Stormwater Financing Solutions for Nutrient Reductions

Webinar Transcript

Welcome. This is Darcy Peth with Ross Strategic. And this is the Innovative Financing Strategies for Reducing Nutrients Webinar Series. We'll wait just a minute here for everyone to get logged in. And then we will begin. Welcome.

OK. We are going to go ahead get started. Again, I am Darcy Peth with Ross Strategic. We are contractors to EPA. And this is a part of the Innovative Financing Strategies for Reducing Nutrients Webinar Series. Webinar series is co-hosted by USDA and EPA's Water Infrastructure and Resiliency Finance Center. Welcome to the webinar.

We've got a full agenda for the next hour. We're going to do our welcome agenda overview; a little bit about how you can participate in the webinar; introduction to the webinar series, which is concluding with this webinar. We have two opening polls for you to participate in. Then we'll have our two featured presentations from Chad Praul at Environmental Incentives and then Derick Winn with the Virginia Department of Environmental Quality. We will have time for two Q&A after each of these presentations and time allowing, additional time at the end. And then we will adjourn at the top of the next hour.

To participate in today's webinar, please click on the Q&A window in the Zoom toolbar at the bottom of your screen. This will allow you to ask questions of the host and panelists. We will read your question aloud, time permitting, during the Q&A portion. If you have technical issues or questions about connecting to the webinar, you can click on the Chat option in the toolbar. And that will send a chat message to the webinar host.

Please don't type in content questions to the Chat window, because it's just a little easier for them to get lost in there. If you do type those into the Q&A window, we can make sure that they get moved up in the queue so that we can read them out loud. We do appreciate if you can spell out any acronyms and just make sure your question is as clear as possible for when it is read aloud to be understood.

And as always, just want to note the views of the speakers are their own and do not necessarily reflect that of the federal government. And any mention of commercial enterprise products or publications does not necessarily mean that EPA or USDA endorses them. And I'm going to hand over to Tara Johnson at EPA to describe a little bit about this series that we are wrapping up with this webinar today.

Hi. Thank you, Darcy. I want to thank everyone for joining us this afternoon on our final webinar of the nutrient reduction financing series that we've been doing with USDA. We are talking about stormwater financing solutions, as Darcy mentioned today. And I want to especially thank Chad and Derick for agreeing to speak to us.

If you have any questions afterwards, my email is up on the screen-- waterfinancecenter@epa.gov. And we will be making this webinar available on our website site at a later date. Thank you.

OK. Great. Thank you. And I did just want to echo that, because we do get that question a lot during these webinars. The webinar is being recorded. It will be posted with a captioned video on the EPA website within a couple of weeks. And we will also be posting a PDF that will be downloadable of the

slides for today. So again, that will be available within a couple of weeks. And we will be sending around an email at that time to let everyone know when it's ready.

OK. We have two opening polls now for everyone to participate in to let us know a little bit about you. First question-- what type of organization are you from? So select the option that comes closest to describing you. I'm going to launch this poll now. And you can go ahead and select your option. I'll leave this open for just another moment. OK.

All right. Thanks to everyone who voted. I'm going to share these results. So you can see them-- looks like the majority of participants today are with state governments at 38%. And we then have 15% from the local governments, excluding utilities; 12% from federal government; 14% NGOs; 6% from utilities; 1% ag; and 14% other.

We have a second poll now if you could describe your experience or familiarity with financing for nutrient reductions. So if you funded one or more nutrient reduction projects-- you have some nutrient reduction initiatives that you're looking for funding or financing on; nothing immediately that you need to fund. But you're interested to learn more-- familiar with potential financing opportunities but would like to learn more; or no or very little experience or familiarity with the topic.

Could we, again, just select the option that best describes you? We'll leave this open for a few more seconds those of you who are still picking your options. OK. I'll share these results-- looks like the majority at just about a third of you are familiar with potential financing opportunities. But you would like to learn more. That's great.

Then right behind that at 21%-- no or very little experience or familiarity with the topic-- also glad to have people in that area. 18% have funded one or more nutrient reduction projects in the past. And 13% have nutrient reduction initiatives or projects and looking for additional funding or financing. So, again, thank you for participating in the polls.

OK. We're going to transition into our feature presentations portion of the webinar. First up, we have Chad Praul is a founding partner of Environmental Incentives LLC. He has focused his 20-year career on performance driven approaches to conservation and wise use of financial resources. He finds flexible and financially efficient environmental strategies that reduce conflict between regulators and permittees.

