

WITW-Podcast-S1E2-Whats The Deal With Invasives_mixeddown

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SPEAKERS

Jay Ferrell, Christine Krebs

J Jay Ferrell 00:00

When you talk about invasive plants, you talk about three places in the world. You talk about Australia, you talk about Hawaii, and you talk about Florida. Right. We think about a lot of people want to move to Florida...invasive plants want to move to Florida too.

C Christine Krebs 00:25

Welcome this is the Working in the Weeds podcast at the University of Florida IFAS center for Aquatic and Invasive Plants. We are excited to connect our scientists with you to clarify and discuss issues surrounding aquatic and invasive plants, while also highlighting the research being conducted here at the Center. My name is Christine Krebs. I'm the Education and Training Specialist out here at the center. And for our first season I'll be sitting down with center director, Dr. Jay Ferrell, to introduce this podcast and to set the stage for future conversations. In our first season, we'll be talking about the center in general, provide an overview of our invasive plant problem, and finally discuss what makes Florida uniquely prone to invasives. So with that, let's dive into my conversation with Dr. Ferrell. So I think before we really get started in this conversation about invasive plants, I think we need to review some of the terminology that we introduced to everyone in the first episode.

J Jay Ferrell 01:22

Sure. So again, these terms, we're going to be using them throughout this season. And next. So making sure everybody's on the same page is really helpful. Let's, you know, let's make sure we're all starting at the same place. So we're going to use these terms like native plant. So the best way to think of a native plant is one that is from here, it's from where you are, it has an origin story. And that's it evolved in this area with lots of other things. Well, then you have nonnative plants. So some folks will call them exotics. But we're starting to try to call them nonnative now. So native, nonnative, and hopefully people will see that differentiation. But a

nonnative is from somewhere else that was brought here. Now, it doesn't mean it's problematic, it doesn't mean it's causing trouble, it just means it is now in a new geographical area. Well, then you have the invasive plant. So an invasive plant is nonnative. But it is one that is a bad actor. It is one that has been shown to cause economic or ecological harm. So it's not just bad, because it's not from here. It's bad because it causes harm to the environment. And then lastly, is a nuisance plant. So just because a plant is native doesn't mean it behaves. So there are some native plants that are really troublesome and we call those Nuisance Species.

C Christine Krebs 02:52

All right. So for everyone listening, we have native, nonnative, invasive, and nuisance.

J Jay Ferrell 02:59

Those are the four.

C Christine Krebs 03:00

All right, awesome. So now that we've gotten some terminology under our belts together, can we kind of talk about why Florida is unique in the invasive species problem?

J Jay Ferrell 03:09

When you talk about invasive plants, you talk about three places in the world. You talk about Australia, you talk about Hawaii, and you talk about Florida. So Florida is always on that list. And because we are very unique and how this state is and how its situated it really lends itself to being a mecca for invasive plants, right. We think about a lot of people want to move to Florida, invasive plants want to move to Florida too for several reasons. One is the climate. If you're in Michigan, there's a big part of the season that those plants are not going to successfully grow because they're under a foot of snow. Florida has 12 month growing season. We also have a lot of people here. When you have a lot of people you have a lot of nutrients. So there's 22 million people, that means there are millions of septic tanks, there are a lot, there's a lot of public water. But when you have all of these people, you also have a lot of concrete. And every time you have concrete, you have put a surface down that doesn't allow nutrients to soak into the soil and get remobilized. So they hit the concrete, they go into a storm drain, they go right in to our rivers and streams. So a lot of nutrient loading because of our population. So those are the types of things as well as the fact that our natural lakes are shallow. Because of how they were formed. Most of our invasive plants can grow from one end to the other across a lake because their average depth of five or six feet. So there's a plenty of light penetration down to the bottom to get those little propagule started in growing. So Florida just has the perfect conditions over and over and over again to be a home base for exotic plants.

C Christine Krebs 04:51

Yeah, and I think for our listeners, he mentions this three part of top three heterote right?

mean, and I think for our listeners, he mentions this these sort of top three hotspots right? Australia, Florida, and Hawaii and if you think of those places, well Australian who islands, right, so all of their borders are kind of susceptible. And then Florida is the peninsula, or one of the peninsula's in the United States. So I guess all of that really just makes sense.

