July 15th EPA Agricultural Municipal Partnerships Webinar

Hi, everyone. Thank you for joining us today. We're going to give everyone about one more minute for others to join and then we will begin.
OK. Welcome, everyone. Thank you for joining us today for our Watershed Health through Agricultural-Municipal Partnerships webinar. I'm Micaela Unda with Ross Strategic, a contractor to EPA. We're excited to share with you all three different agricultural municipal partnerships today and the benefits that they bring to watershed health. And with that, I will hand it over to Tara Johnson of EPA's Water Infrastructure Resiliency Finance Center to kick us off.
Great. Thanks, Micaela. And we can go ahead to the next slide. So I want to welcome everyone today and tell you a little bit about EPA's Water Finance Center before we get started. So EPA's Water Finance Center was formed in January of 2015.
At the center, we focus on financing sustainable and resilient drinking water, wastewater, and stormwater infrastructure. We provide innovative financing information and technical guidance to communities and stakeholders. Our responsibilities include advising, convening, and facilitating peer to peer learning opportunities, such as our webinar today, and providing access to information to share community models of financial and partnership success.
As part of our effort, we are doing case studies on agricultural and municipal partnerships. And we're happy to highlight three of those case studies for you today. These funding and financing strategies for these partnerships improve water quality throughout the areas.
I want to thank you again for joining us as well thanking our speakers for taking time today to present. Thank you. Back to you, Micaela.
Thank you, Tara. So we are excited to be joined today by three speakers, Haley Falconer, Sarah Hippensteel, and Ron Graber. Following our speakers today, we will have a Q&A portion including lessons learned from our speakers. As a reminder, today's webinar will also be recorded and posted to the EPA website along with a PDF of the slides if you wish to share or rewatch today's presentation.
And with that, I'll go over some quick Zoom logistics. So if you are unable to see your Zoom controls, please hover at the bottom of your screen and options will pop up. All participants have entered automatically muted and with video off. To participate in today's webinar, we invite you to click on the Q&A window in the Zoom toolbar at the bottom of your screen. This will allow you to ask questions to the speakers.
Please feel free to type in questions as presenters give their presentations. And if your question is directed at a specific presenter, please include their name in your question. We will read your questions aloud, time permitting, during the Q&A portion at the end of today's webinar.
Additionally, if you have any technical questions about connecting to the webinar, you can click on the chat option in your toolbar. This will allow you to send chat messages with the webinar host who will help you to troubleshoot any form of issues. OK.
So for today's webinar, we are joined by Haley Falconer, environmental division senior manager with the city of Boise, Doctor Sarah Hippensteel, manager of watershed partnerships with the Miami Conservancy district, and Ron Graber, central Kansas watershed specialist with the Kansas Center for Agricultural Resources and the Environment.

So us off today is Haley Falconer. Haley is the environmental division senior manager for the City of Boise. In this role, Haley is responsible for the implementation of the city's long-term strategic plan for water renewal, managing regulations, and water quality, and overseeing an innovative materials management program. When not working, Haley enjoys exploring Idaho with her spouse, two young children, and rambunctious rescue pup. Over to you, Haley.

Thank you, Micaela. And thank you everyone for being here. I'm really grateful for EPA hosting this. I'm excited today to share with you a little bit of the story of Boise's phosphorus removals facility which is located on an agricultural drain in Idaho. First, I want to start on the next slide by just telling you a little bit about what our system is and why this is important within the city of Boise system. So within the city limits, we have two water renewal facilities, West Boise and Lander Street. They're our standard mechanical treatment facilities.

But also several years ago, we constructed a phosphorus removal facility on an agricultural drain called the Dixie Slough. The location was selected because of high phosphorus concentrations and flows in a location within the watershed that was having an impact on not only the Boise river but also on the Snake River. And so what we saw about 10 years ago in pursuing this was the potential to remove phosphorus cost effectively and with a lower carbon footprint and greater environmental benefit which was certainly in line with the city's goals.

And so before I kind of get into the details of the phosphorus removal facility, I want to share a little bit about the watershed in the system that we're operating in and why this matters. The next slide here shows just a little bit about our phosphorus philosophy, I guess, at the city. So we are not aiming to put all of our phosphorus renewable eggs in our water renewal facility basket.

So we do have our two facilities that we have biological phosphorus removal and we will eventually have tertiary filtration. We also have phosphorus recovery where we're creating a product that is a saleable product. But then we've got the Dixie drain phosphorus removal facility where we're removing phosphorus from the watershed in a downstream location and getting credit for that through our NPDES discharge permit at our existing facility.

So all of these are within the city's purview and ownership on city facilities, but really important to that overall phosphorus reduction that's required. But we're operating within a really complex water system and really kind of complex agricultural system. So this next slide is going to be a bit busy, but it shows kind of the aerial image of the region.

So right in the middle, kind of to the right side, is Boise. The darker blue line that runs through-- or the thicker blue line-- is the main stem of the Boise river. And so this is a sixth order stream that has three upstream reservoirs that feed the stream. But we are a dam controlled hydrologic system. And everything that's green that you can see in the previous slide and in this slide is irrigated agriculture.

And so this slide here shows all of the kind of spatial distribution of irrigation canals that we have. So everything is irrigated by-- oh, one back, please. Everything is irrigated by surface water that is diverted from the Boise river, sent through a series of irrigation canals, and then it returns back to the Boise river through a series of irrigation drains.

And so it's a very interesting system of how the water moves. But what happens in the next slide is a graphic that really shows the water moving through. So the right side of the screen at Lucky Peak is kind of upstream in the system. And the bands that are located on this are showing the amount of flow.

And in the summertime, over half the flow is diverted out of the Boise river and for irrigation. And so this is showing different points along the system where there are various diversions and of what magnitude. And then all of the purple lines on here are the returns.

