

Lisa Krinsky: Alright, hello everyone, and welcome to the Water Ambassador Program. Water Ambassador Program is a partnership program between Martin County and the University of Florida IFAS Extension.

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Lisa Krinsky: This program is all about stormwater, stormwater being the precipitation,

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Lisa Krinsky: that runs off of any impervious surface, and including all of the pollutants and everything that goes with it. So this program is to sort of teach

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Lisa Krinsky: Us about ways to improve water quality, reduce our nutrient and pollutant footprint.

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Lisa Krinsky: As well as things that we can do to, minimize the impacts of stormwater. For those of you in Martin County, if you see something, say something. This QR code here will actually take you to the county's

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Lisa Krinsky: Request for services, where you can report something, and they will go out and check it out. You can also call their phone number there, so that they can respond to anything that you may see regarding, stormwater or illicit discharges.

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Lisa Krinsky: We have... Lisa Krinsky: two presentations coming up. Our presentation in March is with the Indian River Lagoon National Estuary Preserve, talking about the new economic valuation study that was just conducted, providing

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Lisa Krinsky: value to the Indian River Lagoon in the region. And then in April 21st, our Florida Sea Grant partners over on the Gulf Coast are talking about a project that they're doing, track reduction for aquatic preserves, or Operation Trap.

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Lisa Krinsky: We will be putting the registration links in the chat for you, if you haven't already registered.

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Lisa Krinsky: As a reminder, all of these presentations are recorded and available on the YouTube page. We'll also put the YouTube link in the chat because this is,

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Lisa Krinsky: long and complicated, but you can also Google just, Martin County, Extension YouTube, and it'll take you to the... to the page, where this year and all previous years, all of our webinars are posted.

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Lisa Krinsky: We will be using the chat feature for... to ask questions, so put your questions in the chat, and we'll respond to them after the presentations are over in the order in which they came in.

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Lisa Krinsky: And with that, I'm excited to introduce our speakers for today. We have a tag team of speakers, both from the University of Florida.

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Lisa Krinsky: I think Dr. Marco Chiavone is going to be starting us off today. Marco is an assistant professor at the University of Florida. He's based out of the Fort Lauderdale Research and Education Center and is in the Agronomy Department.

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Lisa Krinsky: He... after completing his PhD in New Mexico State, he moved to California, where he spent years, as a researcher before moving to University of Florida, and I think we're going to hear about some of that California research today, and how it does or does not apply to us here in Florida.

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Lisa Krinsky: Dr. Chavon's research and extension programs focus on environmentally compatible strategies for turf grass management.

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Lisa Krinsky: We also have Dr. Jason Cruz, who's an Associate Professor of turfgrass Science in the Agronomy Department.

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Lisa Krinsky: Jason's work focuses on nutrient and water management in warm and cool season grasses, including the evaluation and use of site-specific management practices as a means of improving turf grass health while reducing inputs.

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Lisa Krinsky: Jason's research program also emphasizes the construction of knowledge base as it relates to the relationship between the management of turf grass systems and the resulting impacts of water quality.

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Lisa Krinsky: So both of these are perfect experts to join us for the Water Ambassador Program, and today they're going to be talking to us about the ecosystem impacts of artificial turf.

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Lisa Krinsky: So thank you so much, both of you, for joining us. I'm gonna stop sharing, and I think, Marco, you're up first.

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Marco Schiavon: Yep, I'll go first. Marco Schiavon: You need to tell me... okay, so... you need to tell me which screen you are actually about to see. Do you see the right one? Yep, looks great. Perfect, okay. So, yes, thank you for having me.

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Marco Schiavon: My name is Marcos Gavon, and I will be, talking to you about, the... basically a last study I've done before moving to Florida, in Southern California.

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Marco Schiavon: before moving to Florida, because it's quite a good, cautionary tale of, what may happen here as well. First of all, and second of all, well, Jason will then explain you that, unfortunately, in Florida.

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Marco Schiavon: We are drastically lacking data, but we are actually working together, see if we can get something, get this ball rolling. But anyway, so...

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Marco Schiavon: Funny enough, this is the last USDA drought map

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Marco Schiavon: That I pulled out this past weekend, right? February 12th. As you can see, California is completely out of the drought, and we are under extreme drought, okay? It's usually the other way around, but this map is really funny because it tells you that

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Marco Schiavon: either drought or periodical environmental occurrence that may happen anywhere in the United States, or the drought follows me. It's either or. Anyway, the thing is,

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Marco Schiavon: with lack of water, persistent lack of water, what happened is that, in California, while I was there, there was an institutional turf grass replacement program, where the state would pay residents to actually remove their lawns, their turf on their lawns, and,

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Marco Schiavon: Pay them to, Marco Schiavon: change it to something else. And at the beginning, at the beginning, they would change, they would pay residents, to...

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Marco Schiavon: Remove turf grass and put, cerescape or native landscape in, but at the beginning, they, turf grass, artificial turf, so synthetic turf grass.

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Marco Schiavon: Was also within the rebate program, and so people would actually be paid to remove natural turf and replace it with artificial turf grass.

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Marco Schiavon: However. Marco Schiavon: We know, as a fact, this, Urbanit Island effect has been studied for, century at the moment, as a matter of fact. Air temperature, air temperature in cities, are,

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Marco Schiavon: as much as 50 degrees warmer than surrounding rural area. Now, to cool those urban cities, you need, usually air conditioning to actually get your air conditioning going. You need to provide energy. Energy, usually, actually includes some kind of water using, so at that point, there is a

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Marco Schiavon: trade-off, where you remove plants that are helping you to decrease,

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Marco Schiavon: the temperature around you, but then you still need water to actually decrease the temperature around you, because you have removed the plants. And so.