J Jay Ferrell 05:10

Ideal climate, you know, it's just things are gonna stack up perfectly in even in Hawaii, you'd have certain areas where you have hundreds of inches of rain a year. So you're not limited by rainfall, you have that mean average climate. So those are the types of things when you start pulling the extremes out of your climate, that's when you really set up for a lot of explosion of these plants.

C Christine Krebs 05:33

Sort of warm, wet paradise is what we provide. Alright, so moving more into the weeds with invasives, can you describe the problem behind invasive plants and sort of how the problem has evolved?

J Jay Ferrell 05:46

Sure. So we just described how Florida is a great place for these plants to be. But it's not just a Florida, Australia, Hawaii problem, this has really become a global problem. So with increases in technology increases in travel from one part of the world to the next, what I tell people is the globe has just began to shrink, because it is so easy to go halfway across the world in just a few hours now. So moving things accidentally or even on purpose is very, very easy. So again, we see issues in Florida, halfway across the globe. In Australia. The European Union is having major issues. So plants that are native to the US like ragweed is causing millions of dollars of problems in France and other countries in Europe, people that have no idea what hay fever is, now they do with with ragweed is rampaging across that country. So it is a global problem. But the thing we need to also remember is this is not a new problem. So back in the even as far back as the 1500s, when explorers began to move around, they took things with them that they felt that they were going to need in the place they were going. So we have a lot of cattle in Florida. There's a lot of hogs produced, as well as wild in Florida. Those are not native to North America. They were brought here, when explorers would come they would offload these animals so they could have a sustainable food population. Well, if they were bringing and moving whole animals, mammals around, of course, they were bringing plants with them as well. If you've got a plant that you know, has sustained your family for hundreds of years, and you're going somewhere else, you take those plants with you. So we don't have good records on what was brought in in the 15, 16, 1700s. But we definitely know these plants were being moved around for hundreds of years. So the issue is not just Florida, it's the whole globe. And it's not a new problem.

C Christine Krebs 07:58

So I know it's like a - that was a big question to kind of tackle right. And so you mentioned, explorers started, I'd say 14/1500s. Right? And we don't have a lot of documentation. So things

that were present between the 1400s and I guess maybe the early 1800s, were kind of like, it is what it is we have sort of evidence, some fossils, some, I guess, observations from people that lived back then, but would you say the 1800s would be kind of the era in which invasives were becoming - we were able to understand them better then?

J Jay Ferrell 08:29

So in the late 1800s is when we brought in some plants that really changed how we operate as citizens of this country.

C Christine Krebs 08:38

Sorry, real quick. And when you say we brought them in what what would that what did that kind of look like?

J Jay Ferrell 08:42

Well, it means people in North America brought come here, often with the best intentions, right? Because we're at a point that we don't really understand how our native environments work. We don't understand the value of biodiversity. We don't understand the value of native plants until you bring an invasive in and see what that invasive plant does. So one of the good examples of this is water hyacinth. So water hyacinth was brought into Florida in the late 1800s. Now, how did it get here? There's a lot of speculation and debate. A very common story you hear is that they were giving away these great awesome cool little new plants at the World's Fair in New Orleans. Because these are super green, little leathery leaf plants with a beautiful purple flower. It was going to be the next hot water garden plant for the US. So one story is they gave them away someone brought them back to Florida, ends up overgrowing their water garden casting them into the St. John's, declare their water garden and next thing you know it's all history. Others have said oh we really don't think that happen. We think somebody went to Brazil, saw the plant, thought it was neat brought it back. There's all these other stories. We don't know how it really got here. But we do know that they made their way to Florida, they found their way into the St. Johns River. And then before - within 10 years, we had major major issues. So again, remember, this is the late 1800s. We don't have railroads yet, we don't have highways. So the way we moved goods and services in this state was by water and the St. Johns River was the primary way of doing that, in this new state of Florida. But within just a few years, the water hyacinth had gotten so thick, that steamboat traffic had to be suspended. We they could not use the river, there was miles and miles of solid water hyacinth. It was so bad that there was a federal legislation put in place in 1899, the Rivers and Harbors act. That said the federal government is now an active participant in managing invasive plants in these federal navigation ways. So it was so bad, even Washington DC had to get involved. And again, this is not a common problem. It wasn't occurring everywhere. It was occurring mainly in North and Central Florida. But it was so bad. It rang the bell in Washington, DC. So that's one example of when the first time we started realizing what these plants can do. Now, unfortunately, we still haven't learned our lesson by the 1950s. We're still bringing in plants for the aquarium trade, and all of these other - everybody wants to have the next cool thing, right. It doesn't matter if it's a plant, or some type of widget that people are selling. Everybody wants the next cool thing. So the aquarium trade started becoming pretty big in the

