WITW-Podcast-S1E3 Florida Lakes and Landscapes_mixdown

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J Jay Ferrell 00:00

So it's been said to me before that each Lake is an individual even if they're side by side. Well, Florida lakes are quite unique and understanding how these lakes formed and why they are the way they are, will help us understand why each Lake has a separate personality.

C Christine Krebs 00:29

Welcome to Working in the weeds, a podcast from the UF/IFAS Center for Aquatic and Invasive Plants. I'm Christine Krebs and your host for this podcast. I'm also the education and training specialist out here at the center. Last episode, we discussed what the deal is with invasives and why there's such a problem for the state of Florida. And today we want to dedicate this episode to discussing Florida's lakes and landscapes and why they're uniquely prone to this invasive plant problem. From a bird's eye view, you can see lakes sprinkled across the state of Florida, the size of Florida lakes vary greatly. The surface area of lakes can range from several 100 square miles like Lake Okeechobee, to a couple of acres or even less than an acre like the retention pond behind your house. Lakes enhance the beauty of our landscapes and they are important for supporting wildlife and ecosystem health. Lakes are also important for irrigation flood control, water supply and navigation. Many Florida residents and visitors use our lakes for a lot of different activities like birdwatching, boating, fishing, and swimming just to name a few. I want to share a quick overview on the geology of Florida to kind of set the stage before we start our conversation with Dr. Ferrell today. To those of you listening, I want you to imagine slicing through the ground and seeing different layers of soil, sand, clay and then at the bottom, rock. This rock is mostly limestone, which is very porous, kind of like Swiss cheese, or a sponge. This rock was deposited over 100 million years ago. For about 75 million years Florida was covered by Deep Oceans. Later, about 50 million years ago, the Florida peninsula we knew today was just a shallow, mostly limestone reef. Sea levels dropped and then rose several times creating the limestone and water filled bottom layer. This water system slowly erodes the porous limestone to form cracks, which then provide underground storage spaces for freshwater. Eventually, this freshwater beneath us becomes the water that fills our lakes and

other water systems. So now to help me talk a little bit more about these lakes and landscapes. Let's dive into my conversation with our center director, Dr. Jay Ferrell. Hi, Dr. Ferrell, thanks for being here with me today to talk about Florida's lakes and landscapes. Can you kind of dive in first and explain how you can define a lake? What makes a lake?

J Jay Ferrell 02:48

Christine that's a real head scratcher. I mean, that's a tough question, because there's really not a proper definition for a lake. So it's easier almost to talk about what a lake is not than to talk about what a lake is. Right. So there are good definitions for a swamp. So a swamp can be permanent water or up and down water, but it has emergent plants throughout. So think about a cypress swamp that we've seen in Louisiana, for example. So we can kind of picture that. So then, well, that's not a lake. So then what is a lake? Well, a lake has emergent plants, it can have trees as well, but they're not throughout. They can have vegetation throughout, but usually not emergent vegetation, there's usually more open space. But there's no size definition. There is no definition that it has to be natural or manmade. For example, Lake Barkley in Western Kentucky is an impounded River. Totally manmade system, but it's still called a lake. Even fill ponds that were used during a highway construction project, for example, that could even be defined as a lake depending on what it's used for and where it's situated. So like I said, it's easier to talk about what a lake is not than to try to say a lake is exactly this.

C Christine Krebs 04:08

So how a lake is managed depends on not necessarily how it's classified, but rather how it's used.

J Jay Ferrell 04:14

Generally speaking, that is the case so the function of the water can help classify it as a lake. So if its primary function is fishing, or boating, rather than just storm water retention, right, that can help classify it as a lake. Okay.

C Christine Krebs 04:31

And so today, we're hoping to highlight lakes. These larger bodies of water, usually that are used for recreation or a lot of other uses, such as flood mitigation, and water quality. There's a lot of different uses for these bodies of water that we're going to talk about today. And so specifically in Florida, these lakes in Florida, what makes them different than anywhere else in the United States?

