Cindy Loeffler

Interviewed by Jen Brown
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San Marcos, Texas

Transcribed by Alyssa Lucas

[Jen Brown]: Okay, we are recording. This is Jen Brown. I'm here with Cindy Loeffler, and it is March 27, 2022. Um, we're here [ed. note: San Marcos, Texas] to do an oral history about her work in Texas water issues as a hydrologist. To begin do I have your permission to record?

[Cindy Loeffler]: Yes.

[Brown]: Okay, thanks. To start since this is an oral history, can you tell me more about your background and early life?

[Loeffler]: Sure. Um, so growing up my family moved around a fair amount, so I lived in a number of different states, born in Colorado, but lived on, you know, lived in Virginia, lived in Wyoming, lived in Louisiana, eventually ended up in Texas, which is (coughs) for the job with Texas Parks and Wildlife, which is sort of a funny story in itself. But, yeah, so we moved around a lot. My father worked for the federal government, for the U.S. Geological Survey in water resources so, um, apple didn't fall far from the tree (Brown laughs) as they say, and I can't remember a time when I didn't really have an interest in water, you know, just playing around water growing up, going fishing with my grandmother, you know, early, early memory, but I think it was more so my mother who encouraged me to kind of take the path that I did when it came to education and looking at first jobs and things like that and one of the early memories that I have was, I was about ten when the first Earth Day happened, and we lived near Washington, D.C., then, and there were all these events for the public to participate in for Earth Day and that particular day, I mean, it was a day that I remember very clearly is where I think I got the inspiration to work on environmental conservation and then the water piece of it came later, but I've just really always had that desire to, to do something in that area.

[Brown]: What do you remember about that day?

[Loeffler]: I remember it being—of course, it was in April, and it was a beautiful spring day, trees were looking, maybe cherry blossom trees probably, and the activity they had us doing was picking up trash, um, but everybody was so energized and excited, and I just remember it being this really positive experience, um, doing it and it was gratifying. It's like, you think about it now and you're picking up other people's waste, but at the time you could see the difference that we were making on this little patch of the neighborhood, picking up trash, and I think it was the way it made me feel just like, I can make a difference and this is something I want to do, and so I really from probably then on out because we moved, I think to Louisiana, not long after that thinking about the sort of courses I could take in school and activities that I could do

out of school and things like that to really stay on that path so.

[Brown]: And you said your mother encouraged you a lot?

[Loeffler]: Yeah, um, so she, she was the one who would take us around to these things, and when we lived in northern Virginia, she was really a big proponent of taking us into the city to go to the museums, Natural History Museum, Smithsonian Natural History Museum was a big favorite, Civil War battlefields and just running around, but her upbringing, kind of skipped over this part, she was born in Denver, but raised in Estes Park just outside of Rocky Mountain National Park. Her great—her grandfather, my great grandfather lived in Rocky Mountain National Park. He was a painter and so growing up we would always go back to the park to visit him, spend time there and that, of course, had a big impression on me, just being at Rocky Mountain National Park on a regular basis growing up. So she, my mother, understood how important it was to enjoy the natural resources that way that we've set aside, and then on my dad's side, they were farmers, western Colorado, and so summers that we would spend on the farm or parts of summers and just really, I think that's something I regret a little bit that kids today don't have more of that opportunity to just really see where your food comes from and how crops are raised and where your eggs and milk and all of that come from and so I've got first hand exposure to that, that was just wonderful.

[Brown]: Wow. So, you knew you wanted to study something environmental going into college—

[Loeffler]: —Um-hm—

[Brown]: —and how did you make that decision?

[Loeffler]: Well, so, part of it was, I mentioned we had moved to Louisiana so just north of New Orleans and Slidell and part of it was the group of friends that I got together with, you know, eventually there, but really when I think back, I had two science teachers or two teachers in the ninth grade, one science, one math. So, ninth grade biology and I guess it would have been, I remember—don't remember what the math level was at ninth grade, tenth grade, but two teachers that really made an impression on me and made it fun to learn those subjects and so that, that was huge. Um, doing that and then like I said the friends and back then I was, my plan for life was I was going to go study forestry at Louisiana State University and that was, you know, that was it and my mom, again, was the one who a couple years later when it was time to start looking at applying to colleges, by then we had moved to Colorado, and she had encouraged me to look into this engineering program at Colorado State University and I thought she had lost her mind. It's like, why would I want to do engineering? I think I was, eleventh grade then, and she said, "No, really, look at this," and they had environmental engineering and so I thought, "Well, okay, there it is. That's what I'll do" and the more I looked at it though, environmental engineering then was really all about designing landfills and wastewater treatment plants and things like that and I knew that wasn't what I wanted, but I did manage to get into a program that was called engineering science so it's an engineering

degree, but the engineering science piece of it is you get to tailor your degree to what your interests are. So, did all the engineering basics, you know, core curriculum, and then added on from other colleges there water law and water policy and went over into the natural resources college and took all the hydrology and watershed type classes over there, and so it turned out to be a really unique opportunity to pick and choose and take all the classes that were of interest to me and put a degree together that way. Now, it did take longer (both laugh). It took five years to get that degree, but I was exposed to so much, and then when I graduated and had my degree that set me up to be able to go to U.S. Fish and Wildlife Service, work there for a couple of years, and really get on the ground floor for some of the, at that time, pioneering work that was being done by Fish and Wildlife Service to, to design these computer programs, computer models for determining how much water rivers and streams needed so of course that was a great set up and segue into the job in Texas that came a couple years after that, so I've told my kids and young folks, it's like, "it's good to have a plan, where you want to go, what you want to do, but it's also good to be flexible and to be open to these opportunities when they just show up and see what the world holds because you just never know."

[Brown]: Yeah. So, how did you get interested in studying water at CSU?

[Loeffler]: So, CSU, Colorado State University, is one of the foremost water universities if you will, um, out there, especially when you think about things like designing agricultural irrigation systems and kind of because it's the, CSU is the land grant college in Colorado, and so that's really more of their focus or it was at that time. Of course, today, like all universities they are much broader in their thinking and, um, kind of look at sustainability a lot and thinking about water conservation and those things, but again like I said from the earliest days, I remember just being enchanted really is a word that comes to mind. I, you know, I think about when I got in trouble as a little kid, it was because I was over at the pond or playing around the irrigation ditch or doing something like that, that is inherently dangerous, but to me, it was just so tempting. The—(Brown laughs) couldn't stay away or taking my younger siblings on these, um, this one that we took in northern Virginia, Alexandria, Virginia, to go find a creek and so we just took off. We hadn't lived there but a couple months and we just took off one summer morning and found this creek and I think back now, it's like, "I wonder if mom knew what we were up to that day," but (both laugh) it was just exciting so. Yeah so, and then like I said getting into more the technical, the science and math aspects, engineering aspects, and of course my father's work. When we were in Louisiana, he worked for, again, the U.S. Geological Survey, but the—part of his job at that time was looking at equipment for measuring water. So, flow meters and making sure that flow meters were measuring accurately and so he would take us to the lab where they tested this equipment and explain it all to us and, yeah, it was just fascinating so that was walking into a big giant, I want to say lab. It was really more like a big facility. Actually, it turned out to be where they tested the space shuttle engines in Mississippi. It was that facility and there's just something—I mean you're around water of course, but there was just something fascinating about being able to work in an environment like that. So, it helped me to continue thinking and, of course, the natural resource that the environmental piece, the ecological significance, that was really my passion, my, you know, what I wanted to get into and so looking for college degree programs that are really—I mean, you could go fisheries biology,

but that wasn't necessarily what I wanted to do, um, but thinking about, and when I got to Fish and Wildlife Service this became very clear, is how can you take the traditional disciplines of engineering, hydrology, civil engineering, those things, and apply the principals to conservation of rivers and aquatic systems and things like that. So, the experience that I gained from working for the people, it was called the Instream Flow Group at U.S. Fish and Wildlife Service, just irreplaceable. I mean, I, again, sometimes I pinch myself that I managed to just luck in to getting a position there. I was initially, I started as a—I would read articles and abstract them so kind of basically get out the, what's the key message of a particular article or something, and then have to enter it into a computer. Back then, these computers were very archaic and, actually, it was entering it into a mainframe computer, so I wasn't even near the computer. It was just some little terminal in a windowless room for like eight hours a day and so I'm thinking to myself, "This wasn't really what I was thinking in terms of working on environmental things," but I had to get started, pay my dues, get in there, and show them that I was somebody that could be depended upon and then after that, got into, I wasn't actually writing the computer programs to do the simulation modeling, it was more like my job was to see if I could break them (both laugh), you see, find the bugs in—