40s and 50s. So an individual found out that hydrilla was this cool looking plant that was easy to propagate, people hadn't seen it very much before. So they were gonna have a corner on the aquarium market. And the story goes that the first time it was found in the wild was in a canal in South Florida, all planted in very nice, neat rows. So it's clear that someone planted it was propagating it for sale. Of course, the hydrilla got away. It is now in most of the water bodies in Florida. It is addressed every year in this state and millions of dollars each year is expended to control just hydrilla. So that escaped plant by somebody with great intentions, wanting to have the next cool things and be in the marketplace has turned in to hundreds of millions of dollars of expenditure over the last 40 years.

C Christine Krebs 12:47

That's incredible to think that one industry is now impacting another. And so these researchers are now trying to backtrack history and understand and almost get ahead of it now. Right?

J Jay Ferrell 12:58

Absolutely. And before you see what hydrilla can do, you would never have thought that this plant would do what it actually does in the wild. So this was not a nefarious act. This was not a bioterrorism or anything like that. It was someone that was well intentioned, that just didn't put the pieces together, that when you bring a plant out of its native range, and you put it somewhere else, you never know what it's going to do. So please don't move these plants around if you don't know what it is, take care of these things in a proper manner so they don't spread. Yeah. Now another example of this, though, is Giant salvinia. So we're getting better. We're learning. So we've got water hyacinth, that we brought in, cast into the St. Johns River. huge, massive problems, massive problem to this day. Hydrilla brought in for the aquarium trade, released accidentally or purposefully, but not not on purpose into the environment. Huge issues to this day. Giant salvinia is this floating fern, it's about the size of half dollar. But it is one of the most aggressive plants in the world. It is a huge, huge, it is the primary problem in Louisiana and in parts of Texas. It has gotten established in South Carolina. But it has made entrances into Florida a couple of times over the past 10 years. But since we know what this plant is capable of doing, we know how good Florida is at growing plants and our nutrient rich water with our long growing seasons. Every time this plant has been brought in, there has been what we call an EDRR strategy put in place very, very rapidly. So it's early detection rapid response (EDRR). Right so as soon as someone discovers Giant Salvinia, all the alarms and whistles start going off, there is a an eradication strategy put in place immediately. So there are currently three or four populations of Giant Salvinia in this state, and all of them are less than a 10th of an acre, because of massive response very quickly arresting this problem. And going after solid eradication, we're not trying to manage that plant, we're trying to eradicate it, because we've seen what it does in Louisiana and Texas. And we know we have to prevent that happening in Florida.

C Christine Krebs 15:27

It's incredible. So this EDRR that you mentioned, who was involved with that biologist, researchers?

J Jay Ferrell 15:33

So depending on where it is, it'll be either a state or federal agency. And it's usually a state agency that is involved, whether it be Florida Fish and Wildlife Conservation Commission, or one of the water management districts, but generally it is those agencies working together. Say "hey, let's pull our resources, let's pull our ability, our human talent. And let's make sure we prevent this plant from getting established."

C Christine Krebs 15:57

So follow these examples that you provided with us. There's a lot of consequences that come with invasives. Right? And we don't always know them until it's too late. What are some impacts of invasive plants that you would, I guess, summarize for our listeners?