Chad's early experience monitoring water quality grounds him in practical realities that ensure programs do not become overly complex. Chad has earned two degrees from the University of California and is a professional engineer in California. Chad, I'll hand it over to you.

Thanks, Darcy. Hello, everyone. Thanks for joining me today. Darcy, can you go to the next slide, please? There we go. So as an overview of my presentation, I start with what I see as the challenge for stormwater program managers. And I think this will speak to local governments really well-- hopefully to state governments too. I'll then go through a portfolio of strategies that I think can solve the challenge that I'm seeing. And then I'll introduce a couple of example strategies in detail. And then I'll pass the baton along to Derick, who will talk about some nutrient programs in Virginia.

So next slide-- the challenge that I see as I travel to watersheds basically across the country is there's this pull from regulators to achieve more performance in stormwater programs. They're asking managers to be accountable to numeric targets from TMDLs to track progress, to show what projects they're doing. And I truly believe this is good for water quality. But the reality is that this is way more costly than stormwater programs used to be when they just had the six programmatic NPDES elements.

So then there's this counter-pull in the other direction from the local budget office to contain costs. And it's really challenging for a stormwater program manager to substantially increase the budget for this stormwater issue that's lower in public awareness than education, schools, health care, even transportation-- you know, potholes on roads. That's a bigger deal. So it's a tough place for a stormwater program manager to be, where they have these increasing and high costs and high expectations. But then they have real trouble funding what they're going to do.

So I have seen three answers that I share with folks. And the next slide outlines those. Can you switch to that, Darcy? So these three types of strategies to answer the challenge-- and among those types, there's many strategies-- but first is around funding and increasing the amount of funding and increasing the effectiveness of the funding that's there. And increasing dedicated budgets for stormwater is hard. I really think that's true.

But there have been successes that are revealing best practices in that work. And I think a great example out west is in Los Angeles. They've recently passed Measure W. That's now providing a substantial amount. It's $300 million a year for stormwater projects out there.

And increasing the effectiveness of funding can be done by creating a performance management system. And that's really about having a defined unit of performance, also known as a credit, a stormwater credit. Examples of credits that are out there are around the amount of pollutant load reduction, the volume of water treated-- that's what it is in Los Angeles County-- and then or also even just the impervious area treatment. But if you have a performance management system, you can maximize the amount of credits that you're getting and reduce that cost per unit over an ongoing time frame of a longer program.

The second kind of strategies are around engaging partners to help implement projects. And that's about aligning the different objectives of different partners. So they each contribute to each other's needs and leverage each other's budgets. And the examples I always cite of that are integrating stormwater projects with transportation. And that substantially reduces by 25% to 50% the cost of doing stormwater projects.

Another example is that schools and parks can provide land or staff that can do maintenance and operations and also that private property owners-- you can offer them incentives. And that provides access to new land that local governments may not own, substantially changing the cost equation.

And then the third type of strategy is around leveraging the private sector. And there are unique capabilities in the private sector. Partnerships and regulations can really make a change and make progress for stormwater. You can use streamlined contracting processes. You can manage project delivery risk. And you can find sources of financing in the private sector. And we're seeing that happen across the country.

So of those three types of strategies, there are lots of individuals strategies within those. And we organize those into a two by two matrix that we call the portfolio of funding and partnering strategies. Can you do the next slide, Darcy, please? And here's a look at that portfolio. And I'll just give you a chance to look at it and say that it's set up as a spectrum from on the left and on the bottom things that are existing and pretty familiar to a lot of people and then on the right and the top, things that are more new and innovative. And we have a lot of work showing people how those can benefit them.

As you saw in that previous slide, there's these three sections. So I'll just go through each section on the green side in the left. The familiar things at the bottom are grants and general fund budget. That's how most people are funding their stormwater programs for nutrient reduction. And then at the more innovative side of things are developer and in lieu fees, loan guarantees-- things like that.

On the bottom right, this blue area, there is regional projects, retrofit incentive-- regional compliance programs, and regional projects. Those are pretty familiar. Folks out west are very familiar with, you know, doing regional stormwater projects that collect water over a large area and treat it. And then on the right, there's more innovative things like tradable development rights and mitigation markets.

