WEBVTT

00:00:26 --> 00:00:45
Hi, everybody, welcome.
Great to have some people
here nice and early.

00:00:45 --> 00:01:43
Right on time.

00:01:43 --> 00:02:15
Welcome everybody.
We're just gonna give it a few more minutes to let others join.
We had a lot of registrations for tonight's webinar.

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There is a chat box at the bottom of the screen that should be live. If you want to drop in a Hello or tell us who you are. Why you're interested in the tonight's presentation. That'd be great. Say hello. Jaylen. Thanks for joining. Thanks for saying Hi Max. You're just talking about the expectation of promptness by the minute in these types of settings now with with webinars that will still give people a few more minutes.

00:03:26 --> 00:04:12
Thanks for joining Andrea. Thanks to those who may be wrapped up some work a little early to join us this afternoon to evening. And for those that are still just signing on, we're just going to give everybody a few more minutes and the chat is live if you want to drop in a Hello, or an introduction.

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You should be able to change who you're directing your message to everybody or just to the four of us here.

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Thanks for joining Sally. Good to see you. We'll get you out to the Wetteland in person again. Hi, rosemary, thanks for joining. See that number ticking up a little. Think I'm

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good good to see or see your name. Thanks for joining. Just give our friends so 535 or 35 excuse me, and then get going so we can also keep your time and respect everyone's evenings and zoom tolerances for the day. I Sarah,

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great to see lots of friendly faces friendly names, your names. Okay, why don't we go ahead and get and get started? I think we'll see some more people trickle in. And then there'll be make sure we have time for question answer at the end for anything that they might have missed.

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Go to the next slide. Great.

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So thanks, everybody for joining, especially our second webinar on the floating wetland Region One last fall just after it was installed. My name is Laura Justin ski. I am the Executive Director at the Charles River Conservancy. And I would like to start this session, I think it's important as a place based organization that we start by acknowledging the land that we work on and we focus on. So the Charles River Conservancy acknowledges that our work focuses on the resource traditionally known as the Kanaka. Quinn, which means river that turns back on itself in the English language, this land and water was and is home to the massachusett and walking off people, both past and present. I think that we are all fairly familiar with zoom. But um, I want to let people know that, as you can see, the chat is live. So feel free to say hi to folks. We also have the q&a. And so Rachel, to the CRCS, communications outreach coordinator, we'll be keeping track of questions so that we can have a robust q&a discussion session at the end. And you can also access closed captioning. If you go down to the bottom of the screen next to the q&a. And if those icons aren't popping up for you, you can kind of Hover your mouse at the bottom and they should appear. So tonight we're going to have an hour long combination of presentation and then question and answer. I think a lot of folks here already sent in good questions. I'll provide a quick overview of how we got you know, an island in the Charles River in the first place, will then hear from our research partner max rum from Northeastern University. With his summit hot off the press data from the first full summer of sampling program at the wetland. And we'll also hear from the CRC his new project manager, Taylor Leonard about how we've been using the wetlands as an education and engagement tool on how we're really prioritizing and centering engagement as we start to think about expansion and more wetlands in the river.

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Next.

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So first, just a quick word for those that might not be as familiar with the Charles River Conservancy or CRC as we call ourselves often. Our mission is really to engage everybody in the enjoyment and care of this space are we focused on the Charles River from Watertown to Boston, thinking of it as the more urban section of the Charles that lower 10 mile stretch, and generally our programs really involve advocacy, volunteer engagement, getting people out to the parks to get their hands dirty, and then great programming and events, like you see on the bottom with our city slash event. And for those that are familiar with that, we are looking forward and we're going to bring that back in 2020 to go the next slide because our swimming is actually what got us involved in floating wetlands in the first place. So on our website, if you're interested in looking more, there is a feasibility study from 2016 that we worked with stantec engineers on to look for a place where we could bring swimming back to the river regularly. You know, it's an incredibly important way to connect with natural resources and water bodies and we Thank, you know, it's obviously a great goal for for water quality, achievement and it's something that we really see as an important way to reconnect the the communities around the Charles to the river. So in 2016, after lots of other work, we engaged