So the system itself has 76 diversions and 16 returns. So that water is being pulled off the river and used for agricultural purposes where it's fertilize and there's sediment added and then returned back into the system. And so there is an environmental kind of loading and environmental impact. And the next slide shows that same sort of trend.

So similarly, right side of the screen is upstream flowing to the left side of the screen. And again, the bands of these purple, green, and blue bars are the relative loading for phosphorus sediment and temperature. And this is really just intended to show that from upstream to downstream, we see a marked increase in phosphorus in particular where that green band is getting wider as we move downstream, but also in the suspended sediment. Just one slide back, please.

And so where we focus our efforts right at the bottom of the screen there shows the Dixie Slough. And so this was a location that we could identify to place the facility and remove phosphorus and have a greater environmental impact, because we knew that the phosphorus pumps that we removed at that facility, that we wouldn't have clean water that would get reapplied to the land and then returned back. So we were cleaning the water and then keeping it clean.

The next slide just talks a little bit about drivers, which I've alluded to. So there was a TMDL on the Snake River that has a 0.07 milligram per liter load allocation at Parma. And Parma is the point where the Boise River and the Snake River, that's the confluence of those. So we have a very low total phosphorus driver on the Boise river that is included directly into our NPDES permits which were issued in 2012.

So we have final effluent total limits of 0.07 milligrams per liter. And since that time, there's been a TMDL completed on the lower Boise River that's adding in kind of additional year round requirements for phosphorus removal. And so another big driver for this was to be able to levelize the cash flow.

So while the city has funded this project through our rates, we were able to invest a not insignificant amount, but invest early in the phosphorus removal facility and extend the time with which we would need to install filtration at both of our facilities. So we'll both reduce the cost, but I think really it's focus on extending that and levelizing that cash flow.

But I wouldn't be talking about this project if I didn't talk about partnerships and how we got there. And so the next slide really talks about the importance of that, so certainly driven by leadership at the city and a vision for creating a better outcome. But we did this in partnership with EPA and the Idaho DEQ with the Idaho Conservation League, who's a local environmental advocacy organization, and our Idaho Congressional Delegation. And it took all parties coming together over a period of time to make this happen.

And ultimately, really everyone agreed that there was a better water quality outcome. There was a better mousetrap that we could use to get this phosphorus removal. And really where the work was was in getting there.

And any time that things started to get a little bit sideways was kind of anchored back to this agreement that removing pounds of phosphorus at that downstream location was a better outcome for the river system. And so that was a big piece of getting there and something that we saw and we still highlight because it's important and it still feeds the things that we do. But getting a little bit into the nuts and bolts of what it is, so we have an NPDES permit.

On the next slide, I've shown a snapshot of how it currently looks. Again, issued in May of 2012 and then modified to allow the Dixie drain. It is written such that when the permit is final, which is in 2022, which is next year, we can take credit for the phosphorus removed at the phosphorus removal facility and apply it towards what our requirements are at our upstream facilities. And we do have a trading ratio of 1 and 1/2 to 1, so for every pound removed we get up in our upstream facilities, we need to remove a pound and a half at the phosphorus removal facility.

This is certainly one of the challenges, because we're currently-- and for the last several years-- as we operate, we are not able to get credit for those pounds of phosphorus removed until the permit is finalized. So we are working on negotiating a new permit. Our current permit is administratively extended. And looking to change the way that is written. But ultimately, still having this benefit of being able to subtract the pounds removed at the phosphorus removal facility from our total waste load allocation.

But the next slide shows kind of this is additionally complicated by water rights. So we've got some Western water law. And this is the first of its kind where we have a water rights on the Dixie Slough. It's a non-consumptive water right for environmental benefit. So it's a water quality beneficial use.

We have two separate water rights. One is for the summer season, April through October. We are allowed to divert 200 cfs of water from the drain and required to get 70% removal of total phosphorus. And these requirements are through the Department of Water Resources, not through DEQ. So we have two separate regulatory reporting entities.

With the addition of the year-round phosphorus limits, we did also get a winter water right where we also can divert up to 200 cfs but a lower percent removal just due to the nature of how the drain operates. We don't anticipate that there will be as much phosphorus available in the winter and we think that with potentially with the temperatures and changing chemistry, we won't be able to get as much removal.

And the next slide is really the what is it. So we've got here the drain moves from the top of the screen down to the bottom of the screen. So we have a diversion kind of screen and rake system there at the top kind of in the middle of the screen. The water is diverted out of the drain into kind of an initial basin and then pumped into a sedimentation basin.

We get a flash mixing facility where we add an alum-based chemical. And then it goes through a baffled settling pond and then out into the drain. And on the previous side, if we can click back just one, the photo is really the most dramatic evidence of the impact that this facility has on the water quality.

So the left side of the photo is really the sediment laden irrigation drain. That is what the cartoon graphic of the pollutant loadings looks like in real life. You have a very heavily sediment-laden runs at about 0.3 to 0.35 milligrams per liter of total phosphorus in the drain. And then the right side is where our outlet structure comes in and where the water that's gone through our treatment process goes back into the drain.

So we are seeing a visible benefit. And if you click two more slides there, this shows the existing phosphorus removal. And so we're operating-- this is 2019 and blue and 2020 in green. We are operating on a relatively limited basis, because there is a cost of chemical and a cost of staff time to operate. And we're not getting that benefit applied back from regulatory standpoint, but we are continuing to push and test the system so that we know how it can perform.