J Jay Ferrell 16:10

So they impact our environment in a lot of ways, but one of the primary ways is the reduction of biodiversity. So what I mean by that is, remember, an invasive plant is one that causes ecological or economic harm. So what does ecological harm mean? It means that it is fundamentally changing the landscape, okay. That is what these invasive plants do is people have called them ecosystem engineers, because they have the ability to go in and fundamentally change what is going on and the plants that are able to grow there. So a couple of examples would be old world climbing fern, Lygodium, it has the ability to climb to the top of these large trees, but it's a plant that loves to burn. So fire is not new in this state. This state has burned, there's lightning strikes, it is a pyrogenic ecology across the majority of this state, or it's basically one, that fire is part of what plants are there. But the fire grows, burns low, underneath these trees, opens up ecosystems, allows all sorts of wildlife to now thrive, but it doesn't harm the trees. But when you have Lygodium, growing up in the tops of these trees, it causes or creates what is called fire ladders. Those things start to burn. And it just walks that fire right up to the top of the tree where the sensitive tissue is, and it's a hot fire that kills the trees. So now all of a sudden those trees are gone. And the Lygodium now just continues to grow and smother everything out. So that is what an ecosystem engineer does. So they reduced biodiversity. You went from 20 different tree species and all of these different grasses to one plant that is Lygodium. So that is one of the big problems. And there have been scientists that have said, invasive plants are the greatest threat to biodiversity except for development. The only thing that impacts biodiversity more than invasive plants is concrete and steel.

C Christine Krebs 18:23

So thanks to the lessons learned from these plants, and the examples you provided, and the unintended consequences of these of these plants, can you discuss the importance of management in the state and what that kind of looks like with these plants?

J Jay Ferrell 18:35

So management is going to be essential with invasive plants. Now, again, I want to draw a distinction. Just because a plant isn't native doesn't mean we have to manage it. There are nonnative plants that are fine to be in our landscape. They are not causing ecological harm. And they sort of become citizens of Florida over time, right, they start to live in harmony. But invasive plants are so destructive, they have to be managed if we want Florida to continue to look like Florida looks. So management is not a luxury, it is a requirement for these certain plants. Now, how many of them are there? There are a lot of non native plants, but we're really only having to manage the worst of the worst. So you end up talking about eight or 10 species. So we're not talking about going and carpet bombing Florida and you know, cleaning everything out. That's not the goal. That's not what we're trying to do. But those worst actors have to be addressed if we want Florida to look like Florida looks. So how do we do that? Well, there are five management strategies. Okay there is mechanical, biological, chemical, physical, and prevention. And if you want, we'll go through some of these and talk about them.

C Christine Krebs 19:57

Yeah, I definitely think we should cover the different types. So, first one being I guess mechanical then.

J Jay Ferrell 20:02

Alright, so mechanical control is one that we really understand. Alright, so that is a machine that is coming in and harvesting these plants out. It can be on land, it can be in the water. So there are companies that do this. So basically think of like a big crop harvester that is on a barge that is gathering plants at the front of the machine, storing them in a hopper behind, and when the hopper is full, they go offload those plants, and they are taken out of the lake. Now, one of the things we have to keep in mind is every one of these management strategies that we've mentioned a second ago, every one of them have great benefits, wonderful benefits, every one of them have deep flaws, because if any of them were perfect, we wouldn't be talking about the other four. Right. So they're all helpful and flawed at the same time. So mechanical harvesting is a great tool. It takes those plants out of the watershed, it takes those nutrients out of the watershed. There's no muck deposition from those plants dying and going to the bottom of the lake. But there's a lot of fuel cost associated with it. There's a lot of people. You need boats, you need barges, you need harvesters, you need dump trucks, you have to have a place to take it in pile it, sometimes you have to pay to have it disposed of at a landfill. So mechanical harvesting can be slow and expensive in certain situations. Great tool, but not a silver bullet. And we can only harvest an acre or two an hour, in most cases. So to try to manage 1.2 million acres of state water in Florida would require hundreds and hundreds and hundreds of harvesters and there's not that many in the whole world. So great tool when when we need it, but not the silver bullet. So a second option is biological. So that is where you bring in a critter of some sort to help eat these plants. They can be an insect, it can be a fungus, a fungal pathogen, it can be a fish. So you bring them in, they are very specific. They impact the plant you're interested in and that plant only. They are laser focused and targeted. And they are amazing because they're sustainable, right? They breed, the population gets larger, as the plant population that you're interested in managing gets smaller, they fly away or move away into other populations. And they really sustain themselves. And they work all day and all night. Wonderful tool. But bio control is very difficult. So we have to make sure that that bio control