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Marco Schiavon: We've done a study, in, California, and it was, on a regional, so the whole Southern California, and on a city scale. On a regional, scale, we compared different,

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Marco Schiavon: sports field, that had either artificial turf grass or natural turf grass, but then, of course, we had some problem with the resolution. The area was really good, so we could get a lot of data.

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Marco Schiavon: But then, of course, when you get that much of an area, you have problem with resolution, and so we actually flew a small Chesna airplane on top of the city of Riverside to take thermal images of landscapes.

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Marco Schiavon: And, and, have a better resolution, smaller scale, better resolution. On top of that, once we acquired all those, temperature data.

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Marco Schiavon: we try to correlate it to environmental and socioeconomic factors. And, socioeconomic factors, was actually quite, quite nice, and I'll, I'll explain you why.

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Marco Schiavon: But anyway... Marco Schiavon: here you can see we use the NASA Master program, so basically, it's a program, where satellite, would, take NDVI, and, we, related that NDVI to, to ground temperature,

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Marco Schiavon: on four different counties in Southern California. Keep in mind, this area, we're talking about, around 40 million people living there, one of the most densely populated areas in the country. The problem was, as I said, a big, big resolution, we couldn't...

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Marco Schiavon: really be, 100% sure of what we were seeing. And then, on a wasteballer scale, we flew on top, we flew on top of, the city, took images of the land temperature.

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Marco Schiavon: And you could see down here, where we could have a way better resolution, and, and basically see, how much, how hot

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Marco Schiavon: Was the surface temperature. Marco Schiavon: for the cities... for the regional scale, four counties, Orange, Riverside, San Bernardino, and Los Angeles, and we compared

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Marco Schiavon: always, 200... Schools that had an artificial turf grass right next to a natural turf grass.

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Marco Schiavon: How did we find that? Well, it was actually quite easy, because what happens is that in Southern California, it's quite common to have football played on artificial turf grass for high school, and baseball played on natural turf grass.

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Marco Schiavon: So, if the stadium were at least 200 yards.

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Marco Schiavon: next to each other, we, we actually, take the sports complex, and compare the difference in artificial turf among the other. On the other hand.

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Marco Schiavon: For Riverside, we actually, selected 5 different, zip codes within, Riverside, the city of Riverside.

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Marco Schiavon: And, mmm... Marco Schiavon: We compared schools, not only schools, but at that point, since the resolution was so much better, we could compare

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Marco Schiavon: Skyscape, so desert landscape, artificial, houses that had artificial turf grass, or houses, that had, natural turf.

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Marco Schiavon: Now, your question for me would be, well, but how did you know which house had desert landscape, which house had artificial turf grass, which house has natural turf?

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Marco Schiavon: And the answer may be unsettling, but always, always remember that the internet knows about you way more than what you would expect. So, really, all we had to do was go in into Zillow.

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Marco Schiavon: And, look for artificial turf grass, and boom! We actually got, a series of,

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Marco Schiavon: addresses and houses with artificial turf, with landscape, and with natural turf. These are the amount of pictures that we took while flying with the chestnut.

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Marco Schiavon: And, mmm... Marco Schiavon: This is the instrumentation that we used. It was basically a thermal camera. We were, around, 1,000 feet, on top of the... on top, of the, surface. But anyway, we also did, calibrated all the instrumentation.

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Marco Schiavon: down at the bottom to make sure that what we saw was actually, when we stitched it, the images taken from the sky, what we saw was actually representative. And yes, as you can see here, as a matter of fact, this is a great, great image to begin with.

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Marco Schiavon: This thermal image taken from the bottom shows you that, well, first of all.

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Marco Schiavon: Trees, number one, the best thing to reduce land surface temperature. You can clearly see

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Marco Schiavon: the, the shade effect here, at, at, 50 Fahrenheit, so actually quite good. Turf grass, next best thing, but then, your roadside here, the laser landscape.

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Marco Schiavon: Definitely starting to get, hotter, and just fault, of course, being the oddest. Well, this is just stats that you guys probably don't care about, but just to make sure we've done the right analysis. And so, bottom line.

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Marco Schiavon: On the regional, the whole big regional...

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Marco Schiavon: study. What we saw was that Marco Schiavon: The closer you were to the ocean, and the less the difference between artificial

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Marco Schiavon: And, natural turf grass walls. Marco Schiavon: ocean, Pacific Ocean, had a huge buffer effect, a lot of wind that would drop the temperature even on... of artificial turf grass. Point number one.

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Marco Schiavon: Point number two, is basically, Hollywood is really good at selling you California, but, you have to realize that usually in California, when you are at the coast, it's...

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Marco Schiavon: In the morning, it's usually overcast. Now, these data were taken from NASA, we just analyzed what we wanted from the images that NASA took, so also what happened is that we really couldn't call NASA and tell, hey, NASA, we want to do turf grass research, so can you please fly your satellite when we want?

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Marco Schiavon: So we were at the mercy of NASA, and these data were collected, between the morning, early morning, and early afternoon, so not when...

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Marco Schiavon: the temperature, may be the hottest, like, in the late afternoon, or, or, like, between 3 and 5 p.m, when the sunrise is at its peak. But anyway, bottom line, artificial turf grass always hotter than natural turf grass, but the difference was not too bad close to the coast.

