The passage of the 1985 legislation ushered in the second important moment in the history of Texas water that I wanted to talk about. Paul Montagna calls this the House Bill 2 era. At the time, the state was in middle of an oil bust and trying to diversify its economy.<sup>10</sup> One of the things it did was try to protect species important for the coast by ensuring freshwater inflow.

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<sup>8</sup> opposition: see Ken Kramer OH, OH article from 1987, the book the water hustlers

<sup>9</sup> Lee Rosevere, "Curiosity."

<sup>10</sup> For the oil bust, see Calvert, De León, and Cantrell, *The History of Texas*, 407–409, for diversifying the economy, see Texas House of Representatives, *Journal of the House of Representatives of the Regular Session of the Sixty-Ninth Legislature of the State of Texas*, Volume 1 (Austin: Texas House of Representatives, 1985), accessed February 4, 2021, <https://texashistory.unt.edu/ark:/67531/metaph125384/>.

**[Montagna]:** Environmental policy in the United States, and all the individual states, was always pretty much a species-based management approach. In other words, legislators thought, “I really like redfish, let’s make a rule to make sure there’s a lot of redfish in the bay,” or, “I really like flounder. Let’s make a rule to protect flounder,” and in fact, in the 1985 version of the environmental flow law, it specifically listed just seven species that the object was to maintain black drum, red drum, spotted seatrout, flounder, shrimp, blue crab, and oysters. That’s the seven species and that was it. That was our goal.

**[Brown]:** This was the beginnings of Texas as a national leader in maintaining freshwater inflow. The ’85 legislation led to more scientific studies and even gave rise to Paul’s career.

**[Montagna]:** I was hired to be an assistant professor at the University of Texas way back in 1986, and one month before I was supposed to start...I come down to Port Aransas...and we’re meeting with a guy named Gary Powell who is the director of the Surface Water Division of the Texas Water Development Board, and he asked us all a simple question. He said, “Well, I need to know how much water has to flow into San Antonio Bay to maintain bay health” and at the time being both young, naïve, and probably a little overconfident, I thought, “Oh, that’s a simple question. We could answer that in a year or two.” Well, it took me twenty years to figure out how to ask that question the correct way, so it was answerable (laughs)...and so that simple question started basically a whole career for me...and also at the time the director of the marine lab I was working at, he wanted all of us to make sure you’re actually doing something in the backyard. I mean, here we are right on the bay, do something here, do something local, do something to help the state of Texas, and it was literally the perfect question for me because it allowed me to start taking samples in the bay systems right away on a question that is still vitally important today so many years later.

**[Brown]:** The changes to the law also led the Texas Parks and Wildlife Department to bring in more hydrologists and other engineers and scientists.

**[Loeffler]:** One day in the dead middle of winter, cold outside, the days are short because it’s Colorado, and somebody else in the group got a phone call from Texas Parks and Wildlife and wanted to know if there was anybody interested in being a hydrologist (laughs), and so, I remember it like it was yesterday that the fellow who got the call stood up, held the phone away from his ear, and just said, “Anybody want to go to Texas?” and like, well, maybe (laughs). So, next thing I know, Larry McKinney is interviewing me on the phone and job offer on the phone, and I said, “Uh, we might want to come down there first and see,” and so once I got to Austin and got to Texas, it was, you know, an easy decision to make...I really didn’t intend to apply to the department, but it was, again, another great time to get into the agency because of everything that was just beginning back then. This was 1987, early 1987 and, yeah, it was quite a good career there.

**[Brown]:** That’s Cindy Loeffler. She’s now retired, but was a hydrological engineer with Texas Parks and Wildlife Department and eventually became their Branch Chief for Water Resources. Back in the eighties, Cindy and others started working to determine freshwater inflow

recommendations. They and other scientists collected a lot of data, built new models, and advised other state agencies on environmental flows. Cindy found the process rewarding.

**[Loeffler]:** Engineering is about problem solving, and so it was like if you could come up with a way to satisfy all these competing needs or figure out how to adjust those competing needs so that you could find the solution, it was in there somewhere, that, to me, really made it, made it interesting.

**[Brown]:** But it wasn't always easy working on water issues in Texas. Former Executive Director for Texas Parks and Wildlife Dr. Andy Sansom remembered.

**[Sansom]:** Well, I can tell you that Larry McKinney used to come in my office...almost every day, the two of us would check to see if one of us had been fired (Brown laughs)...that's how difficult those kind of things have been in Texas, is we were always on the edge by standing up.