agent is only eating that one plant. Because what if we brought it in to eat on let's say Chinese tallow tree, but that insect also will eat maples, oaks and sweet gums? Well, now we've just denuded most of Florida.

C Christine Krebs 23:15

So I was just gonna say that. Does biological control always involves introducing another invasive?

J Jay Ferrell 23:21

So well, we have to make sure it's not invasive, right. So if that insect comes in and it is causing ecological harm, then it would become invasive. But usually it's just a nonnative insect or fungus, or fish that is going to attack that one plant. So I'll give you another example. So Tropical soda apple is this really spiny nasty plant that grows in natural areas, it grows in pastures, and it is super problematic, brought in about 30 or so years ago in the 80s. And boy it changed cattle production in the state. Well, they started looking for insects in the Central America and South America region of the world because that's where the plant is native to. Well they found some insects down there that do eat that plant. They brought them back but, Tropical soda apple is in the plant family called the Solanaceae, all right. Well, also in that plant family is tomato, potato, bell pepper, and eggplant. If we bring back an insect that is just specific to that plant family, it could destroy the tomato production of this entire state. So it takes years and years of research and trialing. Okay, does this insect - what else does it eat? All right, is it toxic? Is this thing - does it make some type of toxin that if a native Caterpillar tries to eat it, is that going to be impacted? Does this insect also interfere with pollination in our native pollinators? All of these types Some tests have to be put in place. To make sure we're not bringing in a new problem that we also have to address. So, bio control when it's successful, it is absolutely amazing, incredible, totally irreplaceable. But for every successful bio control agent, there's probably 200 that don't make it. They didn't pass the test. And because the testing is so extreme, it takes 10, sometimes 15 years to work all the way through the process. So it's a slow process. It's an expensive process. But it's one we absolutely have to continue to support.

C Christine Krebs 25:41

So we've got mechanical, and then we've got our biological. So what can you tell me about the physical?

J Jay Ferrell 25:49

So physical is when we actually physically change a water body to manage a plant. So for example, Rodman Reservoir is an impounded river. And there's a water control structure on there. Well, every three years, when hydrilla starts to really take off in there, and you've got a lot of floating plant problems, they'll do a drawdown, they will bring that water way down, and they'll dewater about 80% of that reservoir. All of that hydrilla just is now exposed to sunlight, the hydrosol dries out. And they let all those floating plants to get stranded on dry land and

desiccate. And then they bring that water back up really high. And that water that's going into Rodman Reservoir, one of the places is the streams is going through the Ocala National Forest. So it's picking up all of those tannins by going through all those pine needles and leaves that are decaying. So the water that's coming in is tea colored. So they bring in and stack several feet of dark water, then on top of where the hydrilla was growing, the hydrilla has a very difficult time growing because there's not enough light, they do it every three or so years, they've not treated hydrilla in Rodman Reservoir since the late 1970s. Unfortunately, not every system allows you to do that.

C Christine Krebs 27:18

Yeah, this sort of luxury reset button.

J Jay Ferrell 27:21

Absolutely. So it when you have that ability, and you have a group of stakeholders that say, "hey, we value this, and we want to basically not be on this system for six months, every three years." It's a wonderful opportunity but not all of our lakes and reservoirs allow us to do that. So physical is a wonderful management option when you're in a place that you can actually do it.

C Christine Krebs 27:47

And so I guess that brings us to the fourth, chemical?