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Marco Schiavon: the more you get towards the mountain and LA Valley, then definitely that difference increased by a lot. Riverside, where I was, and San Bernardino, hottest cities, together with San Fernando Valley, the difference was up to 20 Celsius, which basically translates, up to 70 Fahrenheit difference between

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Marco Schiavon: between artificial and natural turf grass. Now. Marco Schiavon: Big difference is... I hope you can see my...

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Marco Schiavon: My arrow here is this one. This one is Coacela Valley, so right in the desert. Coachella Valley didn't have a lot of difference between artificial and natural turf grass. And we were like, how is it possible? We're right in the middle of the desert, no gloom in the morning, so no overcast condition in the morning. How is it possible that in the desert.

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Marco Schiavon: There was not a lot of difference between the artificial and the natural turf. Marco Schiavon: And so we called a couple of those school superintendents and gatekeepers, and we told them, hey, what's going on here? Because we see a clear trend when we get far from the coast, and artificial turf grass starts getting scorching hot. How come yours is not? What is it due on?

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Marco Schiavon: And they told us, well, in order to have athletes playing on artificial turf, we constantly need to water it.

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Marco Schiavon: if we do not water our artificial turf grass, then athletes, will not be able to play on the field. So basically, what happens is that you are removing a plant to

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Marco Schiavon: Achieve water conservation, and then you put a piece of plastic, and for that piece of plastic, you actually water it to use it.

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Marco Schiavon: And last time I checked, you don't really... plastic doesn't really need a lot of water to grow, and so it was kind of weird, and that's why we actually tried to correlate socio-economical factor

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Marco Schiavon: to the difference in temperature between artificial and natural turf grass, to see if actually people who has a lot of money, because that's Coachella Valley, Palm Spring, Palm Desert, a really wealthy community, so basically to see if people who had a lot of money had actually the money to water, to use water to cool their artificial turf. But anyway.

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Marco Schiavon: These are actually the results from the city scale when we were able to have a better resolution, and natural turf grass was usually at least half of the temperature.

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Marco Schiavon: of, of, artificial turf grass. These are sands use. Marco Schiavon: So basically, 40 degrees are around 100 Fahrenheit, okay? And that basically resembles the air temperature, so the temperature of the natural turf always resemble the temperature of the air.

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Marco Schiavon: around it, okay? Which is, basically, is telling you that natural turf grass is,

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Marco Schiavon: By transpiring, controlling the temperature of the air around it. Marco Schiavon: While, these, once again, these are Celsius, this right here translates to 210 Fahrenheit, okay? This is artificial turf grass at 210 Fahrenheit.

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Marco Schiavon: August 1912, 19, okay? And that explains you why you actually need to water it in order to have the athletes, come in and play on your field. Desert Landscape, or seriscape, was, usually colder.

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Marco Schiavon: Than the artificial turf grass, but anyway, still warmer than the natural turf. Now.

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Marco Schiavon: Limitation of this study was that since we were doing a city scale study, we really couldn't, check what was the percent of plant

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Marco Schiavon: On the desert landscape. Marco Schiavon: I would speculate that the more plants you have, the more shrubs, more plants, more succulents and whatnot, the cooler your yard would be, but anyway, we couldn't really prove that, because

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Marco Schiavon: We were doing the whole thing on top of Riverside, so we had to work with what we had. But anyway, a picture is better than a thousand words, and here you clearly see it, these are the four soccer and football fields, okay, three soccer fields, 1 football field, all artificial turf grass.

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Marco Schiavon: Those are the practice fields. Do they look amazing and perfect, and you can play the Super Bowl on it? No, but they're a practice field.

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Marco Schiavon: But anyway, this is the picture we took from above, and that is the thermal, okay? And you can clearly see the difference here between, in, in temperature, between, natural turf grass.

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Marco Schiavon: artificial turf grass, and not only artificial turf grass, this is the desert, okay? Right here, you are seeing the desert, okay? And here you have it, 210 degrees, white is 210 degrees.

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Marco Schiavon: The desert itself is around 50 Fahrenheit cooler than artificial turf grass.

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Marco Schiavon: And it's not a joke, this is... this is actually really what happens... what happens there.

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Marco Schiavon: When we check, environmental factors, basically the correlation there, there is a really strong correlation with air temperature, maximum, minimum, or whatever.

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Marco Schiavon: And the temp... and the difference between artificial turf grass and natural turf grass in terms of temperature, but then we check the socio-economical factor

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Marco Schiavon: And no. Marco Schiavon: There was no correlation whatsoever between medium household income and the difference between artificial turf grass and natural turf grass.

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Marco Schiavon: Meaning that, for sports field, okay, people would water their pitch in order to have athletes and play, but homeowners would not... when they, change and switch to an artificial turf grass, then that's it. They do not really water

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Marco Schiavon: Their turf in order... their artificial turf. Marco Schiavon: In order to cool it down. Marco Schiavon: Same thing here. Basically, we saw that, well, regardless of the zip code, all the warmest house, 99.6% of the houses had artificial turf grass, and only 0.4% had, desert landscape, and all these, were actually

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Marco Schiavon: scattered around, five, different, 5 different, zip codes, so no, no correlation there. Now.

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Marco Schiavon: So... Marco Schiavon: Conclusions. In California, the difference between land surface temperature of natural and artificial turf grass is smaller on coastal area, but increases drastically

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Marco Schiavon: inland, and, turf grass, natural turf grass can be up to 120 Fahrenheit cooler.

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Marco Schiavon: than, than artificial turf, okay?

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Marco Schiavon: The thing is, do I think the same thing would happen here in Florida? Well.

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Marco Schiavon: generally speaking, no, because we are supposed to be a high precipitation state, so when it's the warmest in Florida, so in the summer months.