[Brown]: —Um-hm—

[Loeffler]: —the programs. So, initially, that's what they had me doing, and then ultimately at the end, it was starting to get into, all right, writing the programs, and see if you can—I remember one of the projects I was working on there, towards the end. Of course, being supervised by the guru of instream flow modeling was trying to determine how much sediment is transported in a river during a flood event or different flow events, and it's harder than it sounds. We, we did come up with several ways to do it, but the data input for it was pretty, pretty enormous. You have to go out and collect all the sediment data from the stream and measure it and dry it and measure it and come up with a distribution of particle sizes for all the different sediments and it just turned into a lot, and so it's like, all right, proof of concept. It works, but maybe that's not going to be something that everybody wants to do.

[Brown]: Hm, and you said (both talking at once)—

[Loeffler]: —It's interesting—

[Brown]: —the guru. Who was that?

[Loeffler]: So, Dr. Robert Milhous, Robert T. Milhous, um, he was quite a character. I really enjoyed working with him. I interacted with him maybe an hour or so a day because he would come in at night, and do his deep thinking, his best work writing computer programs, and things like that, and he would do this in the middle of the night, and so I would get these instructions from him that would have and, you know, this is all on computer printouts and things like that at like 2:00 a.m. or something or 3:00 a.m. that he was working on these things, but he would give me, "Okay, this is what I worked on last night, this is what I want you to do today," and so we kind of worked like that for a while and then another part of what I did there

was to write the manuals to go with these various programs, and like I said, figure out how to break them, but by writing the manuals, user manuals, for how you ran these various different programs, that helps you learn too. Even if it was code that you hadn't written, to write the manuals, you have to run the programs to make sure you understand what they're doing and so, um, a lot of the basic fundamentals, I mean, not glamorous by any stretch, but getting to really see the basis for how those things worked. So, that, like I said, I think that set me up really well and really, I was intending to keep working at Fish and Wildlife Service. I was on soft-money contract position, but one day in the dead middle of winter, cold outside, the days are short because it's Colorado, and I get this phone—actually, 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, and so (laughs) 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 an easy decision to make, but, um, that was the kind of funny story about working at Texas Parks and Wildlife. 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]: Yeah, so can you tell me, um, starting out, what you did and your role there?

[Loeffler]: Sure. So, I was hired as a hydrologist and there was one other hydrologist already at the agency, but he was within months, weeks maybe, of retiring and he worked in a completely different part of the agency. He worked over in the State Parks Division, Harry Arfman, and Resource Protection Division was just a brand-new division. I think it had been created the year before, maybe two years before, due to Sunset Commission recommendations that the agency needed to go this direction. So, brand new division, brand new program, coastal studies was the program I was hired into, brand new position as hydrologist so, okay, blank slate. We had our marching orders, what we were supposed to work on, but how we went about it was really up to us. I recall that we had our charge, like I said, to determine freshwater inflow needs for Texas bays and estuaries. We were to work with the Texas Water Development Board and at that time the Texas Water Commission, but in terms of how we fulfilled that mandate was a little bit wide open, or at least it seemed like it to me. I remember thinking, and this girl from Colorado, it's like, "Okay, and what have I gotten myself into?" I remember thinking it'll be a miracle if I make it five years (coughs) doing this, you know, if we make any progress. I mean, I didn't have the greatest aspiration initially for how it was going to go and of course, long story short, we did fulfill that task and many, many more. Yeah, it's pretty gratifying to think back, you know, starting from almost nothing. I mean it wasn't completely nothing. Larry put together a really great team, but to go from that to published studies, published recommendations, and then implementing those recommendations, which we'll probably talk about, but the other part of my job at that time as a hydrologist was to work on, make recommendations on Texas water rights. So, this is also a brand-new role for the department. So, in Texas, surface water is property of the state. For somebody to use a water right or to use

water for almost all purposes requires getting a, a water right from, at that time, it was Texas Water Commission, now it's Texas Commission on Environmental Quality, and this was at the time when other western states, and I had learned this quite well from my education at Colorado State University and the Fish and Wildlife Service in Colorado, other western states have made progress in having what you call special conditions on water rights, which essentially means leave some water in the river for fish, and so really charged off down the path of writing comment letters for the most part to TCEQ, Texas Water Commission, um, to get them to leave water in the stream, and that also kind of morphed into, sometimes there would be contested hearings on bigger projects that would be much more involved than writing a letter, you know, having to go and represent the agency or to make, you know, be an expert witness in a hearing or something like that. That came later. That was something that didn't happen on a routine regular basis, but Resource Protection Division, and I'm just giving the water rights piece of it, but the division itself did a lot of that type of work with the U.S. Army Corps of Engineers on habitat impacts, Clean Water Act, Section 404 type impacts, so that was something we did a lot back in those days in Resource Protection under Larry's leadership (coughs), and various degrees of success in going that route, but it's a way to get started. It's a way to get your foot in the door and begin to slowly effectuate change, and so when you go back, at that point in time, there were maybe two water rights, I think, that had special conditions of any note and today there are more. I wish there were more than there are, uh, you know, what we were up against is that by that point the state had already granted most of the water rights or granted rights for most of the water that they could, so we're in a little bit of a scenario today or a lot where really the most viable option is to begin to buy back water rights or seek donation of water rights. So, towards the end of my career, that was something we were focusing on more and there are other entities out there now that are really taking that on in a big way, but so

[Brown]: Hm.

[Loeffler]: Anyway, from humble beginnings of who am I and why am I here and what am I doing, um, working on science piece of it and, like I said, making recommendations to other agencies to really developing the science, that's Texas Parks and Wildlife role, clearly developing the science to base these decisions on and then also the tools for how to really select and identify for voluntary donation or purchase water rights strategically that can benefit the environment in perpetuity because these water rights, when they're granted by TCEQ, they're in perpetuity. They don't come back to the state so.

[Brown]: Can you tell me more about, um, that science and then those tools you used at the time to create the freshwater inflow recommendations?

[Loeffler]: Sure, yeah. So, when you think about, um, what happens in our Texas bays and estuaries, it's very complex. That I will tell you at the get go, very complex. When you think about biological systems, hydrological systems, things that happen on a temporal scale, um, everything from a, you know, what happens in twenty-four hours in a bay to what happens over the course of a year or multiple years, seasons, seasonality, and then when you start to think about the complexity of the biological, ecological web, trying to capture that in a