And so these are showing the total pounds removed in each of the months that's indicated. So we're seeing about 900 pounds per month removal on a pretty limited operation. So even compared to what our final TMDL limits will be in approximately 10 years, we can discharge about 1,000 pounds per month

upstream. And so with the 50% or about the 1 and 1/2 trading ratio, this would apply about 450 pounds of credit to our upstream facility.
So it does have a substantial impact. And what that will drive at our upstream facilities is the potential to treat to a little bit higher concentration and maybe change the treatment technology in the cost of investment. So it becomes an entire systemwide look and removal of how we can achieve phosphorus removal. And with that, I will wrap until we talk about lessons learned.
Thank you, Haley. Next up, we have Dr. Sarah Higgensteel. Let's see if we can get to this next one. There we go.
Dr. Sarah Hippensteel believes that water is critical for community health and prosperity and communities who enjoy the rivers are more likely to protect their water. She currently serves as the manager of watershed partnerships for the Miami Conservancy district. She has raised more than $14 million to protect, restore, and preserve rivers, streams, and aquifers and promote river recreation.
She earned a Bachelor of Science from Ohio State School of Food Agriculture and Environmental Sciences and a master of arts from Antioch University, Seattle, as well as a PhD in leadership and change from Antioch University. She was presented with the Distinguished Service Award by the Water Management Association of Ohio. And Sarah has also delivered a talk at TEDx, [? statement ?] on water. With that, Sarah, I'll turn it over to you.
Thank you so much. And welcome, everyone. Thanks for coming today.
I am going to talk about our experience with creating and implementing a pilot nutrient trading program in southwest Ohio, just to clear things up right away in case anyone thought they were going to hear about Florida today. The great Miami river runs about 150 miles across southwest Ohio into the Ohio River near Cincinnati. So, sorry for anyone who thought they were going to hear more about Florida.
Go ahead. Am I switching my slides? No, you are. OK.
I work for a regional flood protection agency that was created after the Great Flood of 1913. We have been officially a regional government since 1915. And our systems have been protecting flood protection or high water since the system was completed in 1922. So our main mission is flood protection.
But over the years, we have broadened some of our programs to include water stewardship issues-- that's water quality and quantity in rivers and groundwater-- and then river recreation, which is the fun part of my job. But we want to promote safe recreation in our rivers as well. But I'm going to talk about nutrients today. So next slide, please.
Just a little bit about our agency, because we are kind of unique. There are not conservancies everywhere. But in Ohio, the governor passed a law that allows a political subdivision to be formed on the boundaries of a watershed. So I always say, well, we were watershed before watershed was cool.
We have broad authority related to water resources. And so we've always had the ability to do things like groundwater programs and river recreation really from our onset. Go ahead.
And there are 21 conservancies across Ohio, but you can see that there is not a conservancy for every watershed. It's really about the local communities' will or interest in having that kind of government. And so we cross all jurisdictional boundaries and we drain about 4,000 square miles, our watershed drains about 4,000 square miles in Ohio. You can see that the green parts of our-- the blob there in southwest Ohio, that's really where agriculture is happening, primarily row crop, corn and soybeans.
Yellow is where people are living. Dayton is our largest city kind of in the center there. But we have riverfront cities along most of our major rivers.

One thing that's very special about our watershed is what's underneath our feet. We have a very large sand and gravel buried aquifer underneath our thin layer of soil. And there's over a trillion gallons of groundwater.

I say for anyone who is concerned about drought in their region of the country, please come live here. We have more than enough groundwater for our needs. That's not to say we want people to come and waste it, but we do have a very plentiful amount of aquifer groundwater.

And most people, most communities in our watershed do pull their drinking water from the ground. About 99% of the people that live in this watershed pull their drinking water out of the ground. But again, I'm not saying that agriculture is doing a bad job. It's just that that is our primary impact on our water resources on those 6,500 miles of rivers and streams, because more than 70% of our land is in agriculture.

And in case you're wondering about that giant fountain that was in the last slide, we do claim to have the world's largest fountain. That is, it shoots groundwater out of the aquifer and lands in the river. So it's very beautiful, especially this time of year. Next slide.

I'm trying to get you to move here as well as teaching you about nutrients. So that's the good news. The bad news is we do have a lot of nutrient challenges. We export over 20,000 metric tons of nitrogen to the Ohio River every year and 1,700 tons of phosphorous.

That's really dependent on seasonal variations and rainfall and when the rain occurs and when the application of fertilizer has been happening on the field. But in a year where all of those things align, we do export a great amount of nutrients downstream. And we are one of the highest ranking exports to the Mississippi basin. I'll show you some numbers in a second.

So the reason that we know this is because specifically, we have these numbers, it's not an estimate, the conservancy has been-- our scientists have been collecting this data real time, in many cases, 24/7 365. We have monitoring stations that have been collecting data and helping us really understand very specifically how many nutrients we're exporting. Next slide.

This is where you don't want to be ranked the number one. Because the smaller the number, the higher that you're ranked in the amount of total nitrogen or phosphorus that you're exporting. So out of the 818 subwatersheds that make up the Gulf of Mexico, wow, we are top 27 for the upper part of our watershed and 31st for the lower. That's not a number we're proud of. So keep going.

Sorry, those words are so small. But in order to deal with these nutrients, instead of a government agency-- we knew we had a problem. But instead of a government agency going to our agricultural community and our urban community and saying, hey, we're here to help you, we actually went on the road and had over 100 face-to-face meetings-- when you could have face-to-face meetings-- and we asked people, what is it that you need help with?

Now, we told the story of our river because we have scientists that have collected this information and we were there to share what we knew about our river conditions. But we also said then, what can we do to help? And, what do you need? And we I counted them up.

I'm not exaggerating. We had over 100 meetings in a two year span where we did everything from fly to Washington to meet with US EPA and USDA to talk in parking lots with individual farmers after a regular meeting and hear everything in between. So we met with our county soil and water districts. We met with chambers of commerce, our state agencies, and many, many, many agricultural producers.