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Marco Schiavon: We also have, rainy season, so technically that should help us reduce the temperature in Florida. However, I just showed you the map, okay? We are in a drought.

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Marco Schiavon: And that means that we've been in a drought for the past

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Marco Schiavon: year. It hasn't... we fortunately didn't have any storm heating last year, but that also means it rained significantly less than our average, and it's still raining less than our average, so in years like these, we may actually start be seeing differences that resemble those of California. There's a lot of other environmental factors

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Marco Schiavon: that I cannot comment on, because I don't have data, but Dr. Cruza is going to. But anyway, I'd like to thank all my lab here, and I'm right at 20 minutes, so if you have any questions, I don't know if we leave questions for later, but thank you very much.

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Marco Schiavon: And let me... Okay. Lisa Krimsky: Thank you, my friend. Marco Schiavon: Sure. Lisa Krimsky: And as Jason turns over to the... his presentation, if you have questions for Dr. Shivam, put them in the chat, and we will get to them at the end of all of the presentations.

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Marco Schiavon: You're muted, Jason, you're muted.

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Lisa Krinsky: No, Jason, it looked good, you're just muted.

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Jason Kruse: Alright, can you guys hear me now? Lisa Krinsky: Yes, we can hear you. Jason Kruse: Alright.

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Jason Kruse: So, again, I'd like to echo Marco's, appreciation for you guys having me here today.

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Jason Kruse: I'm gonna start, and unfortunately, we don't have a lot of data to talk about, specific to Florida, and I think Marco kind of hinted at that.

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Jason Kruse: We did... to give you a little bit of context, we were approached by...

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Jason Kruse: the Synthetic Turf Council, a number of years ago, asking specifically about artificial turf.

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Jason Kruse: And the possibility of it being considered as part of a Florida-friendly landscape. And we put a lot of work into evaluating that and considering that, and one of the things that came out of that effort was this publication. I believe I've got a link to it if you're not familiar with it.

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Jason Kruse: I'm gonna drop it in the chat. You guys can go and take a look at it yourself if you haven't had a chance to see it. But this, we went through the 9 principles of the Florida Friendly Landscaping Program.

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Jason Kruse: And basically tried to put the... Jason Kruse: consideration of synthetic turf in the context of the Florida Friendly Landscape, and some of that I'm going to hit on in my presentation today, but I wanted to share this with you as a... as a resource that you could,

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Jason Kruse: take a look at it yourself if you haven't seen it before. It's gonna get into a little bit more depth in the content and questions that I'm going to kind of hit at at a high level here.

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Jason Kruse: But I wanted to make sure that you guys had access to that. Jason Kruse: The question that we're talking about here today, you know, the impact of widespread, and I

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Jason Kruse: Using that probably a little bit, you know, generously, but widespread use of artificial turf.

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Jason Kruse: In our urban landscape. Jason Kruse: Compared to natural turf, which has, of course, been sort of our standard base of our urban landscape.

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Jason Kruse: is something that... Jason Kruse: You know, is getting a lot of interest here recently, due to some changes at the state level, and also just the...

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Jason Kruse: Marketing efforts of these companies that are... that are selling these products. Jason Kruse: When we look at this from an urban landscape context.

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Jason Kruse: There's a number of things that we need to take into consideration. Jason Kruse: The environmental impact differences, natural turf.

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Jason Kruse: Because of the way that system grows and the way that it works, it does a tremendous job of filtering stormwater.

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Jason Kruse: The roots, as they grow down through the soil, they break up compaction. Jason Kruse: As those roots break down, they leave channels behind that help with water infiltration. The interaction between the roots and the soil and the microbes there

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Jason Kruse: Create a microenvironment that is very, very...

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Jason Kruse: supportive of microbiology and microbial activity, which helps break down any chemicals that enter that system. They filter the water and use nutrients and make that water clean.

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Jason Kruse: or at least cleaner as it goes through the system. In addition to that, those plants help with cooling the system. An area to put in context to

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Jason Kruse: There's... it's been estimated that an area the size of a... Jason Kruse: a football field, an American football field, so think of, you know.

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Jason Kruse: Florida field here at the University of Florida. Jason Kruse: That area of turf, which is about 2 acres, is estimated to have the cooling capacity of about a 70-ton air conditioning unit. And, you know, if you're not familiar with the way that works, that's the equivalent cooling capacity

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Jason Kruse: to create 70 tons of ice in a 24-hour period. So, the cooling impact that these have on the environment is dramatic, and Marco already kind of hinted at it and told you, you know, the difference in

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Jason Kruse: That cooling capacity of the natural turf versus what we look at with these synthetic systems is one of the first things that we look at in the impact or potential impact of these on the environment.

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Jason Kruse: Artificial turf, has been... identified as a potential source for microplastic pollution.

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Jason Kruse: There's been documented cases of heavy metal leaching. Jason Kruse: And of course, you know, the heavy or higher temperatures.

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Jason Kruse: Our choice in the landscape, whether we're going to use natural turf or artificial. Jason Kruse: Has the possibility and potential to have direct impact on water quality, our climate resilience, and...

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Jason Kruse: you know, an impact on the broader scale of wildlife and microbiology and ecology and water quality and all that together.

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Jason Kruse: Our climate in Florida, as Marco mentioned, we have a lot of rainfall, we have a lot of storm events.

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Jason Kruse: When we look at the... possibility of...

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Jason Kruse: A natural turf grass system being removed, and a synthetic one being installed. Jason Kruse: We have to take into consideration what the downstream effects of that might be, and we'll talk a little bit about that.