In the upper right in red, here we're talking about those private sector things. I think most municipalities are familiar with bonds, various types-- municipal, green. And then it goes all the way up to environmental impact bonds, like those that are going on out in the mid-Atlantic and mitigation markets.

So just as a sidelight, most of the strategies in this matrix are either made possible by or substantially improved by having that credit, that stormwater credit, that defined unit of benefit. And that could be a load reduction of nutrients. It could be a volume of runoff treated. Or it could be an area of land treated. But all of these things need a basis for good reporting, for doing trading, for doing alternative compliance, for setting up markets, for doing progress payments to private organizations. They all need this defined unit of benefit or credit. So that's my definition there.

So the next part of my presentation just goes into the pay for performance contracting that you see in the upper right that's highlighted and then another example of regional compliance programs. So next slide, Darcy. As far as pay for performance goes, I want to do a little contrast between typical project contracting and a pay for performance approach.

And I should say that pay for performance is happening in several places. But I think Anne Arundel County is doing a great job with that out east and seeing some significant benefits, including accelerated time schedules for getting treatment of impervious acres done and reduced costs of projects.

So if we go to the next slide, Darcy, here's a look in a simplified diagram of a traditional project procurement approach. And there is a contract that specifies, hey, we're going to do a project over at a location, like we're going to do a project on 1st Street. And it says we're going to do it in these stages. There's an amount of activity that can be done, that needs to be done. And there are standards for quality.

So the permittee would say-- the stormwater permittee would, say, establish that scope of work. There would be an implementer, who would build the project. And then the permittee would review every

month, every quarter, maybe even every week, and pay or reimburse the implementer for actions that are taken throughout implementation.

And the result that we often see here are change orders that increase costs and also construction challenges that reduce the number of benefits. Maybe there is a utility interference that says that we can't do that nutrient basin here. We aren't going to be able to infiltrate, because there's high groundwater. So reductions of benefits happen. And costs go up with this traditional project procurement approach.

To contrast that-- next slide, Darcy-- let's look at pay for performance. And here, the first stage is a contract that defines the terms for buying nutrient benefits, for buying nutrient reduction or acres of treatment. And that's what the contract is saying. It's not saying, do this over on 1st Street or any particular area. It's just saying something like, we'll pay $20 a pound for nitrogen. Or we'll pay $5 a pound for phosphorus. So you're paying for outcomes.

And then the implementer takes on the project, takes the risk of implementing it, and then eventually reports the amount of load reduction that they're getting in the nutrients. And those are checked and reported. And then-- next slide, please, Darcy-- in the fourth step, either a third-party organization or maybe a regulator would certify those credits and verify that there is actual load reductions. And then at that point, the permittee pays based on the contract terms that they signed with the implementer and what they actually got. So you're only paying for the benefits you get.

And I think this is very innovative and but happening in several places around the country and can happen at both a large scale, like some of the community-based public-private partnerships that we're seeing out east, but also at smaller scales on individual efforts and smaller programs. And we've seen some of that out in Washington and in Southern California out west.

Performance contracts like this are really important in public-private partnerships, because they define how and when the private partner should be paid. So that's my first example. Can we go to the next slide, Darcy? The second example strategy is around regional compliance programs. And really this is a flavor of trading programs. It's a slight difference on it.

And the reason I talk about this flavor is because there have been many examples over the last 10, 15 years of trading programs that were so narrowly defined that there was not enough difference in cost within the trading area for trading to occur. You just couldn't find credits cheaper through one part of the trading area and in another part. That kept the number of transactions low. And that has really meant that the benefits of trading were not realized.

EPA has seen that challenged and this year issued a memo with six market-based principles, kind of expanding beyond trading programs to a more market-based programs. And they issued that in February of this year. And it expands the scope of trading into these six market-based principles. That, I think, aligns really well with my company's take on what has been useful around trading. And that is the establishment of this defined unit of benefit-- this credit, which can be used for many other strategies like that portfolio I showed a few slides ago to improve the return on investment for nutrient reduction projects.

So one of these flavors of trading is these regional compliance programs, where it's not that folks are trading. But different jurisdictions are combining their efforts to combine with each other to achieve a watershed goal on a single body of water. And a good example of this is the bi-state Sediment and Nutrient TMDL program that is in Lake Tahoe out in Nevada and California.