**[Brown]:** But they continued the work and the state mandate at that time, as you will recall, was to make sure there was enough water for those seven species "economically important" for the coast. Fresh water provides important nutrients and sediments. It also regulates salinity levels. All of these and other variables make estuaries into nurseries for fish, shrimp, crabs, and oysters.

**[Loeffler]:** Oysters always ended up being one of the species that were important in all the bays...we had fairly well documented ranges of salinity preference and dissolved oxygen preference and temperature preference as well as thresholds, tolerances like if salinity gets above some level, the oysters don't thrive. Or, if temperature gets below a level, they don't do well. And oysters were a favorite. We ended up kind of thinking of them as the canary in the coal mine for estuarine systems because they're not mobile.

**[Brown]:** Eventually, the science became more complex. When researchers started going deeper, they realized that, unlike rivers, there was not a direct link between environmental flows and important species. Figuring out the indirect part was a key discovery. The scientists found that the fresh water helps create the habitat and then the habitat helps plants and animals. Paul likens it to a series of dominos that need to fall in order to have good fisheries.

**[Montagna]:** What we realized, it wasn't a direct relationship, between inflow and biology, it was an indirect relationship. So, we could understand how flow was affecting habitat, estuary conditions, water quality conditions, sediment quality conditions, those are the things that the animals and the plants are responding to, and we can come up with our standards and flow requirements that way. That was a huge breakthrough and that completely changed the way that we started doing business. And so then we started focusing a lot more on making specific measurements between the organisms and how salinity change, in particular, is affecting habitat quality and how the habitat quality was being affected by the physical environmental flow...Anyway, that really, really changed the way we looked at things and we really started making a lot of progress at that point on because then we started seeing different kinds of

things that need to be measured, we started developing new models and analytical approaches to dealing with data, and we started thinking about new ways in which to put the diverse data sets together, and that's basically what I've been doing for the last thirty-four years, thirty-five years (laughs).

<<musical interlude<sup>11</sup>>>

### Chapter Three: Senate Bill 3 (2007)

**[Brown]:** As scientific advances were being made, it helped policymakers rethink Texas water laws. The most important was Senate Bill 3. That's the third moment in Texas water history that I want to talk about today. The law was passed by the state legislature in 2007. Senate Bill 3 created a process to determine freshwater inflow standards for all the Texas bays, among other things.

Dr. Andy Sansom was one of the folks who served on an advisory committee to help draft the law. From his time at Parks and Wildlife, he came to recognize the value of water, and continued that work as Executive Director of the Meadows Center for Water and the Environment in San Marcos.

**[Sansom]:** Well, you know, if you are interested in nature, you're always led back to water. I mean, it's the one thing that no plant or animal including human beings can live without, and so you can't get into this business at all without eventually understanding the significance of water to biodiversity and outdoor recreation and all the other things that we love about being outside without understanding both the significance of water to biodiversity but also the threats that we face because of the way we manage water.

**[Brown]:** Senate Bill 3 helped Texas rethink the water needed in order to keep our bays and estuaries healthy. Just as important, stakeholder committees determined the standards, and that ensured the decisions would be made through a consensus.

**[Sansom]:** I think the big breakthrough was finding a way to create a process that was inclusive.

**[Brown]:** A stakeholder committee was set up for each Texas bay and river basin. The committees had to have representatives from agriculture, industry, city governments, commercial fishing, recreation, river authorities and water planners, and environmental groups. Each bay and basin stakeholder committee was also advised by an expert science team. In Senate Bill 3 (2007), the scientific management goals also changed from focusing on those seven single species to an ecosystem-based management approach.

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<sup>11</sup> Lee Rosevere, "Curiosity."

**[Montagna]:** Well, the problem is, when you're managing an environment for one species, you actually may be hurting another, and in fact, it's kind of like if you're growing tomatoes in your backyard. You don't ensure a healthy crop by measuring each tomato every day (laughs). What you do is you nurture it, you add fertilizer, you add water, you clear out the weeds. In other words, what you do is you build an environment that is conditioned for the growth of the things you care about and then you don't worry about the specific crop you may be growing, but that's the way the bay works too.