computer model is nontrivial, and so really to break it into manageable chunks, we would think about the hydrological modeling piece of it, which was largely Texas Water Development Board's purview and then you think about the biological modeling, developing relationships between (coughs) species needs and specific parameters that are measurable and predictable (laughs). So, measurable and predictable being things like salinity and temperature, and dissolved oxygen. We did some work related to nutrients and sediments and I kind of touched on data needs related to sediment loading is kind of involved, and nutrients even more so. So, sediments and nutrients were things that we did work on initially, but later on in the application of the actual, the 1994 Longley, et al., *Freshwater Inflows to Texas Bays and Estuaries*, much more emphasis was put on the circulation modeling, looking at the relationships between freshwater inflow, water flowing in, and salinity I would say more than anything. And so, what we would do is, the agencies worked very closely together, which was, you know, looking back, it could have gone another way. It could have been that the agencies kind of stayed in their own lanes and didn't really interact much, but that's not how it was at all. We had frequent meetings. We had intensive inflow studies, we called them, where we would be out on the bays, at least seventy-two-hour surveys all day, all night, seventy-two hours collecting data, all the agencies, three agencies, and by the time you got done doing one of those studies, of course they took quite a bit of lead time, preparation, planning on the equipment, personnel, boats, logistics, all of that, to conducting the study, and then you end up with all this data for the modeling, we ended up building really great working relationships, I would say, among the agencies on these things, but the key starting piece of the puzzle was this model called TxBLEND, which is a finite element model, again, Texas Water Development Board would run it. It would take the input of gauged flow coming into the estuaries and then you would have to do an exercise of estimating how much water was coming in as rainfall on the bay or rainfall on the land surface that wasn't reflected in the gauge record. Come up with those estimates to go into the model and then, you know, I'm going to leave something out because it's been a few years, but looking at things like the tidal signal, looking at things like wind directions. We had wind data that would go into these models, um, various related aspects of—I remember looking at doing some data analysis with the Coastal Fisheries data, looking at moon phases. It's like who knew moon phases do affect abundance of some species but, anyway, so these circulation models would tell you if you had this much inflow in this type of a seasonal pattern or monthly pattern, these would be the salinity patterns you could expect and, of course, let's take oysters for example. Oysters always ended up being one of the species that were important in all the bays. We were tasked with looking at ecologically significant and economically important species. So, Coastal Fisheries data at Texas Parks and Wildlife had just been collected for, gosh, now at least forty years' worth of Coastal Fisheries data where crews go out monthly, weekly, maybe daily in some cases, collect this data, and document all of the species in our bay systems. So we had a wide variety, hundreds and hundreds of species to choose from, but when you really focused on the task at hand, ecologically significant and economically important, oysters always made the cut, you know, oysters were important, blue crabs, white shrimp, pink shrimp, redfish, I think some of the different fishery species that would go into these analyses. And so, for something like oysters, we had fairly well documented ranges of salinity preference and dissolved oxygen preference, 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. They generally stay put and so when you're thinking about the complexity of circulation patterns and, um, having salinity gradients, that was really important is if you're near the mouth of the river where the freshwater is coming in, you've got a fresher environment there and you have the part of the bay versus if you're down near the gulf pass. It's saltier, but oysters they would find the sweet spot and a zone usually towards the middle of the bay and so being able to come up with freshwater inflow needs to maintain the habitat in those areas, really, it was how we, you know, multiagency teams were able to kind of take, again, all of this disparate information and these models that the Water Development Board had created, the TxBLEND circulation models, and find these relationships and make the predictions for if this amount of water is provided to the bay on this schedule then these habitat conditions will exist and the species will thrive. So, sounds good on paper (both laugh), and we were able, of course, with the Texas Parks and Wildlife monitoring salinity, monitoring stations that we have up and down the coast and when Texas Parks and Wildlife does their fisheries monitoring, they call it resource monitoring, they collect information on environmental factors too. So, we had a lot of data, but what I did come to learn is when you have extremes, when you have severe droughts like we had in 2011, when you have floods, big freshening events that sometimes are associated with hurricanes like Harvey and Ike and some of those that you—or freeze events, um, really difficult, really hard on resources. When you have those extremes, you can see these reset events happening in the bays that are hard to predict, hard to manage around, but that's a given in these natural systems that you're going to see extremes.

[Brown]: What happened after you developed these recommendations?

[Loeffler]: (Laughs) So, after we developed the recommendations, we put together recommendation reports, one for each of the major bay systems, so that was our task. I think there were seven major bay systems. We started with the Guadalupe Estuary. So, we're sitting here in San Marcos, Texas, and we're in the Guadalupe River Basin so the Guadalupe Estuary was the first for which we made a recommendation and that freshwater inflow recommendation, I think, that report came out in about 1997 or so, and our recommendation was for something on the order of, I think, it was like 1.2 million acre feet annually and I should have added that when we when we created these recommendations, we would have different levels of inflow recommended. So, there was a level of inflow that was like an optimum amount. You know, if we could get this amount every year, everything would be great, but if we can't get that amount, if we could get this minimum amount, and this was really about maintaining salinities above a certain threshold level then the bay will be okay. And, looking back to what these recommendations look like now, you know, back then in 1970, it was 1977, it was a little bit crude or rudimentary in terms of thinking just send this amount of water down the river every year and this is, this is what you'll get in return, and of course it doesn't work quite that way. And when we put out that recommendation, it didn't happen immediately, but not long after, there was kind of an uproar, a little bit of a hue and cry, if you will, from the water development community. Some of the river authorities just really raised an eyebrow at

that, you know, like, “That’s a lot of water. What are you thinking?” Some years later, this was quite a few years later, around 1999 I think it was, couple years later, there were some local nonprofit groups, one here in San Marcos, that got the idea of applying for water rights for that amount of water for keeping in the river. So an environmental water right, an instream use right, and so when that happened, that really got people’s attention. When, you know, that wasn’t something Parks and Wildlife did, it was a local, the San Marcos River Foundation here in San Marcos, they did it, but I remember it felt like a real turning point because before that, I think, I don’t know, there were, not me, but maybe there were some folks out there in the world that thought that these recommendation reports would be finished and put on a shelf, and that would be the end of that because the legislature didn’t really task us with doing anything beyond that with these recommendations at that point. So, I think there was a bit of a sense out there, and plus in 1997 there was a drought going on in Texas, that it became much more clear to others in the water community that, no, really, we need to do more than just study what the bays need. We need to take action. So that happened. Also, around that time, so 1997 was a rather severe drought. It was intense, but it was short duration compared to 2011 drought. Before that time that Texas Water Development Board had been developing a state water plan and had been since the drought of the 1950s. Of course, I wasn’t here for that one, but the drought in the 1950s was still, was and still is for much of the state, what’s considered the drought of record so the worst drought that water suppliers and different water users had to endure. And so, in the 1950s, the legislature directed the Texas Water Development Board to create a state water plan, you know, how are we going to get ourselves through the next drought? Um, won’t go into the stories around the various water plans over the years, but suffice to say, by about the mid-1990s, I think, 1994, we had come to a place where the agencies were working with the Texas Water Development Board. The board was still the lead because they were the ones with the mandate from the legislature, but Texas Parks and Wildlife and Water Commission were providing input directly to the Water Development Board, and so starting in the mid-nineties these water plans come out about every five years or so. We kind of progressively worked on the concept of including in those state water plans, water for the environment and how that would be done, and so that turned into a pretty interesting thing for me to get to work on with the Water Development Board engineers, was how you could come up with reservoir operating rules that would pass water through for rivers and streams on down to bays and estuaries. And it was, you know, I talked about with the freshwater inflow recommendations that we would have different levels, optimum level, and a minimum level, and things like that, and so we worked with the board on some planned reservoir projects to basically build into the modeling for the reservoir, how much water could you depend on from this reservoir, build in water from the environment, and they were open to doing it, to the modeling, and so we, I think there were three reservoirs, three proposed reservoirs, that we worked on that way, and it was very interesting, not just to me, but to everybody how a thought initially would have been, “Oh, it’s just going to destroy the amount of water you can depend on,” and it really didn’t. It depended on where the reservoir was more than anything, so in water planning, we started to do that, and then on the water rights permitting side back on—actually, TCEQ, Water Commission, providing permits and then projects are built, so Choke Canyon Reservoir in the Corpus Christi area was one of the very early reservoir permits that had special conditions in the water right to provide what we