And that is how we developed this program. And so a lot of times I'm talking about how-- I'm going to focus mostly on how the program operates fiscally or how the numbers flow-- but people ask me, how do

you create a trading program? And I'm going to tell you it takes a lot of time to build that trust and find out what your community really needs.
There's no cookie cutter approach to it. So I just want to add that. All right, keep going.
So for our program, a credit equals 1 pound of phosphorus or 1 pound of nitrogen that is prevented from being discharged from an agricultural setting. And we do consider new agricultural practices. But anything that was already on the ground, any practice that was already out there already reducing nutrients actually could not be used as a trade in our program. Because we were trying to raise the baseline.
So the practices that were already out there reducing nutrients, we considered that the baseline. And our program was going to create new incentives for additional nutrient reductions. Keep going.
The driver for our program at the time was that there was pending state regulation. Ohio was proposing to put in a statewide nutrient limit on our wastewater treatment plants. So our discharging water reclamation facilities were going to be faced with potential technology upgrades to the plant even though in our watershed, a very large amount of nutrient runoff is coming from our agricultural communities. And so the state agency, the EPA and our Natural Resource Conservation Service, our Department of Agriculture, they saw this as an opportunity to generate funds that could be used to address some of the real nutrient issues that were happening in our landscape.
We don't have TMDLs for our watershed. I heard that in the last presentation. And in case that was something you were wondering, we have not had a TMDL written on this watershed. So that's not part of the driver. It was really this pending statewide nutrient regulations.
We had an economic analysis done to see if we had a market. We needed to know if we had enough buyers and sellers and that we would be able to fulfill that process. And so we had Kaiser and Associates, they're out of Ann Arbor, Michigan. They helped us do a study to understand whether or not we could have a market.
And what we found is that at the time-- these numbers are a little bit old, maybe much larger today-- the pending upgrades that the wastewater plants would be faced with would be over 400 million. But we could actually accomplish the same amount of nutrient reductions by putting only 40-some million dollars of agricultural practices on the ground. So of course, we can reduce a tremendous amount more pounds of nutrients for just pennies on the dollar because agricultural practices are things that cover crops or putting in vegetated buffers is much cheaper than building a new extension of your wastewater plant.
So in our watershed, that's really important. Because many of our urban areas that would be saddled with these increased rates that the ratepayers would have to pay if they needed the money to do the treatment plant upgrades, our communities are already in stressed socioeconomic conditions. And so we found that hundreds of millions of dollars could be saved to our citizens if we approached nutrient pollution in this manner. And we get better environmental results.
So I don't think I need to tell any of you that when you do a treatment plant upgrade, all you're going to do is reduce the chemical that you're addressing with that treatment upgrade. It might be just nitrogen or just phosphorous, whereas if you put in a vegetated buffer along agricultural fields, you're getting increased shade. You're getting increased sediment reductions. You're getting a whole lot of other ancillary benefits to that practice.
And this is the better environmental results. Wetlands might be created or floodplains protected, depending on what practices you're putting in. You're going to slow some of this water runoff down which

is really a big problem right now as we get these increased storms, habitats created. So all of those things would be a benefit.
Sorry for the little tiny, tiny, tiny font. A couple of the things that we knew we needed to build into the program. We wanted to utilize existing partnerships. So our government agency, my team and I, we did not work directly with ag producers at the time.
We wanted to go to people who already had those relationships. So the Soil and Water Conservation District offices at each county who have those great relationships, we needed to have them working with the farmers in this program. We wanted to minimize new bureaucracy so that we wanted to utilize existing forms and ways of submitting paperwork so that we weren't trying to make everyone completely learn a new way of doing things. It would be easy for them to want to apply and participate.
And we created an early incentive for our wastewater plants so that we built this as a pilot in advance of those statewide nutrient regulations. We built incentives for them to fund the program so that we could see if the market would function. Some of the other things is using an existing kind of modeling system that would help us estimate nutrient credits from each practice.
And then making sure that if a practice failed, we had a way of protecting the investors. So for every-- not everybody, you can't buy a credit at one to one, I have a slide in that later. But some of those extra credits went into an insurance pool. So we always had more credits on the ground than we needed for compliance so that if something failed, you weren't worried about a compliance failure as well.
If an ag practice failed, you weren't worrying about a compliance failure. OK, next. So this is how the relationship worked during the pilot.
Ohio EPA and US EPA were the ones that were issuing the NPDES permit, discharge permits with the wastewater plant. And you can see that there's a relationship between the plants and the state agency. Then they were also contracting with the Miami Conservancy district. We're the middlemen, the credit manager.
And so we had contracts with the state and federal agency, and we also had contracts with the wastewater plant. We then contracted with the county soil and water districts to implement the ag practices with the specific farmers. But what's missing from this relationship is you can see that there was never a direct contracting relationship between the state regulatory agency and the farmers.
One of the things that we heard early on is that if that was a requirement, that would kill the program immediately. So we built in a lot of checks and balances to ensure that the contracts were enforceable but that we weren't putting the farmers in a position that they felt so uncomfortable that they refused to participate. Next.
Just to say that we did have a number of cities and participants as our early adopters. They put up the funds before any regulatory requirement. And so we had five different cities. Tri-Cities is actually a partnership of three, so if you count that up, it was 1, 2, 3, 4, 5, 6, 7 different cities and counties that participated as our early adopters. Next, please.
Just to say that projects-- this is a reverse auction. And I could talk a whole other session on how the economic part of this worked, and we've had studies done on the reverse auction part of it. But the farmers bid to the least cost per pound. So one person might say I'll produce a pound of nutrients for $1.25. His neighbor might say I'll do it for $1.23. And so it was the lowest cost per pound that would rank highest, and that's how it got chosen.