stantec to create a physic feasibility study to think about where we could someday install a swim Park similar to those that you might have seen or heard about in Europe or in the Netherlands and other places around the world, and others that organizations are working on in the US. And so in addition to this design process, we also started a sampling program to do daily water quality sampling, here in North Pointe Park and in the lower basin, to get a sense of the daily water quality in a way that we would need to if we were to operate a swim Park. And that's how we met max room that a master's student now PhD candidate. And he will go into much more detail about some of his research here. But essentially, what this led us to really understand if you go to the next slide, is that while water quality has vastly improved. In the Charles over decades of investment by many organizations, algal blooms are really going to remaining the biggest barrier to record regular swimming in the Charles, you're probably familiar with these headlines. If you're around the Boston area, though, we didn't necessarily have them this summer. Or maybe you've seen the green tint of the water, or the scanner kind of recognize this algae or cyanobacteria in the water, which can be harmful to humans. And so you know, when we really kind of recognize that an algal bloom could potentially shut down a swimming facility a place to swim in the Charles for weeks at a time, we recognized that we needed to kind of turn our attention to thinking about how we could look for solutions to control outcomes locally and have broader water quality benefits for the Charles River, you go to the next. So we were lucky enough to have a lot of brainstorming sessions with Max and with others, and put together a project that was incubated by the Saki foundation to think about how we could look at human made wetlands as a potential solution. And so that's what we're here about tonight. There, there are multiple benefits of nutrient removal, nutrient pollution removal, increased biodiversity and improved ecological function of wetlands. And so we're working to understand this more, and quantify it as a way of helping to make the river healthier, helping to make the river more so more suitable.

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Next slide. So

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just a quick look at what is in the river underneath all of the lush plants this year. This is the 707 140 square foot wetland that came in 24 pieces from a company in Scotland. That was supposed to be installed in March of 2020. I think most folks know there was a lot going on that month. And so it was delayed until June of last year. But we got it in the river. This Is Us building it that magazine beach, it was planted with 19 different species of wetland and three native wetland plants and 3000 individual plugs in plants so we can carry in quite the load. You can see we got our exercise by lifting up the sections putting it into the river. And then if you go to the next slide, see how it was connected. That's that's match there. And our partner from from both engineering working on putting it together can go the next slide. And so we towed it to the wetland down river to its moring location by the Longfellow bridge, where it lives last summer and has been out in the river this summer. And just before I introduce Max, I also want to certainly acknowledge Can you go one more slide to the many folks that have made this possible. We have a lot of supporters for this project. And they're growing as we look to to expansion and we could not do it without the the financial emotional support and enthusiasm of of these partners here among others. So with that, I will turn it over for the

bulk of the presentation to max room to talk a little bit about what he is seeing and his sampling program this summer in the Charles

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Thank you, Laura. And Hello everybody. I'm going to turn off my video because I'm a little bandwidth challenge today. But I'm excited to share some pretty pictures with everybody and some some pretty plots. Okay, so I think a good way to start talking about this project is to start talking about the plants that we've seen growing on the wetland over the last two years. This is a video that we shot in August and what's been super exciting to see is just how Well, the plants have grown in. This is a picture from last summer where you can really see kind of the structure of the bio matrix floating wetland. And this is a picture from this summer, we're kind of that same little pool is almost completely obscured by all this flowering rows now. And even as you kind of really get down into the weeds, so to speak, you can still see just the density of the plants that are growing out. So I'm going to spend a little bit of time talking about regulatory context around this project. It's important to understand these laws, because they are the way that the state for the most part is thinking about pollution in the Charles River. The first is the clean Charles initiative, which is a program that started in 1995, after a lawsuit saying, hey, Boston, you've got to do a better job, making sure that this river is clean. That effort was very focused on eliminating the effects of mine sewer overflow, which are kind of places where the storm drain is connected to the sanitary sewer. And that contaminated water entering the Charles River. There was a lot of improvement with this issue, especially in the early years of the project. But there's kind of a second, a second standalone issue, which which relates to the cyanobacterial blooms, these harmful algal blooms that happened in the lower basin. And then 2007, there was a separate kind of piece of legislation regulation that was written around addressing these algal blooms. And what that regulation does is it sets a target for how much coal we'd like to see in the river, the goal is 10 micrograms per liter, which probably doesn't mean much to anybody. But what that represents is it represents the amount of chlorophyll that would be in the river, that would hopefully mean that there's not going to be blooms any algal blooms in the river. And the way to achieve that target is by reducing phosphorus. And this top plot shows that phosphorus has been decreasing in the river, year after year. But that phosphorus decrease hasn't really hasn't really shown up when we start looking at the Summer chlorophyll concentration. So just to summarize this, there are legislative efforts that are focused on making the river cleaner. One is about fecal contamination, and the other is about algal blooms. And both of them you can see some real progress, but you can see areas in which we've simply haven't gotten there yet. And the floating wetland is kind of a last mile solution, it's kind of a way to, to hopefully close the gap between where we are now and where we want to get to with a clean and healthy River. I'm going to take just a second to kind of speak philosophically about this project. This project has a foot in two different worlds. The first is the kind of world of engineering where we're talking about phosphorus loads. And the second is more of a kind of equal universe where we're thinking about how is it that the food chain is affecting the way that nutrient pollution expresses itself as algal blooms.