call these “pass-through” flows that depend on how much water is in storage in the system. So, if you think about a concept where, if your reservoirs relatively full, you can pass water down the river to the estuary at a higher level, then as conditions worsen, drought deepens and sets in, then you reduce the amount to where you get to the lowest level of storage and then you’ve got just, you know, life support, if that, for the bay. So, working on the Choke Canyon permit, Parks and Wildlife was heavily involved in that and kind of my role, and this is, you know, I think back to how we did some of this in those early days, and people need to remember that the Internet did not exist (both laugh). One of the things I did when I first got to Parks and Wildlife was figure out how to set up a phone modem data connection so that I could download data from U.S. Geological Survey and nobody had ever done that before and so it’s like, okay, well, pioneering things here. But when we were working on that reservoir project, it just so happened that the consulting firm that the city of Corpus Christi was using was located upstairs from us in our building that we were using that we had some leased space at Parks and Wildlife at that time, and so we would exchange these ideas with the engineering staff. The engineers at this firm that were running the models for the city, and I would run up the back stairs with a floppy disk (Brown laughs). It’s like, “Okay, try this one. Let’s run this scenario.” So, we called that the “sneakernet” (both laugh), you know, running down the stairs. Yeah, so that was pretty early and now the modern day, I guess, embodiment of all of that, which still exists, it’s the Nueces Estuary Advisory Council that looks at how the agreement is working, and, I think, it still exists, anyway, I’ve been retired for a little while, how the agreement is working, monitoring in the bays to ensure that the releases are having the desired affect and what happens when you start to get into critical drought situations and people, you know, we’ve got water issues. So, that was one, and then probably going on at about that same time starting maybe earlier on this one, so, the Lower Colorado River Authority, the Colorado River that goes through Austin, they have what’s called a water management plan. So, they have a whole series of reservoirs on the Colorado River in Texas that operate, the LCRA [Lower Colorado River Authority] operates it as a system and that’s a more complex set of rules that’s updated. They try to update it every five years, and water sharing that happens between the city of Austin municipality, other municipalities, rice irrigation is a huge water user, industry including the South Texas Nuclear Project, and then the river, the Colorado River all the way down, and Matagorda Bay. And so the environment is treated as a user category in that water management plan and it has similar sort of triggers and ways of cutting back during times of drought. It’s more complex. We did a lot of work on that one as computer techniques became a little more sophisticated, great working relationship with the LCRA on coming up with the technical aspects, it was also much more complicated, or more complicated in terms of the permitting side of it, and so things were a little more contentious, I guess, well, all water rights are contentious so it’s like, all right, how do you, how do you decide? But there was certainly a lot of contention over updates to the water management plan for how LCRA operates. By then we were going through the 2011 drought in Texas which, I don’t know if you were here then, but that was a statewide drought, exceptional drought, the deepest category of drought, and it lasted a long time, and so we were seeing water supply reservoirs that were getting very low, lots of environmental, ecological impacts, not to mention impacts to agriculture and cities and cities almost running out of water and things like that. So, it was a real wake up call for, I think, everybody in the water community that, you know, it wasn’t as bad as the 1950s drought, but we had many more

people in Texas by then, and so thinking about water needs for, of course, the environment, you know, that's Texas Parks and Wildlife, we're the natural resource trustee, it's our job to take care of fish and wildlife for people of the state of Texas, but thinking about for all the people in industry and agriculture, and not just in 2011, but going into the future because the population projections at that time were doubling the population in fifty years. Population projections had been on track. The board does a great job of coming up with those projections. We're now in a scenario where we're not looking at doubling the population from here on out, but it's still substantial growth. So, where does the water come from?

[Brown]: And throughout all this time, there's the passage of the water bills—

[Loeffler]: —Um-hm—

[Brown]: —in '97, starting in '97. Can you talk about providing technical input into those water bills?

[Loeffler]: Sure, yeah. So, the water bills, you know, really if you go—okay, so you said 1997 because I was going to say you could go back to at least the eighties and earlier, you know, the creation of resource protection, the direction to the agencies to do these studies, but the 1997 drought, um, fortunately, I was not in the room when this happened. I have only heard stories about it, but the Texas Water Development Board had just released a water plan that Parks and Wildlife, and I guess by then they were the Texas Natural Resource Conservation Commission, now TCEQ, had, had input into and we called it the Consensus Based Water Plan, I don't know if that was its official title, I don't think so, but I think we started on that one in 1994. And then the 1997 drought hit. Again, not the worst drought, but it got people's attention and when Lieutenant Governor Bob Bullock looked at this plan, he went ballistic. Like I said, he's legendary in terms of his temper, and he would fire people at the drop of a hat and then call them up and get mad that they didn't show up for work the next day and (Brown laughs) crazy things like that, but 1997 drought, response from leadership at the Capitol was you've got to do a better job Texas, you know, Texas agencies, on these water plans, and so the Water Development Board, well, long story short, Senate Bill 1, regional water planning, kind of was a direct result of all that, '97 drought and then response to it or I mean, '97 drought, 1994-5 water plan, response to the water plan (coughs), and really the chief criticism that I recall was that the agencies, Texas Water Development Board, had been creating this water plan from Austin that was just kind of a, you could almost say, one size fits all. I mean, it wasn't broken down on a regional basis. It really didn't have much input from water entities outside of Austin, not a lot of input, you know, some of course, I mean the Water Development Board was a reputable agency then as they are now, but the criticism was you need to get out into the regions and really get input from the local entities, local communities, local water users for this water plan. So, hence was born regional water planning, the state was broken up into sixteen regions. Texas Parks and Wildlife's role was to have, um, we were non-voting members on each of these regions, which was a little interesting in that we would go to meetings, and we eventually kind of found our niche, but at first it was like, well, do we speak up and say something or do we sit over here in the corner till they ask us a question? What are we

supposed to do here? And so, we were providing input as best we saw fit in terms of, hey, don't forget fish and wildlife, hey, you need to set aside water for fish and wildlife. Um, I think where we were maybe most helpful was, I like to think we were most helpful with if there was a project being considered for an area that would have just complete, irreversible impacts to irreplaceable resources, we could be an early warning system to say, "Don't build that reservoir," or, "If you build that reservoir there, this is what you will lose." We really weren't in the position ever of saying that we flat out opposed projects, we didn't have that kind of authority. We couldn't really veto anything, but we could say, "You need to know that you've got endangered species," or, "You've got very rare, imperiled ecosystems," or things like that just to, you know, the way I looked at it from kind of the engineering side of things, was just part of an analysis that could, really, if you ignored it, it could sink a project later on, and so that was more of what we did in that role as a nonvoting member, and then I will remember that after the—okay, so these regions would come up with their water plans. These sixteen regions would come up with their regional plans, and then those regional plans would get rolled into a state water plan, and that is the system that we still have in place today. Um, and so when that state water plan draft came in, Parks and Wildlife wrote a comment letter (laughs) on that state water plan draft and this was another one of those times when I think people didn't expect Parks and Wildlife to say anything, and certainly not say some of the things that we did, that were rather pointed in terms of, you know, this is what's at stake if you build these particular projects. So, that was another memorable point in my career was when that—because I was responsible for gathering all the comments that staff had that reviewed these draft plans, and I had put them into a letter, draft letter, and then that got sent up the chain at Texas Parks and Wildlife for final review and editing and ultimately being signed off on. That was a pretty interesting process to watch that happen and then to see the reaction. But that was the first round or cycle of regional water planning. I think Texas is now on probably the sixth round of these five-year cycles where the regions come up with their plans to meet their fifty year water needs, um, then it gets turned into a state water plan. I'm happy to say that now the process, or at least when I retired a year ago and looking at the new state water plan, it's smoother, there are more, um, places where fish and wildlife and habitat and ecological aspects are considered. Do we get the protection we want for those various things? Do we have dedicated environmental flows in the plan? No. Does it address climate change? No, or not—I mean, maybe more than it did initially. I will say for the state water plan that's updated every five years based on updated information, I mean, that's a way to, to help look at emerging trends as they're coming along. There is drought planning that is now required in the water plan that is very helpful. So, it's evolved over time, and it's now held up as Texas's regional water planning process under Senate Bill 1 is held up nationwide, probably worldwide, as one of the examples for how to do it. So yeah, I'm proud of the role I was able to play however minor. You know, I coordinated the representatives from Texas Parks and Wildlife who attended these meetings and then like I said compiled all the comments and got all the feedback and stuff, and then was kind of the face of Texas Parks and Wildlife when it came to making presentations on various things related to the plan, especially in those early years. Getting to go to all the sixteen regions, going to all those meetings, well not all of the meetings but some of the meetings for each of the sixteen regions. There were hundreds of meetings that were going on. But it was, you really get a sense of how diverse this huge state is in terms of hydrology, ecology, what the