So the first slide I have on this is around the permit progression-- next, Darcy. So there's two states around Lake Tahoe. And the California side has an NPDES Permit. Nevada has a different form of regulatory approach. In 2005, there was a very standard permit with effluent concentration limits. And the standard NPDES six programs checklist that everybody had to do.

And let's see here. Let me catch up on my notes. This caused a major problem for permittees. And the story here is that one permittee-- lead from a committee-- told the regulator that she was going to quit her job before she was going to try to implement those concentration limits. And the result there was that permittees petitioned the permit. And there was really just a tough feeling amongst everybody involved at that time.

Five years later, there was a new type of permit, which was a credit-based approach with nutrient sediment reduction requirements. And there in that one, there was a 10% load reduction requirement, which was actually met and exceeded. And there was some challenge there. And this program is still-- and there was still some grumbling from the permittees, because the program was based around a paper handbook. And there were some databases. But they didn't work that well. But they did end up able to achieve the load reductions that were necessary by 2017. And I'll show you results of that in a minute.

Then after 2017, there has been a new permit, which has still credit based but now has an online tracking approach and has a requirement that has not been reached yet for 20%-- 21% load reduction. And it does look like permittees are going to be able to achieve that in the five-year permit term after 2017.

So let me show you results here in the next slide of what the results were in 2016 and 2017. Oops. Actually I'm a little out of order-- tell you a little bit more about the tracking system that we have now and give-- use this as a way to summarize the program. On the top left picture here, you can see there's an inventory section. So permittees have built infrastructure for treatment. They've managed their roads and their other infrastructure to make sure that they're doing good water quality work to reduce nutrients and sediment.

Then, in the upper right-- this Assess box-- every year permittees just do a drive by quick rapid assessment of the infrastructure to see if it's working. And if it is, great-- they don't do anything to it. If it needs some help, they do maintenance. And then in the lower right, this Credits section of this Home page you're seeing-- the regulators award credits annually if water quality is being maintained and the function of the infrastructure is up there.

And then every five years, there are enhanced credit targets, which increase the requirements for credits from all the permittees until they reach a 63% load reduction. And that's the amount that's estimated to be able to achieve the TMDL. So this is the online system and a little description of the program itself.

Next slide is results. And here, you can see that in 2017, the four permittees in California were able to exceed their number of registered credits-- the same thing from the three permittees in Nevada. And you can see how all of their regional efforts add up to achieving that regional goal. And you can see that there is some exceedance of that goal. They actually required to get 10% load reduction. They hit 20%-- I'm sorry-- they hit 12%.

And one of the things that is interesting here is the program-- since they were achieving a little more than they needed to, the program doesn't use the term trade. But permittees can distribute their credits to other jurisdictions, allowing them to have contractual financial agreements with each other or even just informal agreements that reduce costs overall and allow them to share costs.

For instance, maybe a local-- maybe a Caltrans-- our transportation road agency-- will build the capital project. And then the local agency would maintain it. And then they're allowed to distribute credits between each other to decide who needs credits for their own compliance targets. Next slide, please, Darcy.

So lessons learned here is that it was really important to have a cohesive system that added up everybody's results. So they could see both their own contribution and the overall watershed benefits. And then having that system be administratively easy to use was essential. And that has really increased the satisfaction of the permittees in this permit, because they know clearly what they have to do, what they're going to be enforced on or not. They get it done. They go home and sleep well at night.

Second lesson learned is that the flexibility to voluntarily distribute credits-- yes, the tracking system knows where the credits go. They have to say that. But there is plenty of flexibility for the permittees to decide who's going to pay for what and how they're going to do it. And if somebody has more credits than they need in a year, they can send them to one of their partner jurisdictions. This is the element that is like trading but not exactly.

And then the third lesson learned is that this information on project condition is essential for both regulators to know that work has happened and is being maintained over time and for the environmental NGOs to accept this distribution of credits and accept the program overall to make sure that there is a net environmental benefit and that that is maintained over time.

And then the last thing and probably the most striking thing that I have noticed that there is a substantially better relationship among permittees and regulators. And they don't spend time arguing over maximum extent practicable or difficult to achieve effluent limits. They work hard. They hit these increasingly tough credit targets. And then they go home knowing they've done a good job. And I see the permittees and the regulators having lunch together, having good relationships instead of arguing over all the time. So there is a benefit here in this credit based program of regional compliance. Next slide, please.