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So with respect to an engineering worldview, this is really grounded in this 2007

total maximum daily load document. This document looks at all of the sub watersheds in the lower Charles River, and determines how many kilograms of phosphorus each of those sub watersheds are discharging, and also comes up with a kind of load reduction that's required. So you know, these numbers are pretty huge to really think about 20,000 kilograms of phosphorus per year that need to be diverted from the Charles River, lower basin, or removed from the Charles River Basin. And to kind of zoom on that do a better job understanding what that means. We can look at the neighborhood where I live in lower Austin, where you know, Harvard has a really major campus expansion project. And we can kind of visualize some of these like sub sub watersheds are kind of like develop And scale parcels and start thinking about what those parcels represent in terms of phosphorus loading numbers like this, I think this parcel E is a good one to think about 40 acres 40 kilograms of phosphorus per year. So kind of, you know, one kilogram per acre per year. The goal, of course, is a 65% reduction. So that means eliminating about 30 kilograms of phosphorus each year from entering the Charles River. So the question is kind of what chunk of that can affording wetland do? This first box plot shows one answer to that question, using 15 different kinds of peer reviewed published floating wetland studies? And the answer is not very satisfying, okay, you'd need somewhere between one and 150 acres of floating wetlands to meet this phosphorus reduction target. So not not quite a helpful enough answer. But it turns out, one of the reasons that there's so much variability is because in different studies, people have grown different amounts of plants. Some studies have ended after just a couple of weeks, or 70 days. Some wetlands haven't been planted very densely. So we needed to kind of redo this work for our own floating wetland on and after two years of growing plants, we now know how much we can grow on our wetland, which is about 200 grams of plants per square foot. And what that means for us is that to meet this pollution reduction target for this parcel, he you know, so for 45 acre urban site, you'd need between four and eight acres of wetlands to achieve that goal. So just to summarize this, you know, from the engineering perspective, floating wetlands are a tool that can be used to meet phosphorus reduction goals, they're not incredibly efficient. They're basically pretty comparable to other low impact design techniques. And there's a bit more complex into this that we could talk about, there are other mechanisms by which phosphorus was removed from the water, including sedimentation that this doesn't capture. But I think that's a really, it's a high level way to gloss this. Floating wetlands can be used to reduce phosphorus to take phosphorus out of the river. And they take up about the same amount of space as if you were to accomplish the same goal using rain gardens and bioswales, and stormwater detention ponds on land. The next piece of this project, is the piece that's a bit more novel. And that is well, what about ecosystem effects? How does the presence of the floating wetland change the makeup of the organisms that consume algae, and are kind of free swimming in the Charles River, and these these organisms are called zooplankton. What we do is we go out on the river and we net zooplankton. And we count them three days a week, all summer long. And as we're doing that, we're also keeping track of the cyanobacteria in the river. What this what this plot does a good job of showing us It shows that both the wetland location, the experimental, and the control location, there are very, very similar dynamics in terms of how much algae there is and what type of algae is growing. From the first summer, we kind of put together these time series plots that compare both the abundance and the body size of these different three different classes of zooplankton. The headline here is again, that the control