J Jay Ferrell 04:52

Well, Florida lakes are quite unique and understanding how these lakes formed and why they are the way they are will help us understand why each Lake has a separate personality. So it's been said to me before that each Lake is an individual, even if they're side by side. And that is

been said to me before that each Lake is an individual, even if they're side by side. And that is because of how they were formed. So when you think about Lake formation, I would say we sort of need to think about the map of the United States and almost draw three bands across it. All right, a northern band that would be up in the Minnesota, Wisconsin, New York region. A band across the middle, the Virginia's, Carolina's, across to Missouri, Arkansas. And then a Southern, okay. When you look up in the very northern part of the US, there's a lot of lakes up there.

C Christine Krebs 05:39

They're Great.

J Jay Ferrell 05:40

Some of them are even great. New York, tons of lakes in upstate New York. The reason for that is those were formed by glaciers. As big bodies of water froze, these glaciers formed and they were moving. And these things are millions and millions of tonnes in size, and they would scar out big deep areas in some places. The Great Lakes were formed by both glaciers and some tectonic plate shifting. So they're pretty complicated in how that went on. But usually those northern lakes are plentiful, they're common, and they're deep. So Lake Michigan, for example, average depth is almost 300 feet, average depth. So that means there are very, very, very deep areas in that place. Some of them were not even explored until a few decades ago. Now you contrast that to the central part of the United States. There's a lot of water bodies, but there's not a lot of natural lakes. When you go from the Carolinas, across to Missouri a lot of impounded rivers, a lot of reservoirs that were built in the 30s, 40s, 50s, for power production, but not a lot of natural lakes because of the way the Lime Rock is underneath the bedrock. The glaciers didn't come all the way down. The limestone, or the granite under rock really doesn't dissolve like it does in Florida. So they didn't form there. So not a lot of natural lakes, 'till you compare Florida. Florida is very unique. Again, the glaciers never came this far down. But we have lakes everywhere. So why is Florida different? Well, as I was just mentioning, the way that that bedrock is in Florida is quite unique. It is a fairly soft limestone. So with time, with rainfall and other climatic factors, that limestone would start to wear away, and it would become thinner and thinner until they would collapse in. So this is a big generalization, but by in large Florida lakes had been formed by sinkholes. Now there are four other ways that they're formed. But this is the common method, particularly in Central Florida, where you see these just pockmarked lakes all over. Now, some of those sinkhole lakes are quite small. Others are big, usually showing that there were multiple sinkholes that have now joined together. Right. So that is how those lakes formed. Now, because of that, Florida lakes are generally quite shallow. So that limestone would decay away, a sinkhole would open up and then with time, clay, sand, silt, and other things would begin to blow in, they would plug that hole and then it fills up with rainwater. So those are how our lakes have formed. They're fairly shallow, and often they're fairly nutrient rich. So that is why Florida lakes look so different than the Minnesota, New York lakes, and why there are so few lakes across the central part of the United States.

C Christine Krebs 08:47

Thank you so much for that. Dr. Ferrell, I think it's super interesting to hear your perspective on Florida lakes. And I think it's important for Floridians to become familiar with the nature of our

lakes and how unique they are. You mentioned Central Florida and how lakes are sprinkled around everywhere there. I actually grew up in Lake County, Florida, where I grew up boating on the Harris and Butler chains. And you know, there have been some things that have really changed on those water bodies and other things about those lakes have kind of stayed the same. How do lakes change? And why do they change?