**[Brown]:** The new focus on habitat was part of a larger shift going on.

**[Montagna]:** And so right around the year 2000, there's a real transformation in the US, and that's probably the whole world, where environmental regulations and rules started focusing more on, well, let's protect the habitats, kind of like if you build it they will come (laughs), and we started realizing that rather than trying to protect an individual species, we'd be better off protecting the integrity of the environment and the habitat...so we really moved towards this idea that if we protect the environments, protect the ecosystems, try to maintain healthy ecosystems in general, then all the things we care about will be there for the next generations. We don't have to worry about targeting specific species, per se. Now, don't misunderstand me. I'm not saying that targeted species are not necessary. For example, redfish, black drum, flounder, spotted sea trout, you know, those are targeted by fishermen so you have to have, you know, specific slot and size and bag limits on those kinds of organisms, and of course that's where our fisheries management regulations come in. So they're important. But if the bay is no longer conducive for a black drum or redfish to grow in, they aren't going to grow there no matter what you do with your regulation side of it. So, we kind of realized that the fishing regulations must be enhanced by also having, in general, environmental and habitat protection programs.

### A Watershed Moment

**[Brown]:** Senate Bill 3 has made Texas into a national leader in protecting freshwater inflow. But it's not perfect.<sup>12</sup> And we live on a growing coast and in a growing state where there are more demands for water.

**[Montagna]:** So here's the good thing. The good thing is for the first time we built environmental flow standards for every bay, every basin, every river in the state...we've got a nice environmental management approach, ecosystem-based management approach, and we're looking at the most important thing that makes the bay and coastal zone and estuaries what they are, that's fresh water mixing with sea water. So, that part we got right.

**[Brown]:** In other ways, though, Senate Bill 3 (2007) has fallen short of expectations. It has pretty complicated regulations. And while it set aside environmental flow provisions for

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<sup>12</sup> See, among others, Katherine A. Roach, "Texas Water Wars: How Politics and Scientific Uncertainty Influence Environmental Flow Decision-Making in the Lone Star State," *Biodiversity and Conservation* 22, no. 3 (Mar. 2013): 545–565.

unallocated water, it didn't do anything for existing water rights. In some basins, there are actually more water rights than water itself. That over-allocation is only starting to be addressed through other methods. But one thing that Senate Bill 3 actually did was that it created an adaptive management process.<sup>13</sup> That's a unique provision.

**[Montagna]:** Adaptive management means if it doesn't work, you can change it, but that's a wonderful idea. The problem is we have this volunteer stakeholder process running all of that. So, what happens if you throw a party, and nobody comes (laughs)? This was my biggest fear when I was sixteen years old and my parents threw a birthday party, "What if nobody comes?" Well, that's what's going on. So there's seven of these stakeholder committees across the state for each main basin system and many of them haven't met, you know, in ten years...Half of the committees aren't even populated anymore and in particular some of the committees, the chairman is either retired or moved away, and so now these things are totally leaderless and we don't know how to reconstitute them, we don't know how to come up with a new, you know, a new leader. And we've also gotten to the point, ten years after this process began where there's been so much turnover in all the different resource agencies and communities that I discovered that most people don't know what this issue is about and don't even care about it anymore and that's something I'm real concerned about because we did enter the adaptive management phase in 2021, and it's supposed to go between 2021 and 2024, and I don't see any activity happening anywhere throughout the state. So, that part is broke (laughs).

**[Brown]:** We're at a time, then, in which we know a lot more about the science behind freshwater inflow, we know what solutions can work, and we need adaptive management to take place. But it's not. I don't see that as a problem, but an opportunity. That's why I think we're in a watershed moment. We're in a perfect place to reexamine coastal water issues. And Texas has a good history of protecting environmental flows and preserving natural resources. That's also why, on this season of The Gulf Podcast, I'm going to share stories about whooping cranes, fishing, and other topics as we examine the importance of fresh water for the coast.

<<musical interlude<sup>14</sup>>>

### Credits and Disclaimer

**[Brown]:** This season of The Gulf Podcast is supported by the Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi. You should know that the views and opinions expressed on this podcast do not represent the views and opinions of the Harte Research Institute or Texas A&M University-Corpus Christi. You can read episode scripts, oral history transcripts, or listen to all of the oral history interviews featured today by going to The Gulf Podcast website. You can also follow The Gulf Podcast on Instagram and Facebook for the latest updates. Thanks to my student production assistant Alyssa Lucas for the help and thanks to Lee Rosevere for the music. And thank you all for listening. I'll see you next time.

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<sup>13</sup> Montagna, Palmer, and Pollack, *Hydrological Changes and Estuarine Dynamics*, 30–32.

<sup>14</sup> Lee Rosevere, "Curiosity."

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