location and the wetland look very similar. And in 2021, we got some advice, some feedback from folks at the University of New Hampshire, who said, you know, you may want to be looking in more detail at different kind of sub calxa, of zooplankton, that you can have a better sense of, you know, smaller, more subtle changes that are happening between the wetland control location. And this is data that provides kind of a high level summary of just the total abundance in milligrams per cubic meter of zooplankton at these two sites. Again, the headline here I would say is that the control and the wetland look very similar. And the zooplankton abundance in the river is very variable. It varies a lot over the course of the summer. This is a little bit of a sneak peek at some of our data from this summer where we're looking at eight different taxa of zooplankton. So a kind of a much more detailed study. And what these plots show is they show that some organisms are just much more abundant than others. So large rotifers, a splash now small rotifers and Bob's Nino which is a type of very small cliffnotes or in or micro crustacean and then nopalitos, which are larval copepods and, and sometimes larval barnacles in the river as well. These are the taxa that are most abundant, and probably most important, because they're the most abundant in our study. And while we can see some subtle differences between the web link and the control location, the these differences aren't statistically significant at this point. So this is something that I I'm going to be spending a lot of time this winter kind of digging into and doing some more sophisticated comparisons. But this is kind of our preliminary result, as of September. So what comes next, we've got one more summer of kind of this part of the research project, we're going to be doing a better job listing and quantifying the new removal that's associated with a floating wetland, we're gonna be really investing in understanding what are some of the diversity impacts and benefits associated with the floating wetland, this is a little monarch Caterpillar that lives on some of the milkweed out there. And then we're going to continue to do this zooplankton sample work with refined EXA classifications, and see kind of what kind of picture emerges after a third summer. The next step for this project is what we're thinking of as like a demonstration scale, where we're going to hopefully do something that's large enough that it can really locally change the water quality, not just immediately at the wetland, but in the kind of general area of the installation. The end goal for this is to understand whether or not there is a role for floating wetlands in helping the Charles River to kind of attain the regulatory goals. Having a swimmable, fishable River. And you know, what, what kind of piece of that puzzle can floating wetlands be so so that's kind of where we are now, and where we hope to be going. So thank you so much for listening in on this work in progress. And I'm excited to kind of follow follow this project along into the final summer. And see

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thank you to max for the in depth look at current flooding wetland data. Great to have all of those insights. So my name is Taylor Leonard. I'm the project manager at the CRC. And I'm here today to talk about the ways in which the floating wetland can be used as a tool to deepen community connection to the Charles River. So with this next slide, we can begin here with a zoom meeting, a place many of us are familiar with. So over the past year, the Charles River Conservancy conducted a series of design charettes for meetings bringing together public agency partners. So together these thought leaders from Northeastern the Department of Conservation recreation, DCR, mass Department of Environmental Protection Sasaki, green

Cambridge, Charles River alliance of voters, and many others brought unique perspectives to the table. So that we can all develop criteria for the design and community project goals of this phase two of the floating wetland and expansion of the floating wetlands. So as we move into the next slide, we can take a look at some of the goals that came from the charrette series. And so the first goal, of course, noting the immense scientific research opportunities, the wetland provides, which is great that we want to continue. And Max has done such an incredible job at, you know, looking at those goals and meeting those goals. And of course, next the location of the wetland, making sure that we can really put this one in place, it's going to be accessible for all. And the final goal, of course, is the people or the community. The goal is to think about how the flooding wetland can drive education, community conversation and public learning, always a mission to deepen the community's connection to the Charles River. And so next week and look through some engagement types that kind of come from that interaction with these with the people.