There was a group of experts. You can see the agencies that were on there that helped choose the final projects for funding. Next, please.
And just to give you an example, these are some of the projects that were put on the ground to help reduce nutrients. Cover crops, by far, were the most popular and the most common. But tillage rotation, we had several other things that went on the ground. Next.
Not rushing, but I want to get through the whole thing without going over my time. Sorry. So our role as middleman really was to collect water quality data. We were out doing monitoring at the subwatershed scale and we had proposed to do some field specifics monitoring if we came out of pilot. We issued the request for proposals.
We facilitated the stakeholder review. We did the contracting. We helped manage the credits. We helped manage the credit pool. And we really just served as a major liaison between all of these parties to help set the program up, so really a major role as facilitator to build trust between these partners. And then we promoted the market.
So I mentioned this a couple of times, but how do we know it's working? We do have monitoring stations out at our subwatersheds level. Those three stars in the middle, they are close together because that's where three of our major rivers come together. So we're really at the confluence and then down farther in the watershed.
The reason that the star is not all the way at the very bottom of the river is because that's the lowest place that we had a participant funding the program, so very strategic of the places that were collecting this data. Next. So we did a pilot for seven years.
The program generated over $3 million to fund that pilot. $1.2 million came from those wastewater treatment plants, from those communities who were willing to step up and try out this market because they anticipated that this would save them a tremendous amount of money. Ohio EPA promised that trading would be a part of their ability to comply with their NPDES permits. And so in good faith, they put up that $1.2 million.
We got three federal grants. Two of them were USDA grants, and one of them was a US EPA grant. Actually, I'm sorry, maybe was two. It's been a long time.
But we did supplement that with some grant dollars so that they weren't just putting up cash, but they did leverage federal dollars that we were given to set up the pilot and run it. And then we leveraged $500,000 in Miami Conservancy district funds or in our in-kind from doing monitoring and then some local dollars as well. So that's where we pulled the funds in to start the pilot.
So we were very lucky to get those two very large federal grants. Next, please. We held 11 reverse auctions, so we had 11 rounds of the program. Each time we had a round, we would advertise, say that we had funds available, and we would look for farmers who were willing to put projects on the ground to reduce nutrients.
Over that time, we funded 397 projects. And that generated more than 572 tons of nutrient reductions. A total of 1.697 million went directly to the agricultural producers, to those farmers. And that was, if you do the math, the cost per pound to reduce a pound of nitrogen or a pound of phosphorus was only $1.48, $1.48, so, much, much cheaper than it would be to reduce a pound at doing a technology upgrade of a water reclamation facility.
Next. Well, this is where I get to tell the sad story. After an administration change of our state agency, we were told by Ohio EPA, even though they had been at the table as a partner helping to design this

program for nearly 10 years, when they had an administration change, we were told that the plants would not be allowed to use trading as a compliance option. So what we discovered is that the pilot worked very, very effectively. The reverse auction system was very effective.

We were able to generate much more interest in the program than we could ever fund. Every single one of those 11 rounds we turned away, farmers who wanted to put practices in. But unfortunately, because we had not codified the program, we took them at their word, they decided on a whim that they would no longer be interested in allowing trading for compliance.

So the current story is that each of these plants has been spending many, many years in legal battles with the agency. And many of them are now starting to spend millions and millions of dollars to put technology upgrades in. So that's the sad story. Next.

Here's my contact information. And I think I have one more slide. And that's it. So I look forward to any questions you have once we do that. Thank you.

Thank you so much, Sarah. And lastly, we are joined by Ron Graber. Ron Graber has both personal and professional background in agriculture. After living and working on his family's farm in south central Kansas, Ron went on to study agriculture at Kansas State University, where he received both a bachelor's and master's degree. Ron worked as an extension agricultural agent for up to 14 years for the state of Kansas before changing his focus to water quality in 2000.

In his capacity as a watershed specialist, he educates residents about nonpoint source pollution issues, especially with high priority TMDL watersheds. His outreach work also includes motivating producers and landowners within the watershed to implement watershed plans and water quality restoration and protection actions. The resulting development and implementation at EPA approved watershed plans have helped to create innovative partnerships that benefit both urban and rural interest in protecting state and local water resources. Over to you, Ron.

OK. Great, thank you. Thanks for the great introduction. Pleasure to be invited to share a little bit about a couple of our projects that we have going on here in south central Kansas. Next slide, please.

So just a little bit of background information about that primary area that I'm working in, the Little Ark watershed. The Little Ark is just a little bit over 900,000 acres, very intensively farmed watershed with annual crops, primarily corn, soybeans, and grain sorghum, and wheat. So a lot of annual cropping going, a fair amount of irrigation as well.

As you can see, the city of Wichita is right there at the bottom of the watershed. Wichita is our largest city in Kansas. And so the Little Ark River goes through the watershed and then joins what we call the Big Ark in the city of Wichita. And so with this kind of a setup, we had the potential for a lot of issues, a lot of conflicts.

But also if we look at it from the other side, a lot of opportunities to improve our watershed. And so as you can see there, early on, we figured out that we really were going to have to work together because we do have a lot of issues in terms of TMDL issues, sediment, bacteria, nutrients, pesticides. And the only way that we could really get at this and make a significant difference is we were going to have to work together. So you can see there, K state WRAPS is the framework in Kansas that we refer to in terms of putting together watershed plans and implementing those.