people and no two regions were ever alike. It was really fascinating, so that was Senate Bill 1 (both laugh), which is still, like I say, it's been modified. More recently, one of the huge things that was done, I forget what the bill number was, um, provided funding for the plans, I mean, for the projects that are in the regional water plans so the state water implementation fund for Texas was created. So, again that thought of it's not enough just to develop a plan and put it on a shelf, you've got to do something with results, and so Texas has done that. One of the things that I'm most gratified about with the state water plan is watching over the years the amount of future water needs that will be met with conservation and reuse. So, I remember having some conversations early in my career that conservation was, you know, just wasn't very important. I remember this wasn't the Water Development Board, this was more consultants, but it's like this mindset that if you had to conserve water, that meant you didn't do your job by building a big enough reservoir (laughs) and thankfully that mindset is long gone. Now there's still desire in some areas to build some pretty major reservoirs that I wish they would look at different strategies, but not like it was back in the late eighties, early nineties. So, that was Senate Bill 1, and then Senate Bill 2 was a couple years later. I don't remember now exactly, 2000, 2001, I think, was really aimed at creating for the rivers and streams, a data collection, scientific study program for rivers and streams that paralleled, mirrored, what was in place for bays and estuaries. So, my background coming from Colorado, working with the instream flow groups was like, oh, okay, great, about time we worked on rivers, and not that we hadn't, I mean, there were studies and various local very specific studies that had taken place, but this was a more intensive, again, working with the other agencies to accomplish this, the Freshwater Fisheries Division at Texas Parks and Wildlife was really more the lead on this piece of it, but I worked with them closely in terms of how the studies were designed and where the studies were taking place and how that information was relevant to water planning and water right permitting, which was over in my shop in Water Resources, and kind of helped, I would say, provided input, helped to guide in some cases, decisions that were made regarding studies and things. That was really timely. I mean, it was good that that was happening, but I mentioned earlier in our conversation about, in about 1999, 2000, about the same time, that things were happening like environmental nonprofits applying for water rights. San Marcos River Foundation wasn't the only one now, there were some others, but the other thing that happened in, I think, it was in 2001, was the Rio Grande stopped flowing to the Gulf of Mexico. I don't know if you've seen those photos, just overuse of the Rio Grande and so the aerial photos, Texas Parks and Wildlife took one that ended up, you know, it was like the shot heard around the world when that image got out there where it was, literally, you saw the Border Patrol parked in their vehicle and you saw this piece of like an orange construction fencing that was the border in the bed of the Rio Grande. That really got through to folks in leadership positions, that merely studying these systems was not enough, that we had to do more in terms of keeping water in the rivers and streams and bays and estuaries and, you know, Texas, one of the things I love about Texas is that nobody tells us what to do or how to do it. Just because California is doing something someway or Florida or, you know, some other state, we do it our way. And so, California, some of the western states, had been making some headway or trying to on some of these environmental flow issues mainly because they were being driven by the Endangered Species Act. At that time, in Texas we had a few cases, but today the picture's gotten much more complex with the Endangered Species Act and water in Texas, but I've—

Senate Bill 3, which came in 2007, I think it was or actually there were—it took more than one attempt to get Senate Bill 3 passed. I forgot that. I think maybe the first time was 2005 and then 2007 was when it was finally passed, but Senate Bill 3 set up this structure, this framework for taking existing science and coming up quickly with science-based recommendations, but then the missing piece of it, strategies for how to meet those flow needs, and it was very—we learned a lesson from the Senate Bill 1 water planning that this needed to be done on a regional basis, this needed to be done with local input, stakeholder input, science-based teams, and so it created, not only was it a fairly involved in terms of the structure, the people involved, the science teams, and the stakeholder teams, but the schedule for getting it done was aggressive. We were looking at—I talked about the '97 drought and then various other droughts, minor droughts. Senate Bill 3, and it happened in phases, so if you think about the coast being broken up into, they call these bay basin areas, so Sabine Lake, Sabine Basin was one, Trinity, San Jacinto, Galveston Bay was one, um, Colorado, Lavaca, Matagorda Bay was one, Brazos, skipped over the Brazos, Guadalupe, San Antonio, San Antonio Bay, Mission Aransas, so on down to upper and lower Laguna Madre. So, we had all these different groups, you know, science and stakeholders, and they were operating on that they would be grouped into several of those that would be on a schedule and then the next group would start up on another schedule. So anyway, for Texas Parks and Wildlife, and that was my group that was largely coordinating that and, of course, these are huge things that required help from other divisions, input from other divisions covering that. Being there, again, we didn't have a vote, but if you think about Texas Parks and Wildlife being the science organization that could provide everything that's needed or try to (coughs), that's—that was our role and it was quite an intense time, (getting a drink of water). Like I said, that bill passed finally about 2007. I think we really got started up with doing those studies, I want to say, the next year, really in earnest, the year after that, and we had a—one of the things that I think was a real strength of that process, Senate Bill 3 process, was having a statewide science advisory committee that Dr. Montagna was a member of, I think, for the entire time, and that committee would look at all of the methods that were out there, and we're talking freshwater inflow as well as instream flows, all of the methods that were out there, including the state methodology that, you know, the Longley, et al., study or recommendation report, the "Bible," it's been called (laughs). I didn't call it that, but uh, things like that as well as, you know, myriad other methodologies out there and really dig into this science committee was biologists, engineers, geomorphologists, you know, the whole gamut of science expertise and give us good feedback not just for the agencies, but everybody involved in this issue. That helped us get past, in a big way, to get past this real conflict that was going on and will go on forever, and it will go on in any sort of science, natural resources, I mean, we see it today with COVID for sure. It's like, who do you believe, which science can be trusted, you know, science is never done. That was something I was always telling my folks. It's like, the more you learn, the more you need to learn and, but the science advisory committee really helped put to bed some of the criticisms that the agencies were getting on our work (coughs). I think looking back, and especially for going forward with similar types of processes that, that was really key. So, we scrambled for several years. Looking back, I talked with some of my former coworkers about, how did we do that, you know, going to all those meetings, but also providing what the different groups needed, and when they needed it by, and we were going strong when the drought of 2011 was just unfolding, wreaking havoc. I mean, we were—I

remember going to some of the meetings in this particular basin, Guadalupe Basin, down in San Antonio, and it was just, you know, many of these meetings were pretty contentious, especially when you got to the stakeholder, you know, when the science committees would make their recommendations up to their stakeholder committees, and then the stakeholder committees would have to decide what to do and then it—I'm leaving out a step. Then after those two steps, everything would go over to the TCEQ and the TCEQ would set rules, adopt administrative rules, that would govern how they managed the water right program going forward. None of this applied to water rights that had already been granted, only to the new ones coming up, and that was yet another phase of some pretty contentious interactions, and Parks and Wildlife, we would participate in the science support role, but also if you think about the Texas Parks and Wildlife is the state agency and trusted with care of natural resources. We would make comment letters to the TCEQ, and we would go before the TCEQ commission and make comments. Um, one of the things that was and still is a disappointment was it was very clear in the language of Senate Bill 3 that TCEQ was to set aside water. It would be water that would be off the table for granting for water right permits and that it was for the environment, and they didn't do that. They took a different approach in terms of using their Water Availability Models and would determine if a request for water came in, and they ran their model, and it showed that, that amount, some level of that amount, identified as needed for the environment was left over, that they considered that they completed their task, but that water is still technically available for appropriation. It hasn't been dedicated to the environment. So, that was a disappointment for, um, for us at the agency, you know, that TCEQ handled it the way they did, but it's, again, we were not the agency that was the final say. We could certainly make our views known, but at the end of the day, it was up to the TCEQ, so that's how that went. So, I think that got us through [Senate Bills] 1, 2, 3. I don't know if you want to talk about any of the others, but water conservation, a water conservation advisory council was created that still exists that's pretty important in terms of staying, keeping Texas really on the cutting edge of what can be done for water conservation. I feel quite strongly that, that's something to continue to hone our skills going forward as water becomes more and more scarce, and so that was a huge plus to have that done, and there'll be other things, I'm sure. Funding for water projects, but groundwater, groundwater is a completely different animal but very, very important.