J Jay Ferrell 09:18

Well, there's a couple of reasons. Some of them are natural, some of them are manmade. So from a natural standpoint, lakes don't want to stay lakes. All lakes want to eventually turn into a swamp or marsh and then turn into a field. Right? Because think about that with time there's going to be wind action, there's going to be dust flying. And these things begin to fill in over time. The edges of the lake will slough in the lake will become shallower and shallower the water will start to disperse and go other places, and then all of a sudden it's not a lake anymore. That's a natural process. Now we try to prevent that in Florida with the management of a lot of our lakes. Every decade or two, there'll be a lake that is drawn down, heavy equipment comes in and scrapes the bottom to try to reset the clock on those lakes. That's why they do them to try to keep them from filling up. But a lake doesn't want to be a lake, it wants to eventually be a swamp and then a field. Now, so that's a natural process. But another change process is human activity. All right. So the lakes in Florida, as we indicated a moment ago, are pretty shallow. And we get a lot of rain in a fairly short amount of time in the summer months because of our subtropical climate. So historically, these shallow lakes, which would be three or four feet average depth, during a rainfall event or a week long rainfall event, they may swing five or six feet in depth. When that happens, that would help reset some of those lakes that we're trying to fill in. So all of that muck that had formed from plants decaying and dropping leaves to the bottom, that really high water would blast the muck out, it would blast a lot of these plants out, and it would sort of reset itself. So that was how these things operated, or they would get very low, there would be a drought, the bottom would be exposed, there would be lightning, and then you have a fire and it burned some of that off. But we really don't want those things to happen anymore. Because there's 22 million people living in this state, we really can't allow lakes to swing five or six feet because of flood protection. And we really don't need a lake to ever go dry because it may be used for potable water, so we have to try to maintain them as lakes. So now a vast majority of our lakes are now managed with water control structures. So that water is now manipulated and engineers determine how much water can be in that system. So instead of these lakes, going five or six feet up and down, they'll often just go 12 to 24 inches, up and down by the season. So there's a lot of human activity that now changes how these lakes operate and how they look. Now, one of the things about this, it adds wonderful protection, it adds safety, and it adds a lot of ability for us to predict how much water is there for us to use in potable water systems. But, we have really stopped that lake from acting like it was designed to act. So a lot of the issues people will see in this lake, it doesn't look the same? Well, it doesn't look the same because it hasn't cleaned itself in three or four or five decades now. Because it can't we're not allowing it because of safety concerns. So water control brings a lot of wonderful things to this state. But there is an anticipated consequence that the lakes are no longer natural systems. And we see that.

C Christine Krebs 13:12

I think it's interesting that lakes naturally want to change. And then on top of that we as humans, by just living here and being humans, we have impacted how these lakes behave for

all the reasons that you described, right. And so I think it's important to understand that there are unintended consequences to scientific decisions. And being able to talk about them and plan them out together is more important than dismissing them and kind of becoming hesitant about it. Because we're here to stay. Right.

J Jay Ferrell 13:40

Well and we have to understand that in our brains, we so often want to say, here's a problem, here's a solution, right? But maybe that solution is five or six steps removed from the problem you're actually seeing. So it's a very complicated system. It's a complicated series of lakes that are often chained together, and you change one, there's a potential to change three or four downstream. So as the simple solution, we're decades past simple solutions in managing the water of this state.

C Christine Krebs 14:14

Absolutely, thank you for that. We hear all the time from different groups, that they're concerned about our water quality, and, you know, a lake becoming quote unquote, dead or no longer there or changing. And so what does it mean to be a healthy lake? What is a healthy lake?