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Jason Kruse: Natural turf grass, Is a tremendous water filter. Jason Kruse: It has a number of things that it does. I'm just hitting on a couple of them here.

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Jason Kruse: I mentioned the cooling effect. It cools the atmosphere and the environment around it through evapotranspiration, helps reduce the surface temperatures, helps reduce heat exposure. If you haven't paid attention to this, walk from a

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Jason Kruse: parking lot out into a park space, and you can feel dramatically that difference in temperature. It helps... natural turf promotes soil health.

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Jason Kruse: and porosity? Jason Kruse: Promotes biodiversity.

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Jason Kruse: which helps with our nutrient cycling and ecological balance, and as I mentioned, it does a tremendous job of filtering water. One of the...

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Jason Kruse: Things that, you know, the turf grass... Jason Kruse: industry has faced a lot of criticism of over the years is the fact that these systems are fertilized, and

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Jason Kruse: You know, that, you know, because it's fertilized, we're going to have a negative impact on the environment. And, you know, research study after research study, both in greenhouses and in field studies, have looked at turf grass systems and the fate of nutrients that are applied to them, and

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Jason Kruse: Turf grass does a tremendous job. The water coming out of the bottom, if it's fertilized according to IFA's recommendations, is

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Jason Kruse: usually as clean or cleaner than what's going in the top. The... Jason Kruse: Plants do a tremendous job taking those nutrients out of the soil solution and utilizing them for growth. The benefit of that to our environment, when we have healthy plants that are being fed

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Jason Kruse: the way that they need to be. They get this more dense growth habit, which competes against weeds. That dense growth habit also holds soil against erosion, and

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Jason Kruse: Obviously, if we've got a nice, healthy canopy, we've got a nice, healthy root zone, which then does an even better job of filtering the water and helping to improve water quality in both the infiltration and our downstream effects through runoff.

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Jason Kruse: There's a number of things that we need to look at when we talk about the environmental trade-offs, if we're going to look at artificial turf.

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Jason Kruse: We're gonna see soil degradation and compaction. If you go and... if you've not... so... I'm gonna...

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Jason Kruse: put context to this, there's two... Jason Kruse: ways that artificial turf is, you know, largely there's two ways that artificial turf is used in the landscape. We have the athletic field application of it, and then we have the residential landscape application of it.

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Jason Kruse: When we see athletic fields being built with artificial turf.

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Jason Kruse: Those systems are typically excavated out to about a depth of 2 feet. That basin then is filled back with gravel, drain tile.

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Jason Kruse: Sand, and then capped with the... artificial turf carpet.

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Jason Kruse: That, as I'm sure you can imagine, has... Jason Kruse: you know, it is designed... by design, it's designed to infiltrate water very quickly to that drainage system, and then once it hits that drainage system, it goes off-site. There's little to no filtering of that water, obviously, because there's no biological activity, or very little biological activity that's supported by that profile of gravel and sand.

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Jason Kruse: When we see these artificial turf grass systems put into residential landscapes, the construction is very different.

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Jason Kruse: Usually it involves removing the top, you know, 3 to 6 inches of the soil.

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Jason Kruse: Coming back with a plate compactor and compacting the base.

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Jason Kruse: natural soil very heavily, so that the soil and base will not settle over time. That's by design, because they don't want that profile, that final topography of the artificial turf to settle and end up with

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Jason Kruse: Low areas, or high areas or pockets that, you know, kind of collapse on them. Because repairing those systems after they're installed is difficult and expensive, so they...

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Jason Kruse: Compact the soil, the subgrade very, very heavily, then put in sand and, you know, and gravel, gravel and sand to,

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Jason Kruse: put the profile of the lawn in place, and then lay the carpet on top of it, and then add a ballast. Now, the ballast, which is just a weight to hold that carpet in place.

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Jason Kruse: On an artificial turf grass system, it's usually sand and either chrome rubber, which is historically what they've used. There's a lot of sand and,

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Jason Kruse: Cork and some other products are being used now to try to improve some of the heat characteristics of the fields to whatever extent that that's been

35:01

Jason Kruse: and successful in... Jason Kruse: Our residential installations of these, it is typically just sand that is put in to help hold that carpet down so that it doesn't blow away in the wind or wash away in the rainfall.

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Jason Kruse: These systems, as you can imagine, particularly in the residential installations.

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Jason Kruse: They're gonna reduce water infiltration, which is gonna have the potential, you know, impact of... Increasing runoff.

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Jason Kruse: And with that runoff, we're going to see the increased transportation of microplastics and any chemicals that might leach from those products as they move downstream.

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Jason Kruse: We talked about the heat island effects of these. We've recorded temperatures, I've recorded temperatures

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Jason Kruse: here on campus in... at the University of Florida that were about 70 degrees higher than a natural turf grass system side by side.

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Jason Kruse: Natural turf grass system on a 94 degree day had a canopy temperature of right around 100 degrees. Right next to it, with a synthetic turf grass system, the canopy temperature was pushing about 170, 172, something like that. So, they do get very hot.

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Jason Kruse: the highest recorded temperature, I believe, that has been recorded off of a synthetic turf system in, I believe it was in more of a desert area, was in the 180s, 183, 185, something like that.

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Jason Kruse: How does that impact us? Well, we all live in Florida and probably rely pretty heavily on our air conditioning systems to stay comfortable inside of our house.

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Jason Kruse: It doesn't take a big leap to... Jason Kruse: Understand that if we start to replace large portions of our urban landscape with synthetic turf.