Of course, our regulator, the Department of Health and Environment, and then certainly, we've utilized some EPA $319 that come through KDHE. And then you can see the ag players and then our urban neighbors as well, so a lot of issues. The other thing that I might mention before we move to the next slide

is we do have an underground aquifer which supplies a lot of the irrigation as well as drinking water for the city of Wichita and others. Next slide, please.
So the two programs that I want to highlight today really, the two partnerships are driven by different goals. The first one, atrazine, as a drinking water concern and certainly, the treatment costs that go along with that. And then the other program, a little different, is the stormwater permit requirements that the city of Wichita has. And again, the TMDL concern there would be sediment. Next slide.
So the two programs really, if we look at these two programs, the atrazine program is somewhat more mature. As you can see, we've been implementing atrazine BMP since about late 2005. 2006 is really when we started working with producers. And of course, ahead of that, we were doing some planning and putting the program together.
The stormwater program, a much newer program. As you can see there, the planning really started about 2011, 2013. And then in the fall of 2016, we rolled that program out and began to enroll participants and really get started with it. So it's a much newer program.
Some of the things that we really found to be common building blocks with both programs are listed there, the education, local input, trust is a huge one, and then just the amount of time. And I'll talk a little bit more about those as we go along. But those are really some critical building blocks in terms of putting both programs together. Next slide, please.
So again, Kansas WRAPS, Watershed Restoration and Protection Strategy, just a screenshot there off of KDHE's website. And if any of you are interested in learning more about WRAPS in Kansas, it's kswraps.org. I think my box I had in the middle cut the website off a little bit there. But anyway, if you Google WRAPS, you'll find it.
So a little bit about the Little Ark. So our producers, we began kind of gathering up some stakeholders producers in the early 2000s and wrote our first watershed plan, completed that in 2004. And took us a little time to get to that point. And then as you can see, we revised that plan to make the EPA nine elements in 2011.
A couple of times since then, we've gone back and revised our goals and our strategies of how we want to try to achieve those goals. But maybe one of the important things is really in 2005 was when we really started working with growers and farmers to implement some water quality BMPs. Next slide.
So I mentioned the underground aquifer, the Equus Beds aquifer that lies under about the southern half of the watershed, a tremendous water supply for irrigators and municipalities. The city of Wichita embarked upon a recharge project to attempt to capture high flow conditions out of the Little Ark River, inject those back into the aquifer, and then that would allow them to have credits to be able to use that water at a later time. Well, one of the issues with that recharge process is meeting drinking water standards in order to put the water back in the aquifer.
Well, we quickly figured out that at times in the spring when we typically have some of our bigger runoff events that would generate those flows that are necessary to recharge also coincides with when atrazine is typically used on corn and grain sorghum. And so it's there, and the potential to have runoff and spikes were certainly there. And for those of you not familiar with atrazine, it is a very commonly used herbicide in corn and grain sorghum.
And so what we found out is a lot of it being used in our watershed. And so the treatment costs incurred to remove that atrazine are pretty significant. And at times, if those spikes are high enough, then physically can't drink the water and have to basically just wait until the levels come down. And so we

began talking about could we work with farmers to do some things to maybe prevent that atrazine from getting into the river. Next slide, please.

So we put together a program where we partnered with the city of Wichita and they were going to provide us some funds to do some education, some funds that would go directly to growers of corn and grain sorghum to maybe use that chemical a little differently. A huge, huge education and awareness campaign when we first started, really just talking to growers about what TMDLs were, what the atrazine levels were in the water, why we were seeing spikes, and what potential causes might be for atrazine being there. We also worked very closely with any of the pesticide dealers and crop consultants.

What we knew in our area is that virtually 100% of the irrigated corn acres, those guys or those folks were using crop consultants. So we knew it was important to educate them as well and have the same discussion. We also wanted to try to be able to document whether or not our efforts were making an impact on water quality. So we did a paired watershed study where we targeted watersheds to try to get as much implementation as we could and then had another one next to where we basically did nothing. And so we put in these automated sampling devices and collected water samples to try to get at some kind of a documentation on our efforts. Next slide, please. So this is the form that we used with farmers when we went out and talked to them. And I would tell you that we were very different from traditional farm programs in that we went out, contacted, these folks, went out and met with them one on one on their farms, kitchen table, pickup, wherever the case might be.

And this is the practices that university research would say we can expect to see some reduction in runoff on atrazine. So when we went out, we didn't say you have to do this one if you participate. Pick one of these that will fit your management, your operation. And then the amount of incentive or fee that they received was based on the expected reduction.

So if we picked out the early application where we expected 50%, they might get half of the total dollars available. If they chose no atrazine at all, then they would get 100%. So this was our worksheet that we worked with producers on. They also signed a contract that they agreed to implement that practice.

We would do this in the winter, and then go back and verify later in the growing season. And they'd receive a payment that fall. Next slide, please.

So as I said, we started implementing in 2006. And this shows some numbers of where we're at today. And so over 1,200 growers have implemented BMPs over that time frame. One of the numbers that I'm really proud of is the percentage of those that we actually talked to that agreed to and followed through with implementing a practice. And that's above 90%.

I would tell you if we took out a couple of the early years in the program, our numbers would be more like 97% or 98%. And so essentially, everybody that we talked to agrees to implement. And you can see quite a few acres of corn and grain sorghum there.

Another number I should certainly want to highlight is the $3 per acre incentive. But if you think about it, $3 an acre really is not very much. A lot of our guys will have fields that might be 80 acres or larger. So we're talking about an 80 acre field that they agree to do a practice and they get $3 an acre, $240 an acre is not a lot of money to change the way you utilize a chemical. But I like to refer to it as more of an education fee.