J Jay Ferrell 14:32

The term healthy lake, and I hear it a lot, is really a term that doesn't have much of a meaning. It means something very much and very deeply to the person that is saying it, but it's really not a quantitative term. It's a qualitative term. So you can't put numbers to this is when a lake is healthy, or when these parameters change it all of a sudden swings into not healthy. So it's not that and it's really the health of a lake is in the eye of the beholder. So let me give you an example of what I would mean by that. So let's say that you're a tournament angler, and that your job, your livelihood is about catching fish and winning tournaments. There are lakes in this state that don't turn themselves into wonderful bass fishing lakes. That's not what they do, right. So for example, many of the lakes that have formed in the Ocala National Forest area are very low in nutrition, they're very low in nutrients. So the water is clear. The sand bottom is beautiful. There's very few fish in them. There's very few plants in them. Because there's few plants, you don't have this big foodweb to feed the fish. There's just not enough nutrients there to keep everything in high numbers. But it's a wonderful system if you're a kayaker or if you're a swimmer. All right, that would be a beautiful place to go. Now, there are other systems that we would call pea green, they're algae filled, they're ugly. But my gracious do they grow fish, they're full of nutrients, they're full of plants. They're this massive collection of this really broad ecological system that is all swinging and all dependent on each other. Now a kayaker may say I'm never going to get in that water, where the tournament angler says that's where I want to be. So two different people can say, hey, that lake in the Ocala National Forest is not healthy, because it doesn't support fish. And another person could say those green lakes in Central Florida, that's not healthy, because I wouldn't ever want to get in them to swim because I can't see my feet after I get in the water. So lake health, it's not a quantitative term. It's a feeling term. And we have to understand where people are coming from. And we also have to realize

that managing these lakes means you have to manage them for everyone. So it becomes really difficult when we're coming to the table with those biases, thinking only about our interest, and not what this lake is, how it was formed and what it's supposed to be.

C Christine Krebs 17:11

You know, lake health is very nuanced dependent on the user, right? And so when lake health comes into play and the animals and plants present, there are plants in the lakes that you've mentioned, right? Aquatic emergent plants submersed, they can be in different areas of the lake, right. So aquatic plants are necessary for lakes?

J Jay Ferrell 17:29

They're not fully necessary, but boy, do they help.

C Christine Krebs 17:32

Okay, and so what are the benefits of having aquatic plants in a lake?

J Jay Ferrell 17:37

So aquatic plants do a lot of things to help support the ecology of that system. Right. So there are all sorts of little invertebrates that are going to use those plants for cover. There are fish that are going to associate with those plants to hide, to hunt. Meanwhile, these plants are helping stabilize the water column, they help all of those suspended solids drop out and helps clarify the water. They absorb nutrients out of the water column to help prevent algae blooms. Because when you don't have plants, generally speaking, you're going to have a lot of algae. And when you have a lot of algae, you have these really high and low cycles of oxygen, these algae start making tons of oxygen because of photosynthesis. They bloom, and then they crash. So as soon as they crash, that oxygen all gets consumed because of those algae dying and microbes eating those algae. So when you have plants in the system, it helps prevent all of this boom and crash. It stabilizes the system. And it is really difficult on fish when they have high oxygen, really low oxygen, really high oxygen, really low oxygen. They prefer a stable environment. So a fish will usually fare better, under stable fairly low oxygen than high low, high low high low.

C Christine Krebs 19:06

Okay, interesting. And so there are benefits to having aquatic plants present in a lake system, right.

J Jay Ferrell 19:12

Yes.

C Christine Krebs 19:13

But we also know that there are definitely problematic plants, right?

J Jay Ferrell 19:18

Absolutely. So not all plants are created equal. And just because you see green, that does not necessarily mean good.

C Christine Krebs 19:25

For those of you listening, these problematic plants that we're referring to are called invasive plants. For people who may not be familiar with this term, Dr. Ferrell, can you just briefly describe what an invasive plant is and what makes them a problem?

J Jay Ferrell 19:38

So an invasive plant is a plant that did not evolve in this location. So it has been brought here and it was brought here without natural enemies to help keep it in check. So an invasive plant is from somewhere else that is brought here that is now problematic, that is causing difficulty to the ecology or they're just a very expensive issue because of problems they're causing. So we have to manage those plants because they are going to start overtaking the system. Because all of our native plants have predators, they have all of these other factors from the climate, to fungi, to insects that are helping keep them in check. These invasives come in, they will overrun the system. And any time you go from lots of plants, to very few plants, or just one species, now you're back in a threat of having this oscillation. The more plants you have, the more stable the environment. And when I say the more plants you have the more different types of plants.

C Christine Krebs 20:44

Sort of emphasizing how beneficial biodiversity is the having this variety among us.