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Jason Kruse: We're going to create a lot more heat surrounding our homes and our businesses, and that's going to have the potential, we don't have a lot of data on this, unfortunately, but it's going to have the potential to increase our cooling costs

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Jason Kruse: Because of that heat that's being, you know, retained in those synthetic turfgrass systems. And then we have the lifespan aspect of these systems. Generally, they're expected to last between 8 and 15 years.

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Jason Kruse: On the artificial turf that's installed in athletic fields.

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Jason Kruse: We see them warranted for about 8 to 10 years. It is not uncommon on high-use fields for those fields to need to be replaced, just because of wear after about 5 or 6 years.

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Jason Kruse: Minimal use. They can usually, you know, last through their probably 8-10 year lifespan.

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Jason Kruse: What happens after they've worn out, though, is another part of this that we need to take into consideration, because

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Jason Kruse: We don't have a way to recycle them easily. Some of the manufacturers do market and say that their products are recyclable.

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Jason Kruse: That's great, but the problem with that is that we don't have recycling facilities Jason Kruse: regionally in Florida that are able to actually recycle those products.

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Jason Kruse: So when they get removed, Cut into rolls, hauled off on a truck.

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Jason Kruse: they get taken to a landfill. And that is the fate of these systems, by and large. Even in areas where those recycling systems are... are...

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Jason Kruse: Where they can access them, As you probably can appreciate, budget comes into play, and

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Jason Kruse: if it's more economically feasible to take it to the landfill than it is to haul it the extra distance to the recycling facility, I'm sure you can imagine what that choice... the choice that's made in that situation is. Most often times, it's taken to the landfill.

38:58

Jason Kruse: Water quality is an important aspect of, you know, our lives in Florida. We are constantly worried about

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Jason Kruse: our groundwater quality and the, you know, water in our aquifers. We're worried about our coastal water quality, both from a, you know, a wildlife and fishery standpoint, from a sporting standpoint.

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Jason Kruse: Natural Turf does a great job of Jason Kruse: increasing porosity, increasing infiltration rates, replenishing groundwater, and mitigating and moderating some of that stormwater surge. It helps reduce

runoff during large rainfall events because of that increased porosity and infiltration rate. Artificial turf, in contrast.

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Jason Kruse: As we've discussed, it's either installed over a compacted base, or it's installed over a... basically a... I'm...

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Jason Kruse: inert system that doesn't have any biological activity. So, in both situations, we're going to either increase runoff, or

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Jason Kruse: minimize the amount of filtration that happens to that water when it comes into the system, which then we have to be concerned about the downstream effects of that. Is it going to leach things into our groundwater? Is it carrying microplastics and other chemicals into our surface waters? We don't have answers for a lot of those questions, because we've not

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Jason Kruse: had the opportunity to address some of those questions yet. We're, you know, Marco, as he mentioned, we're looking at trying to

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Jason Kruse: to find some support to look at those questions and find some good answers for that, because I think those are important things for us here in Florida.

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Jason Kruse: Natural Turfs, Jason Kruse: You know, it reduces the pollution risks, and, you know, it is a good tool for us in our

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Jason Kruse: our ecology. Jason Kruse: The heat and climate considerations? Jason Kruse: I mentioned artificial turf reaches temperatures above 170 degrees.

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Jason Kruse: Why is this important from a health standpoint? Jason Kruse: We have seen...

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Jason Kruse: numerous cases, not in Florida necessarily, but there have been, you know, in the history of these systems, these systems date back to...

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Jason Kruse: the 19... I think it's in the 1970s, when the Astrodome was built, is one of the first Astro... that's how the AstroTurf name, got its name, when it was installed in the Astrodome. But, over the lifespan of these systems, we have seen

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Jason Kruse: cases of heat stroke in young athletes. You know, our young athletes are kids that are playing on these systems on the weekends for their soccer tournaments, baseball tournaments.

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Jason Kruse: they are probably the most at risk, because they don't have a good understanding of what heat stroke is and the symptoms that are associated with that. So when they go out and play on these fields.

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Jason Kruse: When the temperatures midday are reaching that 160, 170 degrees.

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Jason Kruse: They're not aware of what's happening with their body, and we're putting them at addition, you know, at increased risk for dehydration and heat stroke, which, of course.

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Jason Kruse: is not a good situation for them, particularly in young athletes. It's not good for anybody, but particularly where they're young athletes, we have a lot of concern about that.

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Jason Kruse: We have concerns about this as it relates to pets in the landscape, you know, the heat on their... on their paws, and the potential risk with that. And then, just our overall

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Jason Kruse: the broader landscape. Jason Kruse: you know, Marco and I have talked about this. We have some suspicion that, you know, these increased temperatures

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Jason Kruse: That result from artificial turf being installed. Jason Kruse: will have a negative impact on the surrounding landscape, because, you know, the trees that are planted in the landscape, their roots are going to extend out through those artificial turfgrass systems, and we don't have a good understanding yet of whether or not those increased temperatures

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Jason Kruse: are going to have a negative impact on tree health, a negative impact on, you know, nutrient uptake and water uptake of these plants, and we may have broader implications that we don't have a really good understanding of yet in Florida's climate.

43:02

Jason Kruse: Boom! Jason Kruse: some recent changes that are, I think, really important for us to understand, in... I think it was in 2023,

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Jason Kruse: House Bill 683, was put in place. They... basically, the Florida legislature

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Jason Kruse: and FDEP is working on this right now, the Florida legislature Jason Kruse: Put a law in place that... Allows installation of synthetic turf.

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Jason Kruse: on any property 1 acre or less. So, counties and cities cannot restrict that from happening without some pretty particular,

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Jason Kruse: restrict, you know, situations, they can't restrict the installation of that. FDP, as I mentioned, is in the process. They actually just had another listening session here about a week ago.