It gives us an opportunity to have a discussion with the grower about how they're using atrazine and why it's important, not only from a water quality improvement standpoint, but we all know that if we can keep that chemical on the field where it's applied, the chances of getting good weed control are better, which

translates into higher productivity and higher profitability. And so it allows us to have that conversation. And then we can move forward with other conversations about, well, OK, are you using no-till and would you think about growing cover crops that might reduce sediment from leaving a field?
And it just opens the door, and it allows us to build that relationship with that grower, that producer. And you can see the numbers there. We predicted that based on that we thought we'd get about a 50% reduction in atrazine leaving the fields, and our actual water monitoring showed a little over 40. We did discontinue the water monitoring system after the 2018 season, so we're not we're not collecting water monitoring data anymore. Next slide, please.
So let's move to the other project. And this would be the stormwater project. And the city of Wichita has a MS4 permit that requires post construction controls on any development that's an acre or bigger. So the convenience store on the corner, if it's an acre or bigger, then they're required to put it in some kind of control. If it's a residential area, then it might be residential pond.
But they're all required to do something, fairly expensive controls in most cases. I would point to the one there in the center of the hydrodynamic separator. Those are pretty popular in the city of Wichita for the smaller developments. A lot of folks utilize those. Let's move to the next slide, please.
So early on in our discussions with the Stormwater Advisory Board and the city of Wichita, when we were looking at ways that maybe we could partner up to achieve some of the same goals in terms of keeping sediment out of our river system, we went through kind of a quick and dirty economic efficiency. And so we've got some very common practices there on the left for in a rural landscape that are utilized that can be pretty effective.
So just to highlight one, the no-till. So if we have a farmer that switches from conventional till to a no-till situation, university research would say we get about a 75% reduction in the sediment leaving the field. So we're just doing some simple math and using an average erosion rate in the watershed and dollars that growers might receive through traditional farm programs to switch to no-till, which is typically about $30 to $40 an acre. Run the numbers on the percent reduction, divided it out over a 10 year life.
And we figured out that it was costing about $3 a ton to keep that sediment on the field. Now, that's only the incentive monies that might come. That's not the cost that the farmer would incur. So this, you could just about double that if you figure what the farmers, his cost as well. So $3 a ton.
So if we look at an urban BMP, and again, let's look at that hydrodynamic separator that are fairly popular within the city of Wichita. So those things are pretty expensive to put in, typically over 20,000 with some annual maintenance costs. So we ran the same math on that and looked at erosion rates that are fairly common in an urban setting, how much of the sediment that we could expect that separator to remove. Figured a 25 year useful life, and you can see we came up with over $5,000 per ton of sediment that that separator was keeping out of the system. And so huge, huge difference between obviously, between the 3,000 and the 5,000. And so when we had this discussion with the Stormwater Advisory Board, it became apparent that if there was any way we could work together, it made a lot of sense and we needed to do it. Next slide, please.
And so here's kind of our structure in terms of trying to put this together and how we might work together and kind of the players and certainly, KDHE would provide the regulatory oversight in terms of the MS4 permit. The city's responsibility would be to promote the program amongst developers and sign them up, collect fees. From a WRAP standpoint, we'd go out and recruit producers and get them enrolled to do practices as well. Next slide, please.

One of the big things that we did early on was try to determine what that fee might look toward for a developer. And so putting together a spreadsheet to look at how much sentiment's produced per acre in town, and try to estimate what the city growth what rate might be, how many of those developers might actually participate in the program. One of the things that KDHE asked was that we have a 2 to 1 credit ratio. So for every ton of sediment in town generated on that site, we needed to get at least 2 tons in the country.

One of the things when we were talking about some of these practices to try to get around that if somebody does convert to no-till, they would sign a five year contract, what happens at the end of the five years? Would they go back to doing normal tillage? And so we set this up to be such that we could replace every acre after the five year contract if we needed to.

And so we went through all of these numbers. And the city of Wichita agreed to put up some funding to kind of get the program started, because we knew that it would take a little time for the dollars to come back in on our developed site that participated. And so the amount that was arrived on was $19 per acre of urban development per year, and that would be a lifetime commitment for that property. Next slide, please.

So, where are we at with numbers? So again, we started implementing in September of 2016, and this would be through the end of 2020, so just a little bit over 4 years. Excuse me.

So at the end of last year, 201 of 280 development projects had opted to participate in the off-site program, and that constituted 893 acres of urban development. And so the amount of sediment generated by those acres amounts to 357 tons. And so with a 2 to 1 credit ratio, we'd have to have twice that much.

And so you can see the numbers there. Initially, we went out and within the first year, enrolled 496 acres. And these all went into conversion from conventional to no-till. They also opted into intensive crop rotation which would give us a little extra bump on sediment reduction. So we had 1590 acres there to offset.

One of the big numbers I want to point out is if you look there in the middle, 4.2 million, this is what the city estimated from those developments was saved by the development community from not installing hydrodynamic separators. So that is a huge, huge amount of money of savings to them. We went through a process to-- since our initial bank is starting to dwindle-- we did an extension on that contract, so we could add another 300 acres this year.

Again, we'll be at the end of the initial five year contract. We'll be in the process of writing a new five year contract here starting fairly soon. So I think I've probably used my time. I'll quit there, and we can move to any questions there might be.

Thank you, Ron, so much. Yes, I think just to make sure that we maximize time for questions, we are going to loop back around to lessons learned.

So I will just stop sharing, so we can see all of our presenters, and start directing questions your guys' way. OK. So Haley, this first one is for you. The question is, how scalable down is the drainage ditch treatment plant and how does it handle high flow events?

I think the scalability is really probably a lot of waste site specific. A fair amount of the cost that we incurred were associated with the groundwater level and the requirement to pump. So I think if you could end up with a facility that didn't require that, you could certainly see that cost kind of scale down differently.