J Jay Ferrell 27:50

Chemical is a primary one and this is one that is very controversial. So chemical control is quite specific usually. They can go in and they can pick what plants they take out and they can very selectively remove the invasives and leave the natives. It's fairly inexpensive for the amount of acres that you're able to cover, it's fast, and it's quite reliable. We sort of know, if you go in and you intervene with this molecule at this time on these plants, we can very reliably predict the results. However, the vast majority of the general public do not prefer chemical management to be used on their waters. So that is the huge drawback. So folks are concerned, they don't like that, that system. So you have to work with the stakeholders help them understand what's going on. But folks are not generally happy. So that is a huge drawback. And that keeps chemical from being used at more places.

C Christine Krebs 28:54

So I guess these chemicals that are put in the water, they are tested and made for water and in the system. So this technology was made for this purpose or?

J Jay Ferrell 29:02

J Jay Ferrell 29:03

So every herbicide that would be used for managing aquatic plants in these waters have been through an extensive review process by EPA. Now there are only 17 that are registered for aquatic environments. So there are hundreds and hundreds that are registered for corn, for sod, for soybeans, for cotton, but only 17 of those hundreds and hundreds are registered for use in aquatic environments because the standards are so high to be put into water that a lot of herbicides don't clear that bar. So these have been extensively tested, they are reevaluated regularly. So I think people can have a good level of assurance that the likelihood of harm from using these herbicides solutions is very low. But concern is concern.

C Christine Krebs 29:56

So the fifth method would be you said prevention, right?

J Jay Ferrell 30:00

Right. And this is the one we often forget about, but it is probably the most important. So an ounce of prevention is better than a pound of cure, right? If we could have prevented that first water hyacinth from being put in the St. Johns River, if we could have prevented those hydrilla tubers from being planted in those canals, what would Florida look like today? Right. So if you are in a scenario where you have exotic plants growing in your aquarium, that's wonderful. The level of concern from that is very, very low. But whenever you are finished with those plants, we need to dispose of them properly, don't go put them - just because they're wonderful and well behaved in that synthetic environment of a aquarium doesn't mean they're going to be a wonderful addition to a reservoir, or a lake or a canal behind your house. So we live in a country that allows great freedom, you're able. The government doesn't open your mail and see if someone has if you've ordered an invasive plant from halfway across the globe, and they'll put it right in the mail and mail it to you. So the government is not intrusive in that way. So a lot of faith and trust is placed in our citizenry. So if you are buying these things, and you're using them, just be responsible with it, don't release those plants. Don't release your exotic reptiles, don't release your exotic birds, make sure those are handled properly.

C Christine Krebs 31:27

So I just I think it's a perfect time to let our listeners know that the center actually on our website has a plant directory. This plant directory is created as a resource for you to look up plants. And if you type in the search bar for a certain plant, you can do the common name, you can do the scientific name, and if there's a plant that you think we should include, reach out to us, we are currently building this library. But there's a lot of management advice, resources and information and even pictures of these plants to help you kind of understand and make better decisions when it comes to purchasing plants and moving them around.

J Jay Ferrell 32:00

And also don't forget, if you're looking at redoing a landscape at your house, and you don't know - you go to your store, into your local nursery, and you don't know what to get, reach out to your local IFAS extension office, or to the Florida friendly landscape program. They will direct

you to the plants that are going to be the best behaved and also be beautiful for the situation you're putting them in. So if you don't know, there's wonderful resources within IFAS.

C Christine Krebs 32:27

So going back to the management methods, there's five of them, right? And you say that, you know, not one management effort is better than the other or in one isn't used more than another, they all kind of have pros and cons and they all have their place in management as a whole. Is there a way that you guys kind of decide when to use what and how to integrate these sort of processes together?

J Jay Ferrell 32:52

So what you're talking about is what we call integrated plant management. And that is where you use these techniques in tandem, to make sure we're addressing the problem and really loading up on the pros of each of the techniques while we minimize the cons. So that could potentially mean we do a drawdown in an area, help set those plants back and then add grass carp to the system. So you do have physical control, then you add a bio control.

C Christine Krebs 33:21

And just for our listeners, grass carp is a type of fish that is a popular biological control for hydrilla.