44:00

Jason Kruse: looking at the rules that they were trying to enact to support this legislation, FDP has proposed rules enforcing permeable bases,

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Jason Kruse: They want to limit and make sure that the infills that are being used in those profiles do not have any

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Jason Kruse: environmental concerns with them, that they're not going to be harmful to wildlife, harmful to water quality. They're restricting, of course, that the fibers in these profile... these artificial turf grass systems are lead-free, which is, of course, important for our water quality.

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Jason Kruse: All that being said, from... Jason Kruse: my standpoint, where I sit, these systems still conflict with the principles of Florida Friendly Landscaping.

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Jason Kruse: We... it's hard to see how these are going to help with water conservation. If we see widespread use of these in athletic field situations.

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Jason Kruse: I'll... Jason Kruse: echoing what Marco said, he's seen it in California, but it is rare, if at all, a case where these fields are built

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Jason Kruse: for use in athletic instances where there is not irrigation of some sort that they have access to. You've got these, you know, these weekend events, midday events. They need to have the ability to cool these down for the players to be able to act... to play on them in many cases, so...

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Jason Kruse: We're still seeing water use on them. Jason Kruse: In our residential landscapes, of course, we've got a lot of things that we need to take into consideration in terms of runoff and water quality, both from an infiltration standpoint and a runoff standpoint, and then that heat island effect, of course, that we discussed earlier as well.

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Jason Kruse: With that, I'm gonna stop here. Jason Kruse: And I'll kick out my share...

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Jason Kruse: And I think we've got just a few minutes to answer some questions.

46:00

Lisa Krinsky: Yes, thank you so much, both of you. Those were fantastic presentations. For participants, I did throw up a quick evaluation, if you can take just the handful of seconds to go through that.

46:12

Lisa Krinsky: Some of these, I'm gonna start from the top, and some of these may have been addressed, but first question is whether or not there are any reported burn injuries from artificial turf.

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Jason Kruse: So... Yes. Probably more... cases of... things...

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Jason Kruse: to get a burn from artificial turf, you have to stay in contact with it for a period of time. So, you know, if you're playing on that surface, and you reach down and touch it, or you fall on it, you're gonna feel the heat. To get an actual skin burn from it, you have to be in contact with it for a longer period of time, and there has been...

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Jason Kruse: A number of people burned. It's... it's... when I looked into it earlier, you know, 15 or 20,

47:00

Jason Kruse: individuals have burned, actual skin burns from them that are not just from a, like a rug burn type of a situation, an actual thermal burn from them. What we have seen a lot of is delamination of shoes.

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Jason Kruse: Athletes who play on the synthetic turf, their shoes actually fall apart because of the heat.

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Jason Kruse: melting the glue that holds your shoes together. That should speak something to you in terms of how hot those surfaces are, but the, the number of people being burned, it has happened. It's not as much of a widespread issue as the, you know, shoes falling apart and things like that.

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Lisa Krinsky: I'm also wondering, Lisa Krinsky: if pets... I know people install it for dogs and clean up, and so whether or not that's an issue. But, Amy with Martin County said that she herself has actually been burned by artificial turf. She just put that in the chat.

47:56

Lisa Krinsky: And the next comment actually comes from her. She recognizes that FDEP is looking at this right now. The regulation is wondering if you guys can share this info with them.

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Jason Kruse: We are actually both, actively involved in discussion with them through their rulemaking process. Both of us

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Jason Kruse: individually, Provided feedback on their proposed rules, and have been continuing a discussion

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Jason Kruse: to hopefully get some support for some research to answer some of the questions that Marco and I have.

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Jason Kruse: Brought to their attention. Lisa Krinsky: Great, thank you. We have a couple of questions that all, have to do with the pollutants or toxins that are associated with the leaching of artificial turf. I know you said that research is limited in Florida, but are you... can you provide any additional context, maybe here or elsewhere?

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Marco Schiavon: There is, on the EDIS publication that I think Jason shared, there's some literature. There is none in Florida, those are...

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Marco Schiavon: Those are one of... those are some of the questions we're trying to answer, about potential glitching of, of,

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Marco Schiavon: contaminants. Marco Schiavon: But yeah, from Florida, there's nothing... there has been study, in other states, and you can find them on the... this publication that says.

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Marco Schiavon: Short. Lisa Krinsky: Okay, great, thank you. And we can put, repost the link to that UDIS publication in the chat so that it's... it's further down for all of you.

49:36

Jason Kruse: I just pulled back the phone. Lisa Krinsky: We have a comment from Florida Oceanographic Society, which is a local nonprofit here that deals with a lot of things, including water quality. It says, great presentation. It's great that you are doing stakeholder engagement and such, but does that include public outreach or town halls with the general public?

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Lisa Krinsky: Also, are HOAs becoming an increasing obstacle as you spread this knowledge to the masses?

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Jason Kruse: So I think we're... this, this, law that Florida put in place kind of Fell in our lap.

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Jason Kruse: And it's rec... you know, it came as a little bit of a, like. Jason Kruse: oh boy, type of a situation that we've been trying to respond to. So we're really in the early stages of trying to address some of these questions. You know, the...

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Jason Kruse: Prior to this law being enacted, there was a lot more

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Jason Kruse: a lot more limited, I think, use of synthetic turf, and certainly there were, you know, cities and municipalities and counties that were limiting the use of it, and so it wasn't a big concern. Now, with this law being put into place.

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Jason Kruse: I think... we are... I'm more concerned that we're gonna see widespread installation, A lot of people...