[Brown]: Um-hm. You had talked about the kind of contentious aspects of all of this unfolding. Can you tell me more about that (both talking at once)—

[Loeffler]: —Sure, yeah—

[Brown]: —and all the things you heard?

[Loeffler]: Yeah. Um, yeah that was really interesting, and in a lot of ways oddly rewarding, you know, looking back now, and to see, kind of, the evolution of thought, including my own. When you come into a conflict scenario, especially something as heated as water can get, and in a state like Texas where you're going to have many different interests and to come at it with everybody's got their own position, what's important to them, and the beauty of these

meetings as painful as they were at times, but the beauty of these meetings is that when you really get in the same room and talk it through, and we had some great facilitators, professionally trained facilitators, at some of these meetings that if not for them (laughs), it would have just turned into shouting matches and maybe nothing really got done. Larry used to talk about being in the room at the capital when chairs started flying, and I never saw anything like that (Brown laughs), but it's like, yeah, you know things are getting interesting when that happens, but being able to really roll up your sleeves and sit down, and I talked about earlier with the Corpus Christi Lake Choke Canyon Reservoir, the head of the River Authority at that time and the person who was pretty much the key representative for the city of Corpus Christi in those dealings were people that, at that time, you know, we didn't really see eye to eye. They had their views, we had our views. I mean, environmental groups had their views, and I'm happy to say over the course of time, over the decades, it turned into a situation where, I mean, everybody had to kind of move off their starting point, by a lot in some cases, but at the end of the day after literally decades of working with those folks, we'd become friends, we'd become allies, we see things—again, we have, you know, little bit different points of view about what we're getting to, but one of my favorite quotes was from Con Mims who'd been the head of the Nueces River Authority, and towards the end of his career, and this was working on Edwards Aquifer issues, which came later, um, endangered species issues. He said, "Yeah, the older I get, the greener I get," and he just turned out to be, I mean, he always was, but it took working through some of those really difficult problems, just so wise, and so, you know, somebody who grew up in Uvalde, Texas, in the ag world, agricultural world, and working with somebody who, you know, I had been exposed to life on the farm. I knew how important water was for, you know, my grandparent's farm was irrigated agriculture, so I could get where they were coming from, but really it took—and some of the most effective interactions were if we could get out on a boat in San Antonio Bay, in Corpus Christi Bay, out in the marsh, tromping around, and just really have those conversations out there. That's not always possible, but when we were able to do that, it was just so gratifying to see people's thought process changing, positions shifting, finding those common solutions. I mean, that was something I enjoyed probably more than anything, was really working towards solutions. When you have—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 interesting. So, that kind of a scenario rolled out, played out in Guadalupe Basin. I haven't talked about the Brazos Basin. We did a lot of work with the Brazos River Authority, again, a similar set up with their reservoir system as to the lower Colorado River Authority where they have a series of reservoirs. Brazos River Authority went in to get a water right permit from TCEQ that was basically to operate all their different separate reservoirs as a single system, and they called it the System Operation Permit, or SysOps, for short. When you looked at the gains that you could make of operating a reservoir as a system, it's like building a new reservoir. The amount of extra water that you could, in theory at least, come up with, and so that was incentive for Texas Parks and Wildlife to work closely with them, and plus we had an agreement that did change and morph over time, but an agreement that there would be a dedicated amount of water that would be placed in the Texas Water Trust, which I haven't talked, but the Texas Water Trust was a creature of Senate Bill 1 that allows for water rights to be amended, not a new water

right like San Marcos River Foundation was attempting, but to amend a water right. So, if you had a water right that was for some other purpose, agriculture, and you didn't need it for that anymore, it could be changed, amended, to be an environmental right. So working with the Brazos River Authority on that concept was something that, worked on for a good bit of the last part of my career, I think starting in about 2004, and it's still going on so. Yeah, so, really just the kind of the classic, having lots of different points of view, lots of different interests that don't really understand the other the other person's need or the other interest's needs, and then rolling up your sleeves, sitting down, taking the time, doing the work, and coming up with a solution.

[Brown]: Yeah. Um, did the science change since you started your career to when you're working on these (both talking at once)—

[Loeffler]: —yeah—

[Brown]: —later plans?

[Loeffler]: I would, yeah. Let me get a sip here. Yeah, I think my comments, I've kind of alluded to that a little bit by saying that first bay inflow recommendation was kind of, I think I used the word crude, which was maybe harsh (laughs), but it's more simple, more simplistic to looking at, I would say if anything, still the notion of that key relationship between freshwater and salinity is still very key in all of these bay inflow recommendations, permit conditions, and things, but where I think things have gotten more sophisticated would be with the timing of delivery of water for those things, the seasonality aspect of it. Before we basically were assuming we had two levels, you know, optimum and minimum. Now, if you were to go look at the Lower Colorado River Authority Water Management Plan, there are five or six different levels of inflow and different accounting methods for how water is accounted for, deliveries of water to Matagorda Bay are accounted for, so that's gotten more complicated. I will say something that is emerging more and more every day, every year, climate change impacts, and climate change was not factored into the state methodology. Maybe it, you know, we wrote that thing back in, we, the royal we, the agencies, back in the early nineties. It was published in 1994. I was going to some, global warming is what we called it back then, to some various summits and meetings and things, and so it was understood, but we really weren't factoring it in, and now, you can pick up the signal clearly in the Texas Parks and Wildlife data that water temperatures are warming, and DO levels, dissolved oxygen levels, are dropping and so the science of how you, um, you know, really factor that in. There's thought, you know, thinking about what are the other tools I haven't talked about today, but the Parks and Wildlife has, is regulations, fisheries regulations. So, if we're looking at, the department is looking at flounder abundance, which is a very important popular recreational and commercial species. Flounder are affected by temperature, and so what knobs can you turn to try to reverse that trend with flounder? The Department also has a propagation program, mariculture, where they make baby flounder and stock the bays, but really to keep up with the trends that we're seeing and habitat loss and all those things. But yes, I would say the science I touched on, the Science Advisory Committee during the Senate Bill 3 process, that helped immensely. We were always, I think,

on the right track at the agencies with the science that we, or the methodologies and the data we were collecting and things, and it was almost like a National Academy of Sciences type review of our programs and our processes and, you know, it wasn't that, but it felt like it at moments.

[Brown]: Um-hm.

[Loeffler]: And I think we came through that fairly unscathed. There were a few critical comments I remember that at the time felt a little close to home, but feedback is always great, especially when it's from a group like that to help you think about what you could do better. So, I'm not sure I actually answered your question, but those are some of the thoughts about just watching the evolution over time and the implementation. I've always felt strongly that it was our responsibility, not just to go off and do these studies, but we actually had to use the results to take care of the resource. That was our job at the agency.

[Brown]: And you touched on this a little bit about the amended water rights, but can you tell me more about what you did maybe in the last ten years before you retired?