So recall those three types of strategies. I often get asked when I'm traveling around the-- or I hear people say, well, yeah, trading only works over on the east coast in Virginia. Or these other types of programs only work over in these conditions in Lake Tahoe. And so I took a minute to put together a map. And if you could advance here, Darcy, one slide, I just took a minute to put together the programs that I'm quickly aware of and show that just to show that where they're happening. And they're happening across the entire country.

And there are these types of strategies going on all up and down the west and east coast, up in the Great Lakes, and even in the center of the country. We're seeing these things take off. I'm really interested to receive ideas from those of you who are listening about other programs that are executing these strategies across the country, because I'd like this map to be even more complete. But it really is true that although there are some-- in this portfolio-- there are some innovative things, they are beginning to be implemented and work across the company.

And just to finish out, like I said, this pay for performance approach is working in Anne Arundel. It's working very well. They've done three rounds of RFPs for that over several years. And then this regional compliance program, which is akin to trading but a little bit different and in line with EPA's new guidance from this year-- it is happening. And I'd be happy to answer questions or be in contact with folks after this seminar.

Oh, thank you for the reminder, Darcy. There are a couple of resources here at the end of the presentation that you'll get. There is a blog that we've posted around this portfolio of funding and partnering strategies that you can read and pass along to folks who may need it. And then there's a pay for performance tool kit that we offer that was on a federally funded website through a federal grant to do research on how pay for performance can apply in stormwater and also in habitat conservation.

I mentioned the regional compliance program in Tahoe. There's the link to the website there and then the new water quality trading policy memo that EPA released in February with those six market-based principles-- so great resources for you to check out. And like I say, I'm happy to answer questions.

Great. Thank you so much for that great presentation. We have had a bunch of questions come in. I'm going to read some of those out loud during the next few minutes before we switch to our next presentation. So first one-- regarding pay for performance, when there is not a market for a credit without third party verification, how does someone determine the value of a credit to contract for?

So what you just need to do is start negotiations. And you can have a reverse auction or put out an RFP. And Eric Michaelson in Anne Arundel County-- that's exactly what they did. They said, hey, our regulatory requirement is to treat a certain number of acres of impervious surface. And I'd forgotten the number. But it's in the thousands of acres.

And they're doing projects on their own. And they know what it costs the county to do their own projects. But they put out an RFP that said, hey, we'd like private parties or NGOs or anybody who can treat acres of impervious surface to make proposals to us and tell us what it's going to cost per acre for them to do it.

And they saw a wide variety of costs. And they were able to choose the lowest cost that they felt was going to be verifiable. And they had, you know, contract conditions that are important to help them be sure that there was going to be regulatory approval of those credits.

So the market can tell you if you put out an RFP, I guess is the short answer.

Great. Next question-- so payment in lieu fees seem to always be less than necessary to cover all the costs. And governments sometimes have impediments to timely implementation of projects using payment in lieu. Can you cite an example to the contrary?

This is a great question. And it's really true. It is a little bit of the potential dark side of in lieu fee programs. And I don't have a good example of an in lieu fee program that's working perfectly right now. But what I can say is it's important for a jurisdiction to protect itself from getting into that situation by number 1, recognizing that the full lifecycle cost of the infrastructure that's going to be built in lieu is really important.

And once that full lifetime cost is known and you know, that's the fee reflects that, a lot of developers choose to just do the on site project. So it's really a matter of doing an analysis that includes the full lifecycle cost as opposed to the capital cost.

Next one is a bit of a long one. But there is a question at the end of it.

[LAUGHS]

It says, although the overall adoption of cover crops is less than 4% on our nation's crop lands, Maryland farmers are leading the nation at planting cover crops. This has had significant impact on local water quality. Many of these farmers are increasing their soil health and farm profitability while mitigating nutrient runoff, drought, and flooding. These regenerative ag projects leverage the private sector and yield a financial ROI, while also providing multi-functional [INAUDIBLE] benefits like cleaner water. Are there other private sector examples for funding nutrient reductions like this, especially with certified credits for nutrients or carbon sequestration?

Whoo! That is a mouthful. So examples--

[LAUGHS]

--other than agriculture, where we can get lower costs?

Yeah, I think so.

OK. Well, one of the things that is out there is around-- I guess it's not private. But it would be around looking at water supply and treatment of water for water supply and if there are ways to provide stormwater as a source there. And so infiltrating stormwater for water reuse is a big thing out in the West coast.