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So here, we have identified three ways to build community ties. We have land engagement, water engagement, and satellite learning. So the first image you can see is a local group from Cambridge exploring a floating my own tagging. So this is a tag game that teaches about the relationship between cyanobacteria, zooplankton, and wetlands. And as you can have read and learn the relationship between the three in this fun game. And it's a great way to consider outdoor learning with a backdrop of a floating wetland and outdoor learning has really been vital to our mental health and physical health, especially in this past year, where we may have needed to get outside of the classroom and engage in that outdoor learning, and it provides a way to connect safely. So definitely leaning into those kind of opportunities for outdoor engagement outside of the home and outside of the classroom. Next, you can see we have some kayaks shown in the last slide. So this image here, we have a wonderful relationship with palette Boston, which is afforded the CRC the chance to bring community members of all ages out in the water, and on kayaks, youth groups and other nonprofits that are really interested in the floating wetland, and just a community have had a chance to explore the native plants on the wetland up close. And then next we have this final image. We can't ignore satellite learning as a way to bring the floating wetland into our classrooms and into our homes and after school programs when we cannot get out to the floating wetland. So there you'll see a floating wetland kit. With some grasses being grown in the home. snowing can shift to the next slide. and here we can take a look at a flooding wetland steam activity kit. And so speaking of this satellite learning, this guide, which use the page as a guide here, was developed in partnership with MIT secret through undergraduate research opportunities program. And this was supported by the MIT community service fund. This guy walks users through a process to create their very own flooding wetland at home. And the kit really acts as an incredible way to engage youth and hands on learning, provide background on the Charles River ecology. And then you can also learn about the pollution and water quality, and especially when you're not able to get out to see it. And so here you have a multi page guide, and a way to follow along with that research. And it's really wonderful to see kind of how that can take place. And so the floating wetland kits we can shift to the next screen. The floating wetland kits are piloted and a third grade Cambridge remote classroom with much success. A

huge shout out to those who were able to drive across Cambridge and deliver kits right to students homes and teachers homes and major health and sufferings pilot. But we're pleased to say we're now looking to expand this program beyond this piloted third grade classroom into sixth grade classrooms across Cambridge public schools. And we're going to be working closely with MIT, Cambridge public school teachers, educators, you know, our home teachers or parent teachers as well, and school advocates, and we're collecting feedback to really build on that expansion.

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Next weekend, shift gears to the water. So this year from July through August 2021, the Charles River Conservancy partnered with the Cambridge mayor's summer youth employment program. So this program is a six week summer jobs program for Cambridge residents. Students ranging in age from 14 through graduated high school seniors were led by sustainability planner Jennifer Lawrence, as they worked with the CRC to engage the local community about the flooding wetland, and really develop community driven concept designs for our phase two expansion. So over the next couple of slides, we can start to look at how that engagement took place. These students, they worked really hard to kind of come up with different ideas for engagement, one being bananagrams. On the left, you can see in the image, and on the right, developing a chalk drawing to kind of talk through different aspects with that floating wetland right there in the background. Next, we can see when the students collected their feedback, they were able to develop these community led designs. And so on the image on the left, you see a blueprint of the different plant native plant arrangements, talking through kind of a domed experience, so that the community was really able to see all of the flowering plants. And on the right, as students really brought their knowledge of the community saying, people want to engage with it in kayaks along a dock, but also from land. And so looking at these kind of unique shapes for floating melons. And so we can head to the next page.

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And so

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big thank you, to our students who worked on this project, and they're able to take these presentations share about their community. And, you know, here we see them all together. So after this program, you know, we're really excited next summer, to hopefully engage these students once again. And also encourage that design thinking throughout the year through different integrations with our general design process for kind of this next phase. And these are just two programs that help illustrate how the floating wetland kit can be used to deepen a relationship with the Charles River, and its ecology. And the flooding wetland in the water is in the water for another year. So we're thrilled to have that time to continue building engagement opportunities, and new partners as we progress with these community driven design concepts for extended wetlands. And we'll continue to share opportunities to share more about this project. And we really encourage you to stay up to date with our monthly e newsletter and on our website and social media. And we will, you know, at this time, start to shift into a q&a session. So I'm happy to start with some q&a as we've received during this chat. Let's see, Max, I think maybe we can kind of start with you. And there's a really fantastic question from rosemary. And it's do

these plants survive the down river basin near the locks and with the brackish water backwash?

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Yeah, that's a great question. I see another question about kind of, do they survive in salt water? And another one about do they survive the winter? And I think we can answer all those kind of together. So these are native perennial plants. So they all overwinter and they were selected. One of the criteria that we use to pick the plants was to look for plants that have some salt tolerance. So not every plant that we put out there did great, some did better than others. They've all done, or a lot of them have done really well in the brackish conditions. And over the winter, we actually moved the wetland just because we're not, we haven't decided to kind of handle ice that could be pushing on it as that ice flows down the Charles River, but the plants stay in the water. So their roots are wet all winter long. Thank you,

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Max. I think that's really great to hear. I'm kind of the longevity of it. I think that would lead in really well, just thinking about these kind of long term plans. Laura, if you could briefly touch upon the future plans of the wetland. And, you know, he talked a little bit about those community focus designs, and but also sharing kind of some of those plans for expansion. Sure.