[Loeffler]: Okay. Oh, yeah. Um, let's see. Okay, yes, I have not talked about the Environmental Flow Information Toolkit, so EFIT for short. Yeah, in the water world and state of bureaucracy, everything gets basically reduced to a set of initials just because, I already talked about SysOps, but the Environmental Flow Information Toolkit was something that was a staff-led initiative for what turned out to be a pretty major project to develop a tool. So, it's a Geographic Information System-based tool, a map tool, that takes TCEQ water rights, so think about a big map of the state of Texas and looking at what the environmental flow needs are. So, we've just been through the Senate Bill 3 process where we have identified at hundreds of locations what the water needs are for the environment, rivers, streams, bays and estuaries, all of it, and we have the water right information from Texas Commission on Environmental Quality, which water rights have already been granted, what are their priority dates, we haven't really talked about the prior appropriation system, but priority dates on these water rights, seasonal distribution of use, what is their purpose of use, agricultural, city, whatever, and then looking at where are the unmet water needs, and where are there potential water rights where the water right holder may be willing to do a transaction. So, sometimes I think about it as the state of Texas went through a process, and I think maybe is still going through, but buying back shrimp licenses or crab licenses so commercial crabbing, commercial fishing licenses for take of state resources, and so this is a similar concept, and these are state water rights or the state has given out rights to use a state resource and now for conservation purposes, it makes sense to get that water back. And so, um, the team at the agency, and this was an interagency team so my group, the Legal Division, Freshwater Fisheries Division, Inland Fisheries, worked on it together, and we received grant funding to do this, to develop this online tool, and really the next phase of using that online tool, then is to actually sit down with local stakeholders and identify where are these areas that need additional secured water, the set aside concept with TCEQ, and how can transactions be done. And so, there's at least one relatively new nonprofit that's out there that's developed around this concept of doing this, and they're starting in

select basins, select water projects, Texas Water Trade it's called, and they're setting out to do these water deals, if you will, and not just surface water, but also groundwater. One of the ones they're doing right now, this is, I'm getting off into the groundwater side, but Comanche Springs out in San Angelo, or no Fort Stockton, excuse me, Fort Stockton, so out to the west, long ago stopped flowing regularly. Like if you go to Barton Springs, you know, there right in Austin or San Marcos Springs right here, these are springs that have flowed pretty much always. Not the case with the Comanche Springs, and so Texas Water Trade is working with some local folks out there to basically have groundwater pumping managed, or I think maybe even suspended during certain times, as a proof of concept to show that if you managed the groundwater pumping differently, the springs could flow again, and having the springs flow, of course, is a wonderful thing, but it also provides surface water back into the system. So, it's exciting to see what they're able to do with that concept of basically getting pumping rights in that case, but surface water diversion rights would be a similar idea. You know, I'd be remiss in not recognizing that the Texas Water Trust was set up as a repository for these types of rights and so there are, I believe, like four water rights, I think, that are in the Texas Water Trust, including one that Texas State University here placed in the trust. So, conceptually, it will work. Other states, you know, Colorado has a more robust water trust program, but I think that's kind of where we're going next with some of these things, is identifying where the critical needs are, potential partners, water right holders, others to bring that water back and protect it.

[Brown]: Um, one of the things I wanted to ask you about is that the changes in Parks and Wildlife itself and the agency and Larry McKinney talks about the shift from like what he calls the "hook and bullet" crowd to (both laugh) a more modern ecosystem management. Can you talk about what changes you saw in the agency—

[Loeffler]: —oh, sure—

[Brown]: — and the other thing is, like, what were your experiences as a woman there?

[Loeffler]: Sure, yeah. Um, well, of course, if you stick around some place long enough, you're going to see things change so when I retired, I'd been there just short of thirty-four years. I think I said earlier, it's like initially those early days, it's like I don't know how long I'm going to make it here, but thirty-four years. And so, yeah, definitely during those, those early days, resource protection was so new, and I don't think people really understood what we did or why we did it. I mean, of course there were a lot of people who did, but when Andy Sansom came along, and he was our Director it felt like a new era, but before that it was, it was different so— but during the seventies for sure and into the eighties, I talked earlier about the first Earth Day, and you would see rivers on fire and you saw clear environmental impacts. I wasn't here when this happened, but reading *Silent Spring* by Rachel Carson and reading the section in the book about when everything in the Colorado River here in Texas died, from Austin to the coast including all the fish in the bay. I mean, that's how it was described, like so I didn't see it, but in an event like that, and it was due to as I recall pesticide runoff that had gotten into the river up in Austin, an event like that certainly gets people's attention that we need to be doing a better job with protecting habitat. It's like "hook and bullet" folks understood that you don't have

species that you can catch and take and hunt unless you have the habitats, so it was a process. It took a little, over time, evolution to kind of get to that point where it was more kind of mainstream, if you will, but Larry was the leader to make that happen, and he had a lot of respect within the agencies for sure, but also outside the agency. I was looking at something the other day preparing for the interview today, and it's like he had this nickname back then, Dr. Doom (both laugh), and he would make presentations to our commission, to outside the agency, to anyone who would listen really, about the path that we were on as a state, especially, of course, what resonated with me was about water. If we're talking about doubling population in fifty years, and he used to say things like, "We have enough water for the people who are coming, but we don't have enough water for their lawns" (laughs). Things like that, that would get people's attention. I mean, they just resonated, and so over the course of, certainly through the nineties till he retired in 2000, oh, when did he retire, 2000, mid 2000s, it was just a continual—water was front and center. We had an executive director, Bob Cook, who was asked one time at a big public gathering, I forget now what the event was, but what were three most important issues facing the agency and Bob Cook said, "Water, water, water," and it's like, okay, yes, we have our marching orders. The Texas Land and Water Conservation Plan, which is kind of the strategic plan for the agency has reflected, you know, it's updated over time, it reflected the importance of water. The program that I managed, the Water Resources Branch, which was a really—I liked the way we were structured in that I managed a team of water professionals, a dozen or so, but we were given pretty broad latitude to work with anybody in the agency that we needed to since our charge was statewide, groundwater, surface water, natural resource issues affected by water, it was really a big, big picture. And so, I always had leadership at the agency that allowed that, just whatever you need, cross the division lines and do it, and people in the divisions understood how important water was and so I think it functioned fairly well. We tried to be very cognizant that everybody had a full-time job, and we couldn't really lean on people too hard all the time, but it worked well, and so, we were able to function that way largely until I retired, and it's still the structure in place. Now, I retired just over a year ago. The position that I held is now, what's posted, just recently last week, is a new position that's been posted that looks a little different from what I did before, but it still has a—it answers to two different divisions at Texas Parks and Wildlife, the Coastal Fisheries and the Inland Fisheries Division, and so I'm hopeful and there are people at the agency after I retired some others from the Water Resources Branch also retired or left to go do other things, but there's a good core of folks there that they understand kind of what it took to get to where we were as an agency in the water arena. I remember going to a meeting, and this was related to the Edwards Aquifer, and this was later in my career, where we had a very, very contentious issue. This was, for folks familiar with Texas water issues, the Edwards Aquifer was under threat of federal management due to Endangered Species Act issues. They're listed, six or seven listed endangered species that were not being protected, and so the threat of federal intervention was real and that was the incentive that got people to the table, but it was a very complex process that if we had not had the person who we almost let it get away, Dr. Robert Gulley, to guide us through years of really difficult negotiation, you know, we wouldn't have gotten it done. We did get it done against the backdrop of the very terrible drought, but one of the things that was really interesting was at the beginning of that process they put us into this room and there were sixty or seventy people, and we had an exercise of, this is how I remember it, it

