Stormwater Bioretention Through the Establishment of Native Wetland Flora Transcript

Hello, my name is Elise. This is Spencer. We are about to present to you our conservation plan, as Dr. Bahn mentioned, through the establishment of wetlands. So, we're going to start off with exactly what a wetland is. It's any type of ecosystem that water completely floods the soil and creates a very highly hydraulic soil. These are very nutrient-dense. They are important because they can mitigate the flood damage done in the area, which we can see when, unlike right now, we're kind of in a drought. But when Ohio gets our usual downfalls, also natural purifiers, so they improve the water quality of the groundwater and the land. Since it kind of does have this layer of water over it, we can see both aquatic and terrestrial plants and animals creating great biodiversity in these ecosystems.

Above, you can see some wetlands that we have near us. More towards the Dayton area, we have Wegerzyn Metro Park. And then here in Greene County, we have the Beavercreek Wetland Reserve, which is comprised of many parks and reserves just throughout the area. As well as on the right or left here, we have a Sibenthaler Fen.

Wetlands were actually very prominent in Ohio, but unfortunately, over 90 percent of them have been destroyed. This has been done through either filling or draining, agricultural conversion—sorry, draining and filling over with farmland, as well as just plain building over them, which consists of either filling or training and making a parking lot or a building, etc. On the bright side, the Ohio EPA has price protection over wetlands in Ohio because so many of them have been destroyed in their natural ecosystem. Now, if someone were to want to mess with these wetlands, then they would have to get approval from the EPA, which is highly unlikely since there's only about 10 percent left since about 90 percent have been destroyed. Here in the Dayton area, the Beavercreek Wetland Association has been the main proprietor in the conservation of these wetlands. And next, we are going to present our plan for preservation here at Wright State.

Awesome, thank you. As Elise said, I'm Spencer Thomas. For our project, we focused largely on stormwater because it seemed like a lot of Wright State Woods, like the issues were connected to stormwater. We've heard about the salt pollution, but there are other issues that natural ecosystems can face when it comes to stormwaters, such as other kinds of pollutions, like vehicular or automotive pollution. There's also sediment from potentially from other building projects, as well as concrete washout. That's a really big one. There's a lot of paved areas around here they need maintained. But additionally, there's other kind of more overlooked kinds of pollution, like thermal pollution. Like when that water hits the pavement, that pavement is usually a lot hotter than the surrounding areas, and that does heat it.

One thing that Elise and I and our partner Davis, who is not here today, unfortunately, one thing that we noticed when we were out taking a hike with Dr. Bahn for our conservation biology class was the stormwater retention dam by the Wright State Woods. We found a map of Wright State's MS4, also known as a municipal separate storm sewer system. It includes four different basins, one of which is a retention basin, so it's wet year-round. That's by the Nutter Center. And then there are also three detention basins, which means that after a certain period of time, they dry up entirely. They only detain the water for a certain amount of time. One of these already has bioretention, and it's over by the Student Success Center. And it looks really lovely if you've ever

walked over that little bridge and you see the little trees and whatnot, yeah. To kind of touch on what that means, those plant roots, they are able to wick up some of that water and hold it in situ, as well as the bacteria and fungi on their roots can absorb some of the pollutants. As well as nutrients, there's also about 30 outfalls, which about a third of them discharge directly into the woods without any kind of basin to hold that water back. So our action plan, it focuses on these basins and outfalls.

The first thing that we would do is assess them for any features worth protecting, anything, any plants that are native and benefit a wetland ecosystem. The next thing would be to remove invasive plants, and this can be done, as I said on this slide, through prescribed fire, prescribed burnings, or targeted herbicide, the cut and dab that we spoke of earlier. Another thing that our plan would focus on is recontouring the dry basins. And so what this would do is add what's called a forb to the basins, and they would be on where the effluent pipe, so where the water is coming into the basin. There would be a small pool or a deeper area where that water can get trapped, especially at times of low flow. This helps remove total suspended solids, as well as it kind of retains some of that water during those lower flow times. Further back, we'd also put small mounds, so it's kind of like just displacing all of those soils from the micro-pools near them, and this kind of gives a little bit more of a foothold for upland plants and not entirely like obligate wetlanders.

Additionally, we would establish appropriate floras. So this would be like I said, emergent as well as riparian flora, for example, Joe Pye weed, sycamores, as we spoke about earlier since they're so salt-tolerant willows, swamp or marshmallow weed, various others, Queen of the Prairie, um, another great plant. The last thing that we would focus on is controlling erosion. So one thing that we've noticed when we were walking around is that a lot of these outfalls that do discharge into the forest, they tend to scour and cut away at the soils surrounding them. So we would reduce this effect by adding riprap aprons around the outfalls as well as potentially installing log check dams out of dead trees and other snags nearby. And as you can see, like this, it slows down the water. It gives a potential time for sediment and solids to settle out. The benefits of our plan would be that it attenuates peak storm runoff, so it slows that water down and keeps it closer to the site, whereas collected. It provides in situ filtration of the contaminants and pollutants in the water through that bacteria and fungi on the roots. Additionally, the roots will increase infiltration into the soil just down directly into the aquifer, and it provides habitat. It's not the most high-quality habitat, obviously, since it is a stormwater basin. It's not going to be a perfect wetland, but it does provide some kind of foothold. Additionally, it combats erosion. All these pictures, by the way, all the plant pictures, I took myself, by the way.

Do we have any questions?

[Applause]

[inaudible audience member]

So the question was what kind of maintenance does that require to have bioretention versus just like a, what I'm assuming you mean, like a traditional basin. Yeah, one of the biggest issues that you'll see is plant roots, specifically tree roots. They'll try to get into an under drain pipe or any

other kind of spillway, and that can be a big challenge, those roots clogging up the pipes. That's a big one. Additionally, these basins, they are put there to control stormwater and to keep it from flooding places further downstream. They're required by the EPA whenever you create impervious surfaces. So over time, they might fill up a little bit with organic matter, and that would have to be removed because that can impact the water quality volume.

Any other questions? All right, thank you.

[Applause]