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So I think as we talked about a little bit here, we're definitely planning to extend the pilot research program into next year. So Max and his team will be sampling through 2022 as you showed in that great zoom picture that we're familiar with. That was the start of really thinking about and planning for expansion. So with that, That group of public agency partners and other academic leaders and engineers, and with the students, that was our first step at really thinking about, where how many would that look like in the river, you know, we know that our 740 square foot island that we've Love is not going to do it. So thinking about more, you know, we did really develop out criteria to really define the goals of people placed in science and to determine where they were these wetlands go and looked at a couple of possible locations. And so now we're working to narrow down exactly where, you know, specifically looking at places that have sea walls and that don't have you know, riverbanks and that won't be in the way of navigation. And think about developing, you know, one or more plans, drawn plans, renderings, like the one you see behind me for expansion. So I would say stay tuned to that, but definitely looking at where and how many, and what they look like.

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Thank you. Really exciting to always hear through those next steps. And let's see some other questions that we have here. I'm thinking about kind of the connection to the swimming in the beginning. And I think, Laura and Max, maybe there's some opportunity for both here, what are the projections, if any, of making the Charles helping enough to swim with the thought on these flooding wetlands tied in?

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Sure, I can start I can start that one. You know, definitely that is that is our

goal is to bring back swimming and in to some degree, we've we've achieved it right when we hold city slash, and the event where people can can jump off the dock of the Escalade, and enjoy swimming in the river. You know, we've done testing and confirm that that day, you know, the water is clean, and there's no algae bloom, and that it's safe to swim. So in some ways, we've made great progress and achieved that. But for more regular swimming, and the design building of this windpark Yeah, I'm hesitant to put, you know, a timeline exactly, you know, three years, five years, 10 years, but it's a goal that we're still working towards. And I think, you know, projects like this, get us get us closer and adding other toolkit, other tools to our resiliency toolkit get us a lot closer. Max, I don't know if you want to join in with a more?

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Well, the thing that I would add is a bit of unfortunate pessimism, which is that one of the things that's really driving the algal blooms, is climate change, as kind of the water is getting warmer. And as these storms as kind of the rain that falls in this region is more of it is falling in these kind of short, intense storms, both of those things contribute to the algal blooms. So we're kind of, we're kind of fighting against the tide a little bit. So we need to really, really be active of everybody who cares about the Charles River, kind of in this region, we need to be really, really, really active, to make sure that we're doing the things that are going to lead to a river that is is healthy and clean, and doesn't have algal blooms each summer. So it's it's a hard challenge, but it's I think, you know, it's one that kind of all of these urban rivers are dealing with.

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Hence, great, thank you. Yeah, it's definitely kind of an ongoing conversation, I think across the board with everyone who's looking into these floating wetlands. All right. Let's see if we can dive into some other questions. And see, we have a couple about these wetlands during the winter. You know, how do the plants survive in the winter?

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I'll just say that we, for this, this project we've been are have additional partners at MIT and the sailing pavilion that has won us park the wetland They're dark in the winter, which allows us to keep the the roots in the water and have the plants be dormant. And also avoid any ice damage from the river freezing over like it did last year. So it's still in the water and the the plant roots today, like I said dormant but we do move it from its if it's from its moorings, if you see it gone. Don't worry. It will back.

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All right, and the future design, I'll just say that the point is to come up with something that can survive having a little bit of ice around it, or having tons of ice.

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And I guess kind of building on these questions. A question from john Bolduc, if there was sufficient visual to vegetative cover. Could the plants help cool the river in summer through evapo transpiration?

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Yeah, that's a good question, john. I think yeah, I think that potentially, the wetlands can cool the river through direct shading. So my understanding with these floating wetland systems is that the evapo transpiration rate ends up being really, really similar to just that pan evaporation rates, so there's not more cooling from that method. But indirect shading, that's potentially helpful. So that is something to think about. But I think you'd need quite a lot of these wetlands to go there. So we're not really thinking of cooling down as being one of these wetlands.