And there is an interesting study done in LA county in the last year or two showing that it's worth $1,100 per acre foot of water infiltrated to for water suppliers. And so water suppliers can benefit from the stormwater folks infiltrating water in their groundwater basins. And it is shown to be worthwhile to pay for. So that's one other example. And I'm sure there's more.

Great. We have a bunch more questions come in. Unfortunately, for time, we're going to need to move on to our next presentation. As I mentioned before, the slides and the recording of the webinar will be available online later. So the speaker's contact info is there. So if you're interested in following up over email to get another question answered, that will be a possibility. But thank you very much, Chad.

For now, we are going to move on to our next speaker, Derick Winn. Derick graduated from Virginia Commonwealth University with a master's in environmental studies, concentrating in nonpoint source

water policy and GIS. He has over 10 years of experience working for the Commonwealth of Virginia, specializing in various NPS water quality programs, such as post-construction stormwater management, MS4 program development, TMDL implementation, and NPS grants.

He has five years of experience in NPS trading, where he oversaw the NPS trading program expansion that took Virginia from having only 12 nutrient banks in 2014 to over 140 nutrient banks today, generating nearly 9,000 pounds of phosphorus reduction. I will hand it over to you, Derick.

Thanks, Darcy. Can you hear me?

Yes, we can.

Awesome. So yeah, I'm Derick Winn. And I'm the nonpoint source training coordinator for the Virginia Department of Environmental Quality. And I would like to thank EPA and USDA for giving me this opportunity to share Virginia's nonpoint source training program. And I hope to provide some insight into how other states and localities can start their own training program-- next slide.

So I'm going to give you a little overview of some of the topics I'm going to discuss today. First, I'm going to start off with nutrient trading terminology and Virginia DEQ roles and responsibilities. Then I'll move into the Chesapeake Bay and the point source trading program briefly to then move into nonpoint source trading-- some of the water quality issues it addresses, the enacting policies, and the market driving permit, which is the Virginia Stormwater Management Permit.

And then I will go into the status of nonpoint source trading and emerging markets within nonpoint source trading, some of the challenges we face with nonpoint source trading, and lastly, what it takes to start a nonpoint source trading program-- next slide. So I just wanted to start off with just addressing a little bit of the terminology just to define it to give you a little-- a better, clearer idea of what I mean when I use some of these terms.

Essentially in Virginia, a nutrient credit is measured in pounds of nitrogen and phosphorus reductions delivered to tidal waters of the Chesapeake Bay. Credits are generated by a project and may be transferred for the purpose of satisfying nitrogen and/or phosphorus reduction permit conditions offsite from a permitted activity.

A nutrient bank is a project where at least one credit generating practice is implemented. Nitrogen and phosphorus credits are tracked separately and are not added together. You'd be surprised how many applications I saw where they add total pounds of nitrogen and phosphorus together to get a nutrient credit--

[LAUGHS]

--not sure where that idea but anyways-- and then, I'm going to-- I wanted to explain kind of the difference between two different types of credits. One is term credits. Term credits are generated by practices that must be certified annually and can be used for one year of permit compliance. The next type of credit is perpetual credits, which are generated by permitted practices on deed restricted land and can be used to permanently satisfy pollution reduction requirements.

Some of the roles and responsibilities that DEQ has include DEQ approves credit generating practices and certifies the generation of credits for individual nutrient banks. DEQ facilitates trades and credit sales by tracking credit transactions and providing a registry of available credits to the public. Some of the things DEQ does not do-- we do not generate, sell, or broker credits. And we also do not set prices for nutrient credits. This is left for the free market to determine-- next slide.

So I can't talk about nutrient and sediment pollution in the state of Virginia without at least first briefly discussing Chesapeake Bay watershed. It's a massive part of the state. It's a watershed that contains parts of six states and DC. It's a 64,000 square mile watershed, home to over 18 million people.

Nutrient and sediment pollution has been causing eutrophication or algal blooms in the Chesapeake Bay, decline in oyster and blue crab fisheries, decline in submerged aquatic vegetation habitat and also has been causing annual summer hypoxic conditions. If you look at the map on the right of the Chesapeake Bay, that area in red shows you all the areas where there is a dissolved oxygen level of virtually zero, which is detrimental to aquatic wildlife within the Chesapeake Bay. This area forms almost every year. And 2015 was a particularly bad year for the Chesapeake Bay.