J Jay Ferrell 33:27

And a lot of other submerse plants. So grass carp again, they are they have a lot of good about them. They manage hydrilla quite well, but they're not specific to hydrilla. So you have to be really careful how many you stock, where you stock them, make sure they're not going to get away. But you'd have to balance those things depending on the nature of the system, the plants you're trying to control, and what's going on what the ultimate goal is. So by integrating these things together, you can really leverage the strengths of these different methods and get you to where you want to be. And those are decisions that are made by biologists that are in the field that know these systems intimately. They've worked on them often for years and years. They understand them in and out. So it's not somebody in a board room that doesn't know anything about Florida making these decisions. It's boots on the ground people with a vested interest in the resource.

C Christine Krebs 34:22

And so when you mentioned these boots on the ground, who are the people wearing these boots? And I guess how would you describe the structure of aquatic plant management in Florida?

J Jay Ferrell 34:32

So there are primarily three agencies that do management of aquatic plants and plan that management. So one is Florida FWC, that is the Fish and Wildlife Conservation Commission. So they are responsible for managing over 1.2 million acres of state waters and they manage it for the benefit of the habitat, as well as for the benefit of humans. So, boy that's a hard job because so often what is best for a large mouth bass may not be what's best for a homeowner living on that lake. So they've got a really tough job. But Florida FWC, they are a primary state agency that is highly invested in plant management. But again, it's for habitat and human enjoyment. Secondly, you have the water management districts, now they have a more directed focus. They are primarily responsible for managing plants for the purpose of water flow, and flood protection. Now they also do a lot of plant management on lands that they have purchased. So the Water Management District has purchased thousands of acres across Florida to act as a nutrient buffer to help prevent nutrient flow into our state waters. Now, on those water management district lands, boy, they'll get old world climbing fern, they'll get Chinese tallow, they'll get all of these bad invasive plants growing - cogon grass - so that they're not just allowing it to turn into a weed patch. They want it to be wild Florida as well. They want it to be diverse. So they'll manage those species in those upland environments as well to protect the biodiversity. But primary focus is flood control. So the third is the US Army Corps of Engineers. If you recall, I mentioned a little while ago, that as far back as 1899, with the Rivers and Harbors Act, the Army Corps was empowered to go manage these invasive plants to preserve navigation. So they are still highly invested each year on managing plants in the St. Johns River, and in certain places in Lake Okeechobee because it also serves as a federal navigation way. So those are the three agency groups that are primarily involved with managing this state and public water. Now, a lot of times people question where does the Center for Aquatic Invasive Plants fit in? So they know that our center is highly involved in doing research with these plants trying to understand them. We do research relative to the management of them but what role do we play? Well, the role we play is with doing research, collecting data, training students, and then disseminating that information. So people understand what the data says, what we've learned, and whether or not they want to use that information to drive their management programs forward. We are not involved in any of the discussions relative to what plants to manage, where to manage them, when to manage them, or how to manage them. We stay out of that. We just collect the data.

C Christine Krebs 37:46

So we're the information resource. And I hope our listeners understand that as much as we are a resource to these managing agencies that he'd mentioned, FWC, Water Management, District, and Army Corps of Engineers, we are just as much as resource to you all. So following us on social media, staying connected, and listening to the podcast, allows us to connect with you as well. As an extension to the university, we are here as information resource about aquatic invasive plants. So we're nearing the end of our conversation on invasives in general. Is there one takeaway that you'd like our listeners to leave with today, Dr. Ferrell?

J Jay Ferrell 38:20

The one thing I would like us to remember as we exit this conversation is that invasive plants are here because man brought them here. Now, it was often with good intentions. But we need to remember this is a manmade problem. And it is going to require a manmade solution. I hear

people a lot of times saying leave these plants alone, they are naturalized citizens now let nature take care of itself. Well, if we do that, there's going to be other problems associated with that. So just help us think through this issue. We brought them here, we now have to deal with them. Now we have to deal with them smartly, we have to deal with them ethically. But it is a problem we created that we have to now come together and help solve.



Christine Krebs 39:12

Thanks for listening to Working in the Weeds. Check out our show notes on our website 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 also find us on Facebook, Instagram and Twitter. Stay tuned for more episodes from working in the weeds as we turn science into solutions.