J Jay Ferrell 20:49

It's all about biodiversity, because different fish, different invertebrates are going to naturally associate with different types of plants in different places on those plants. So having all of that diversity there means we're going to support a big wide group of both vertebrates and invertebrates. And that's what we want our system to look like. And that's what we expect it to be.

C Christine Krebs 21:12

Christine Krebs 21:12

And so what makes Florida and its waters uniquely prone to these invasive plants?

Jay Ferrell 21:17

They're specifically prone to these invasive plants because of how the lakes were formed. So when we're talking about Lake Michigan with an average depth of almost 300 feet, plants can't live at a depth of 300 feet. So there are only certain places in that lake where the plants can actually live, they're shallow enough for them to live. Now, Lake Michigan has a lot of plant problems too. But in Florida, with us being it, four feet, six feet, eight feet average depth, there are a number of invasive plants that can colonize the entire lake and grow 100% and completely cover that water body. So that can't happen in a lot of our northern lakes. But it can down here. So the northern lakes are going to be confined, the plants will be here, they'll be highly problematic where they are, but they're not going to overrun the entire system. Our lakes, you can absolutely have that and there are many examples of where hydrilla has gone to almost 100% cover in some of our lakes. Another issue we have in Florida is the high nutrient content. So there are vast phosphorus deposits in Central Florida. So nutrients are high. So there's plenty of nutrition for those plants. And we have an almost year round climate that promotes growth of these plants. So day length changes dramatically as you move north. Florida day length doesn't change a whole lot. They do change but not dramatically. So we always have plenty of sunlight, we have shallow warm water, and more nutrients than we know what to do with. So all of those things come together to really foster some of these plant problems that we see.

Christine Krebs 23:01

So wrapping it all up, we kind of talked about the lakes and landscapes of Florida, what makes them unique and why they're why they're specifically prone to this invasive plant problem. As we wrap up this episode, are there any last thoughts you'd like our listeners to leave with today?

Jay Ferrell 23:17

What I would like us to remember is that lakes have a personality. Lakes can be side by side and be very different, even though they were formed side by side and should be almost identical, they are not and there are numerous examples of this. So understanding and appreciating that each lake is an individual, each lake is different, that can help us now not complain that this lake doesn't look like I want it, or I wish it looked like this one. Well, they're totally different and they're always going to be different. So understanding which ones match your needs, as a sporting member of the State of Florida, can help you really enjoy the diversity within these lakes and and help you enjoy what you're trying to accomplish on that lake that day, rather than being frustrated that one lake is not providing all of your needs.

Christine Krebs 24:11

Yeah, so to me, it sounds like through research and collaboration between local communities like yourselves listening, managing agencies, like the FWC and the university, researchers here

at the Center for Aquatic and Invasive Plants. We can all work together to protect Florida's lakes and landscapes. All of Florida's residents and visitors can help protect Florida's lakes by being more aware of human activities that affect these lake systems. One example that I can think of is appropriately using fertilizers in your lawns and gardens because some of that excess fertilizer can end up in our water systems. And that can affect how plants grow in these lake systems. And I encourage our listeners to check out the UF/IFAS Lake Watch website, as well as the FWC What's Happening on my Lake. These two resources are very helpful. They can give you some more information about Florida's lakes and show you how you can get involved.

J Jay Ferrell 25:07

So you're saying that we all have a part to play in this?

C Christine Krebs 25:10

Yeah, I think through listening to these podcasts, shameless plug, and kind of checking out these awesome resources online, and engaging in some public meetings, whether they're virtual or in person is really beneficial. We're all here to listen and engage. Thanks for listening to working in the weeds. Check out our show notes for more information about the topics discussed in this episode. If you have any questions or ideas for the podcast, email us at caip@ifas.ufl.edu. That's caip@ifas.ufl.edu. You can find us on Facebook, Instagram and Twitter. And stay tuned for future episodes as we continue to turn science into solutions.