So Chesapeake Bay has been listed for impairments for dissolved oxygen and aquatic life with nitrogen phosphorus and sediment identified as the stressors for these impairments. And the Chesapeake Bay has been issued a total maximum daily load. And I think it's one of the biggest in the country, if not the biggest in the country-- next slide.

So the Chesapeake Bay TMDL really identifies three major sources for nutrient and sediment pollution in the Bay-- by far the biggest being agricultural runoff, next being urban stormwater runoff with wastewater treatment facilities not far behind it.

You'll notice that there's air pollution significant load. And that simply pertains to nitrogen from your [INAUDIBLE]. And it doesn't apply to sediment or phosphorus. And my next slide is going to focus on wastewater treatment, because that's really where trading begins in the point source sector-- next slide.

So point source trading really started with the Watershed General Permit issued in 2007. That basically enacted a cap and trade program with point source to point source trading for existing facilities to meet an initial cap load. Point source to nonpoint source trading was reserved to accommodate new and expanding facilities. And this permit allows wastewater treatment plants to generate an annual term nutrient credit-- next slide.

So the Watershed General Permit overlays individual NPDES permits and addresses nutrient loads in Chesapeake Bay watershed. NPDES waste load allocation limits are based on Bay TMDL implementation. This permit really allows wastewater treatment plants to work together with the most cost-effective upgrades being built by facilities that can provide credits to facilities with the least cost effective upgrades to achieve a tributary wide nutrient load reduction-- next slide.

So really nonpoint source trading policy wise gets its start with the point source trading program, because in response to new and expanding facilities being able to purchase nonpoint source credits, trading guidance for agricultural landowners was published in 2008.

And this guidance establishes credit rates in pounds of reductions per acre of practice implemented for ag BMPS and land use conversions. The first nutrient bank in Virginia was approved in 2008 generating credits through agricultural land use conversion and reforestation. The nutrient bank conversion areas were deed restricted in perpetuity prohibiting ag land use and development for perpetual credit generation.

Lastly, the guidance also requires the implementation of baseline practices prior to credit generation-- next slide. So there's an agricultural baseline here in Virginia. I mean, there is a baseline for all practices. But essentially there are five practices that have to be in place before an agricultural tract can start generating credit. And those practices include a soil conservation plan, a nutrient management plan, cover crops, livestock exclusion fencing, and a 35-foot riparian buffer.

Once these practices are implemented, a agricultural piece of land can then generate credits through practices such as continuous no till, a 15% reduction in nitrogen on corn, early plan to cover crops, and also on land conversion. All practices generate annual term credit. But land conversion can generate perpetual credits, because it's a deed restricted practice. [INAUDIBLE] is essentially a genius strategy for incentivizing unregulated agricultural nutrient reductions through trading.

Baseline requirements also have another benefit by creating a level playing field. And it prevents the worst land stewards from generating the most credit. And also implementing a baseline also generates additional non-tradable nutrient reduction, providing a net uplift to the watershed. So it's really not just a trade of 1 pound from a credit generating entity to a permit holder. So it's not just a pound for pound if you were getting additional reductions to the implementation of baseline-- next slide.

So to date, there really haven't been any nonpoint source to point source trades in Virginia. And there are really several reasons why that's the case. And one of them is being expanding wastewater treatment plants were able to upgrade and stay under their load cap. adequate credits were available from other point sources. Another reason is there's a 2 to 1 uncertainty ratio applied to nonpoint source to point source trades. And this is mainly due to point sources having a much better handle on what they're discharging and what they've reduced versus the estimated nutrient reductions of a agricultural BMP.

And the main issue is it's a problem of scale-- takes a lot of land just to generate the amount of nutrient credits a wastewater treatment facility would need. For example, it would take 2,000 acres of early planted cover crops to generate 500 pounds of nitrogen reduction, which is enough credit to offset one 10,000 gallon per day facility operating at 8 milligrams per liter of nitrogen. And overall, ag BMPs are just expensive compared to the cost of point source credits. So really at this point, nonpoint source trading lacked the smaller scale water quality issue and permit driving market, which leads me to the next slide.

Now I'm not going to get into the details of the impacts of stormwater runoff on water quality and nutrient loading. But I would like to say that stormwater management is more of a-- has more of a scale that's suited to nutrient trading than point source wastewater treatment sector-- next slide. And I'm going to go ahead and skip this next slide, as well for the sake of time.