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Jason Kruse: fall for the marketing of these products. The marketing is very effective.

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Jason Kruse: Unfortunately, it's not backed with any... Jason Kruse: You know, evidence-based data, and that's a real challenge that

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Jason Kruse: A hill that we've got to climb to try to get in front of some of this.

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Lisa Krinsky: And speaking of evidence-based data, one of our questions asks, other than the EDIS publication, is there any data from Florida publicly available?

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Jason Kruse: There is not. Jason Kruse: I even... so... Funding is what drives research. There has been...

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Jason Kruse: no funding, essentially, on synthetic turf in Florida.

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Jason Kruse: You know, the... the challenge with that, to be honest, is, you know, the funding that... a lot of the funding that happens across the country is driven by artificial turf in athletic field-type installations.

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Jason Kruse: Those, you know, there's a couple primary manufacturers that Jason Kruse: Sell to those types of venues, and they have invested a lot in their products and trying to

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Jason Kruse: So, primarily, they're driven by athlete safety, not really environmental

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Jason Kruse: considerations. They're trying to show that their surfaces, their technology is going to be safer for the athletes than the product was viewed historically. Not a lot has been done to look at the environmental considerations or impact. A little bit in the Northeast, I think, Marco, there was some work that was done.

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Jason Kruse: But we really are gonna have to lean pretty heavily, I think, on state and...

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Jason Kruse: And government agencies to fund some of this work if we want to see it done. Marco Schiavon: Yes, yeah, that is all true. The environmental side is being Tremendously underlooked.

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Marco Schiavon: We are in, communication with FTP, the Department of Environmental Protection, and hopefully,

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Marco Schiavon: they could sponsor, we started talking about constructing some research area here at Fort Lauderdale.

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Marco Schiavon: And, see if we can get something, something done. But,

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Marco Schiavon: Regardless, research takes years before we can get, publishable high-quality results.

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Marco Schiavon: And the legislation is happening now. Marco Schiavon: So, the legislation will... Take place, will be enforced before we actually know the long-term potential environmental impacts.

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Lisa Krinsky: Thank you. And, Lisa Krinsky: Bill wants to know if either of you have worked with or contacted any of the laboratories or testing centers that are actually maintained by the synthetic turf manufacturers.

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Jason Kruse: I have not, nor am I probably that aware of any laboratory or testing facilities that

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Jason Kruse: Are used by them. Marco Schiavon: Neither, neither, no.

54:09

Lisa Krinsky: Okay, so Bill, if you know of any... if you have more information regarding those, laboratories, feel free to put it in the chat, or add to the comments.

54:19

Lisa Krinsky: I guess there's, One of the questions asks about

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Lisa Krinsky: and again, acknowledging that you just said there's limited research in Florida, but talking about, sort of, the ecosystem impacts, also looking about alternative ground covers, such as Sunshine Mimosa, would that not be the best option instead of using turf at all?

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Marco Schiavon: So, yeah, well, alternatives, there's, quite a few research at this point. We have research going on. What we're missing with those alternatives, more than anything, is really long-term research, meaning, would they stick, would they persist, and stuff like that.

55:04

Marco Schiavon: But yes, we're doing research on those, and it starts coming out, and yes, some of the alternatives for people that don't want turf are great. At the end of the day, it's all about customer satisfaction. Mimosa, probably not as dense. Maybe some people don't like the color response, or something like that.

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Marco Schiavon: It will need less water, yes, for sure, it will need less fertilizer. That is about customer satisfaction. As Jason said.

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Marco Schiavon: if you manage turf grass, according to UFI fast recommendation, the environmental,

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Marco Schiavon: inputs, the negative environmental effects are really negligible. You can even minimize them with alternative if you want to, yeah.

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Jason Kruse: Yeah, there's a number of alternative species that have been looked at. You know, Perennial peanut's been around for a long time.

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Jason Kruse: There's some of our colleagues that have been working with frog... what's it, frog fruit, I think is another option that's being looked at as a turf replacement. One of the things that's important to keep in mind is that the functional use

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Jason Kruse: of the landscape is an important consideration, and if we're going to, you know, have dogs running around on it, or our kids running around on it, then we've got to look at how it's going to respond to foot traffic. If we just want green cover, there might be some good options, but if we want green cover that's going to handle

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Jason Kruse: use of any sort, then our options start to become a little bit more limited. And then we also have to look at the...

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Jason Kruse: broader, you know, I guess the 12 months, how does that... how does that look in the landscape? Print of peanut's an example, where for the summer months it looks great, and then come winter, that canopy basically disappears, and we have increased issues with potential soil erosion and runoff

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Jason Kruse: often, and things like that, where our natural turf ground systems, even if they do go dormant, which they rarely do in Florida, but even if they do go dormant, that canopy and that root zone is... still maintains a density at the...

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Jason Kruse: at the surface of the soil that holds soil in place. So there's a lot of questions that we've gotta...

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Jason Kruse: to... Consider if we're looking at alternatives in the landscape.

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Lisa Krinsky: Fantastic. Well, with that, we are nearing 1 o'clock, and I just want to end our Q&A session with, there are a number of comments in here saying, great information, great presentations. Thank you both so much.

57:43

Jason Kruse: Thank you, everyone. Lisa Krinsky: Thank you, Jason and Marco, and this presentation will be available on the Martin County Extension YouTube page in about a week. Give us some time to get it up there. But thank you, everyone, and we hope to see you next month for the Indian River Lagoon Economic Impact Assessment.

58:03

Vincent Encomio (he, him, his): Yeah, bye. Jason Kruse: Right.