High flow events, the kind of peak flows down the drain that we might see are around 300, 350 cfs, so we don't have a problem managing or passing the 200 cfs that we're allowed. More specifically, one of the issues that we have is backflow from the Boise river, because we're only about 1/4 of a mile upstream of the confluence of the Dixie drain with the Boise river. And so we do see some water kind of flowing back up that drain from the Boise river.

But we've gone through a really high flow area and not had any issues with that. We are still working out some of our technological. We've got a screen as our very first step. And we do have some kind of management of the screen and the vegetation that gets bound on that, but overall, that hasn't been a concern or a challenge for us.

Thank you, Haley. This next one is for Sarah. For farmers who received funding for annual practices, for example, like cover crops, were they required to implement them for a certain period of time? And, what were the verification measures for those practices?

That's a great question. The contracts were signed for a period of one or more years. Some of them even were a 20 year time frame when there was infrastructure-- it was more of an infrastructure implementation. And I'm sorry, I didn't hear you on the second part of the question.

You asked me how long they were put in, and then what was the second part of your question?

Yes, it was, what were the verification measures for those practices?

Oh, verification members, I'm sorry. So there was an annual inspection. There was an inspection to verify that the practice was actually installed properly first. That's when that would signal that the credits were available then for compliance.

And then every year after that, they were inspected. And then there were several different checks and balances on whether or not-- if there was a failure, then that would kick in a specific set of steps to make sure that other credits would immediately be reassigned to make sure that the permit was in full compliance, if that makes sense. Hopefully, that answers your question.

Thanks so much, Sarah. It looks like our next one is for Ron. Ron, the question is, for the urban and ag sediment program, have there been any estimates of the associated phosphorus and nitrogen reductions achieved first? What would have been achieved with the hydro?

Yeah, so no, there haven't been any estimates. But we think that we're, especially from a phosphorus standpoint, we know that in terms of what's leaving fields, if we estimate those phosphorus loadings, that there really is a side benefit. We're getting a much greater phosphorus reduction by implementing practices in a rural landscape than what we would from an urban parking lot runoff, so to speak, practice.

OK. Thanks so much, Ron. Next one, we have one for Sarah. And this sort of gets at our lessons learned. If you were to do it all over again, what would you do to avoid the program ending with a change in administration at a supporting agency?

We had a point during the pilot phase where we had several of our buyers saying, how can you trust the agency? We should be putting this into our revised code now. And we said but they've given us their word. We have letters. We have it in writing.

And we could not have fathomed that the turnaround would happen. And so looking back, it was at that point that we should have immediately gone to our elected officials and said, hey, this is working great. We need your help. We need this put into Ohio Revised Code.

Our program was already in Ohio Revised Code, but there just needed to be another couple lines that would have prevented this from actually happening. So we were just a little too trustworthy.

OK. Thank you, Sarah. Our next question is directed at Haley. And it is, how was/is the phosphorous removal facility financed? Was it paid for through water renewal facility ratepayers?
Yeah. It's all paid through our rates. So it's in our water renewal fund. And I think the most impressive thing, and it was one of my lessons learned, is just the need for that early . In our case, it was a city council that was willing to commit to the purchase of land outside of the county in this location that was really an ideal location before we had the regulatory pathway to make the project happen.
So we had the land, and then we worked our way through that. And that was really our city council and our mayor seeing the vision for that. But both the construction cost and the ongoing operations and maintenance costs are borne by the city and by the ratepayers.
Thank you, Haley. And it looks like we have another one for Ron. Re the sediment reduction, was there an analysis of how much of the sediment load came from rural versus urban sources?
I assume that you're asking in the river prior to implementing practices. And no, there wasn't that kind of assessment. Certainly through the monitoring the KDHE does and others do, we have an idea what the TSS is in the river and we need to remove a lot, certainly. And so again, with our project, we've not been monitoring in terms of post activities. We'd really have to edge-of-field monitoring to document the impacts on those individual fields and how much sediment and nutrients that we might be keeping out of the system.
Thank you, Ron. We will go back to Sarah. Sarah, how did the state and federal grants work into the cost per pound? And I believe you may have started to type your answer for this one. But so everyone can hear, we'll do it in our Q&A session.
Muted. The grants helped offset the setup of the program. So that would not necessarily have factored into the cost per pound. But then also it offset the cost for the buyers so that it was helping to cover the admin costs that the buyers were going to commit to. So it might not have necessarily affected the per pound. We were going to separate those costs.
So I guess the answer is yes and no. But it would not significantly have changed the cost per pound if we did not have the grants.
Thank you, Sarah. Haley, coming back to you, in regards to the Dixie drain, do you have any information on the cost to remove the kind of phosphorous at that facility?
That's not something that we calculated or that I have readily available. I would remark that it's a bit different from other resource projects in that it is tied to compliance. But we know that it is and there's a better environmental outcome particularly with that 70% removal rate that we're required to hit for the water right. And so we need to be protective of those water quality water rights and ensure that we're seeing for other areas that are using kind of a similar thing, certainly, that we're getting the phosphorus removal associated with the water that's being utilized for projects like this.
So that's really important. But that's not something we have, certainly, a number we would expect to go down over time as we're able to treat more flow and kind of push more water through the system.
Great. Thank you so much, all of the presenters. It looks like that is all the questions that we have time for today. So I'm going to hand it over to Tara to close us up and wrap it up.
Micaela, it turns out Tara actually had to jump off. So I think you can go ahead and wrap us up.
Got it. Thank you, Darcy. Well, again, we just wanted to thank all of our presenters for joining us today and all of you for coming in, watching, and listening to our agriculture-municipal presentations. We just had a question come in regarding will the slides be shared. And yes, as a reminder, all of the

presentations and slides will be shared via PDF and presentation recording on the EPA website shortly after. So, thank you all again, and enjoy the rest of your day.