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And we have a question as specifically about the muddy river. And so I was interested to see that the Stony Brook phosphorus load is so much greater than that, from the muddy river, how can we muddy river people access additional data about this,

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to do live our muddy river people and friends. This is definitely data that we are collecting and wanting to share this what max just shared is pretty recent in terms of, you know, calculating going through and you know, our goal is certainly to make as much public and happy to have a follow up conversation if there are specific questions and could set up kind of more of a brainstorming session or work session

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was specifically for that muddy rare thing that this that data comes from the 1007, which is a published document that you can download. And we have a link to it on the Charles River welding website to see where those numbers came from. I would also say send me an email because Northeastern is doing a cool project right now on quantifying the phosphorus load from the river.

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Yes, and I'm just mastery still have you there?

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Yes, you do.

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Okay, great. So we do have another question. We have a question that says algae blends and cyanobacteria are often grouped together, but I understand that they are different and not related, which is present when there is a CSO.

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Oh, my goodness, well, we have three phrases that are often not well explained. They're well understood. algal blooms, cyanobacteria and CSOs. So let's, let's start just making sure everyone knows, a CSO is a combined sewer overflow. So you know, when the cities of Boston and Cambridge, these old cities were constructed, and when there are a lot of horse drawn carriages, taking everybody around, and there was a lot of horse poop on the roads. sanitary engineers kind of got together and said, well, let's do something to just get this poop off the roads into the river as quickly as possible. And they built these big storm sewer systems that did

just that when it rained everything that was on the road washed off into the Charles River. And over time, there were a lot of different kinds of sanitary sewer systems that you know, at first kind of were small systems here and there and then were later centralized, but those systems that are still connected The original storm sewer systems, so CSO refers to when we have a lot of rain. Sometimes the sanitary sewer that carries sewage overflows into the storm sewer system, and a bit of sewage is combined with stormwater and enters the Charles River. So that's CFS. And what that really relates to is fecal contamination. So what we usually think of as bacterial contamination, like if you hear about eagleeye, or interior caulk guy that are in the river that's related very often to the CSO issue. So algal blooms, and cyanobacteria, these are terms that are to be honest, very often used interchangeably. And I think it's okay, if you think of them as being the same thing. cyanobacteria is a type of algae. So you can have all different types of algal blooms. One type of algal bloom is a cyanobacterial algal bloom, which is sometimes called that CH, a be a cyanobacterial, harmful algal bloom. And that's an algal bloom that's dominated by a specific type of organism that produces neurotoxins that can be harmful to humans and other features. So So, algal blooms cyanobacterial algal blooms are not really necessarily related to combined sewer overflows. And in fact, on the Charles River, when we have conditions where there are, excuse me, where there's a lot of rain, we're unlikely to see algal blooms, because when there's a lot of rain, there's more flow through the river. And that tends to flush the algae out of the river. Hope that hope that was helpful clarification, though. And thank you for the excellent question. confusing for everybody all the time to think about these different terms.

00:51:39 --> 00:51:56
Yes, Max, I think that was great. And I just want to be mindful, we are hitting that hour mark. So I'm just going to turn it over to Laura to kind of wrap up the conversation and bring it around to how you can stay in touch.

00:51:56 --> 00:53:28
Thanks, Taylor. Thanks, Max. Thanks, everybody. And thanks again for working through some technical difficulties with us. You know, after after how many months of zoom, we still end up with some back end issues. But I'm hoping you enjoyed seeing some of the great engagement that we've been doing and connecting this real world research projects to classroom learning at all different ages. seeing some of the early data from from Max and our partners at Northeastern and hope you will continue to follow along our website is ww dot the charles.org. And then for folks that have also registered for the webinar, we're gonna follow up with an email tomorrow to share an Eventbrite link to join us for a paddle on the water. This will be a free event if you're available. Next Friday, October 1 at noon, we'll probably be one of the the last paddles that will get out on the river this fall to see it but it's really fun to see up close. So please register if you're able to join, there'll be limited capacity, but looking forward to seeing some of you in person there. And we'll also be posting this webinar up on our website so you can go back and share it with other folks that you think might be interested. So thank you all again, please feel free to reach out we love always adding partners. We love talking about the wetlands. We love showing it to people so please don't hesitate to reach out for further specific conversation. Thanks everybody, and have a great night.

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