was like, write down on a piece of paper the agency that best represents your viewpoint. And it was anonymous. You write it on a slip of paper, stick it in a box, and almost all of them came back Texas Parks and Wildlife, and it was like, wow, I guess our reputation as being somebody who, of course, we look out for the resource, that's our job, but in a way that considers all the other things going on with water, and so that really stuck with us, you know, not just myself, but my team in terms of we've accomplished something here, and, like I say, we did manage to, I say we again, all these water projects are huge efforts, you know, many staff at the agency had been working with the stakeholders and the other agencies to create a habitat conservation plan to protect spring flow, San Marcos and Comal Springs in New Braunfels, to protect the species and so by protecting the spring flows that water has a chance to flow to the coast and now the Guadalupe-Blanco River Authority is working on their own HCP, Habitat Conservation Plan, to do a similar thing so, and one of my former staff members is working on that project now so that gives me a lot of hope, you know, just very gratifying that my former teammates are still out there doing great things. You also asked about what it was like being a woman at the agency. So, I was always very fortunate. Not everyone was, but my experience when I came in, the other part of that kind of funny story about how I got hired on at the agency, when I said I needed to be able to come to Austin, I'd never been to Austin, and set foot on 4200 Smith School Road, and Larry greeted me and the first person I met at the agency was Susan Rieff, who at that point was the first female division director, and not much older than I was at that time, which was late twenties, and the stories that I heard that Susan had to put up with when she first got there, I didn't fortunately experience that, but she didn't put up with it, you know, and so, I had people like Susan and others at the agency to thank for paving the way. I was one of the first women but certainly not the first, and so people like Susan, and there was another woman in Coastal Fisheries named Maury Osborn who mentored me. She had been there for a while, and she was really helpful. So, you know, I think it was just a matter of, I kind of shared that little story with you, I think before tape was rolling about people at other agencies maybe thinking I was somehow not up to the job especially working out in the field.

[Brown]: Can you tell me that story for the tape?

[Loeffler]: Yeah, sure. So, one of the first things that happened, well, my job when I first got to the agency was, involved quite a bit of field work, and this was an instance where we were going out on the Texas bays. I forget, I think maybe it was Nueces Bay, and we were planning the field crews between the two agencies, Texas Water Development Board and Texas Parks and Wildlife, and probably Texas Water Commission, I don't remember, but how many people, how many boats, various scientific equipment, and all this stuff, trying to get it all organized and Water Development Board calls over and asks, "Well, who are you sending?" and the answer was, "Well, we're going to send Cindy," and I think it was one other person, and the person at the Water Development Board said, "Well, Cindy and who else? I mean, Cindy's fine, but you need Cindy plus someone else," you know, more than, like, I didn't count as a person or something (laughs), and what was kind of, kind of great was I think whoever it was at Texas Parks and Wildlife almost didn't know how to respond to that, but the person at the Water Development Board got a browbeating from, I think, maybe his supervisor, one of the senior

people over there about, you know, no, that's not appropriate. Cindy is your person and Cindy can do the job. And so, of course, in that kind of a set up, you do the job and, yeah, they were great. Every now and then I'd run into, usually from, well, older gentlemen who, you know, just a cultural way of upbringing, I didn't read much into it, but it was very isolated, I would say. I never felt like I was subjected to any kind of routine or systematic discrimination or treatment or anything like that, and I realize I'm probably one of the fortunate ones, but that's, I think I can say that with full honesty and having someone like Larry McKinney who was also, he was a great proponent for helping women in their careers and basically treating us like everybody else. No special treatment, but certainly not, we weren't held back, or we weren't not allowed to do certain things. I mean, I did have a, I was sharing with some of my coworkers the other evening about some of those early day field work experiences that were, you know, looking back like going out and collecting data in the middle of the night in industrial Houston. It's like, hm, probably should have had somebody with me on that one, and just some other little funny stories, but nothing bad ever happened. It was always okay, and the department does have very tried and true safety, guidelines and requirements in place now that we didn't have back then, and so.

[Brown]: Well, what else do you want to tell me about your work with water?

[Loeffler]: Oh, gosh. Well, it certainly was, um, a great career, and like I said, I'm most proud of the people who I worked with, and I'm thinking primarily the people on my team, but not just on my team. You know, I had the great privilege of being able to mentor almost always women, and they would come from other programs, sometimes from other agencies. I had somebody from the Water Development Board, a young woman, Ph.D. from Texas State, who asked me to mentor her in their agency's formal mentoring program, and I was really honored by that, that she would come over to a different agency and ask somebody to do it, but I've always felt like you lead by example. You don't ask people to do things that you wouldn't be willing to do, and you don't act in ways that you wouldn't want them to act and keeping the lines of communication open. I definitely learned that working on some of these, these tricky water negotiations. It's like, you've got to be clear with your intentions, with your words, mean what you say, honor your word, things like that. I like to think that that rubbed off on my team, and I'm happy to say I'm good friends with some of the folks that we worked together. We didn't—I didn't get to the end of my career and was like, "The last thing I want to do is talk to these people." It's like, no, I really enjoy seeing what folks are up to now, and what good work they're still doing so, yeah, it was very gratifying and, you know, change is inevitable. We see that in everything. The department seems to be going a little bit different direction on some of these water issues (coughs). So, I'll be watching that carefully, and I'm in touch with my former coworkers, and they know they can reach out if they need help on things too. So yeah. But it's been interesting, it's been good, not something I would have ever predicted when I was the lowly undergrad in Colorado however many years ago (Brown laughs), but here we are.

[Brown]: Well, is there anything else you wanted to add?

[Loeffler]: I don't think so. I talked about climate change. I do think that climate change really is

going to be the huge challenge. I mean, many, many different aspects of life, society. One of the things I got asked to do probably about five years ago, so maybe four years before I retired, was to be on one of the teams that provided input to the IPCC report, the International Program on Climate Change that's what that stands for [ed. note: narrator meant the 2018 National Climate Assessment], that's updated periodically, and the content that we were working on, they had us set up in teams that were regional across the U.S., this was the Great Plains, the southern Great Plains, I think it was the Great Plains, and I was one of, I think, two people on that team that was there to provide content on climate change impacts we were seeing with fish and wildlife, natural resources, and odd as it might sound, five years ago it was hard to find data. The thing about working on these reports is that you have to be able to really verify every shred, every sentence, every word has to be completely documented, and so thinking about, all right, what's out there that we can really draw on that we can say, "We're seeing an impact," and so it boiled down to—and plus you only get just a small amount of text because these reports end up being massive, if you've ever looked at one. We ended up settling on using some of the Coastal Fisheries data to show trends in flounder, flounder declining, gray snapper, which is more of a tropical species were seeing increases, and so I think the caption for that figure was "climate winners and losers," but in the short amount of time since then, of course, trends have not changed, if anything, worsened and seeing more and more impacts and more and more things that just as time goes by, there's clearly, maybe (coughs) excuse me, maybe climate change isn't the sole driving force, but state climatologist of Texas Dr. John Nielsen-Gammon talks about climate on steroids so extremes being more extreme, and so when you're looking at the water world, the effect of drought, the effect of flood, those types of events being more extreme than they are even now, and maybe more frequent. We know how to, or (laughs) we think we know how to, basically do predictions and analysis within the range of known conditions, we do a regression, it's like you throw out the outliers and you work within the data set that you know, but that's out the window when it comes to setting high-temperature records or having freezes like we saw just over a year ago in Texas. Is there something going on there? So, I do worry how we're going to, my piece of it is thinking about water and ecosystems but with many things, it's just how do you adapt? How do you create resilient habitats and resilient ecosystems that can whether extreme events like that? And I hope we don't see losses of species. We'd been pretty fortunate in Texas to not actually wipe out species. We did have through the Edwards Aquifer process I mentioned before, one thing that was sad to go through, but delisting of a species because it has not been seen in probably forty years. It's not been collected, so U.S. Fish and Wildlife Service took it off the list. This is the San Marcos gambusia fish, took it off the endangered species list, but because it's extinct. So that's a sad thing to go through. You feel like you failed as resource managers, and so I sure hope we don't see that with other species that we know and love and are part of our natural heritage, and it's our job to take care of them. I think that's my message on that one.

[Brown]: All right, thanks. Is there anything else before I turn the recorder off?

[Loeffler]: No. Thank you for the opportunity to—

[Brown]: —Thank you—

[Loeffler]: —talk.

[Brown]: Very interesting. I'm going to turn this off now.

[end of recording]