So we have this issue with stormwater management in the state of Virginia. And we addressed that issue with the Stormwater Management Program, which was enacted in 2004. The permanent went into

effect requiring post-construction stormwater quality and quantity criteria statewide. The permit is required for construction activities one acre or greater, identifies phosphorus as a keystone pollutant, which is used as a surrogate for nitrogen and sediment. And the permit requires post-construction stormwater runoff not exceed phosphorus loads greater than 0.41 pounds per acre per year-- next slide.

s really with the Stormwater Management Program, the enacting policy for known point source trading was an amendment to the Virginia Stormwater Management Act, which went into effect in 2009, adding provisions for nutrient credit trading. These provisions allow permittees to meet post-construction water quality criteria with the purchase of perpetual nonpoint source phosphorus credits generated by permanent practices, such as land use conversion, stream restoration, and urban stormwater BMPs.

Associated nitrogen credit must be retired for all VSMP phosphorus purchases. Nutrient banks and construction activities must be in the same or adjacent [INAUDIBLE] within the same tributary in order for them to trade. And also localities have the ability to restrict trading based on water quality impairments and for the protection of sensitive water, such as drinking water reservoirs.

All water quantity requirements that are required in the VSMP program must be treated on site. So there's no volume trading in Virginia at this time. And lastly, the use of state and federal water quality grants is prohibited for the generation of nonpoint source credits. Essentially this is all supposed to be private sector invested. And it's a system that works pretty well overall. One thing that can be funded for nutrient banks is a baseline implementation. So those baseline practices that are required before the generation of a credit can be grant funded-- next slide.

So now that we have a market within the Virginia Stormwater Management Program, we have a pretty active market today with over 140 nutrient banks, all permitted practices generating perpetual credits, which is required under the VSMP program. So to date, we've had a generation of a total of 8,800 pounds of phosphorus. And 4,900 of those pounds have been sold. Average cost per pound varies by watershed. You could be anywhere from 8,500 to 22,500. But on average, I'd say it's probably about 12,500 statewide.

And these prices are driven by onsite treatment costs, nutrient bank land value, and bank competition within a trading tributary. There've been thousands of trades over the life of the program, ranging anywhere from 1/100 of a pound to 100 pounds. Total annual market value is about $15 million. And on the right there, you'll see a graph that really just tracks the generation of phosphorus credits and the sale of phosphorus credits from 2013 to 2018. You can see that the program's really been ramping up over the last six years-- next slide.

I'm not going to spend too much on this slide. This is just kind of give you an idea of where all the banks are in the state of Virginia and what the major tributaries are in Virginia. Our little black dots are where nutrient banks are located. And the map on the left indicates where all the major development areas in the state of Virginia are. And you can see that a lot of these nutrient banks are pretty much placed on the outskirts of these development areas. So really those development areas are kind of driving where these nutrient banks are located-- next slide.

So other than the VSMP program, there are other markets that are emerging right now in Virginia due to 2012 legislation, which allows MS4 and Industrial Stormwater permittees to purchase nonpoint source nutrient credits. These credits can be utilized for meeting Chesapeake Bay's TMDL load reduction permit

requirements under their MS4 and Industrial Stormwater permits. And they need to meet load reductions for nitrogen, phosphorus, and sediment. So they aren't just interested in phosphorus like the VSMP program.

Only a few MS4 purchases have been made to date by the Virginia Department of Transportation's MS4. But I imagine that that sales record is probably going to pick up once we start ratcheting down on total load reductions required. And this is pretty much taking effect over three permit cycles. We'll probably see a lot more activity from the MS4s in the last permit cycle.

Lastly, I also just wanted to mention in 2016 legislation was passed to allow nutrient banks to generate sediment credits for sales to MS4s. So there's also another market that's emerging within sediment credits-- next slide. All right. So this slide really just shows you a side by side comparison of point source and nonpoint source trading. I mean, they really do operate as separate programs. And there's some policy overlap. But in effect, they have not overlapped to date, because there have been no nonpoint source to point source trades.

So for the point source trading program, it's a traditional cap and trade program. And the scale of trading is in the hundreds of thousands of pounds, which is quite a bit more than the nonpoint source side. Number of annual trades is only in the teens. And the credit type is an annual term credit. And the trades are limited to the major tributaries. And this program is really only in the Chesapeake Bay watershed.

And the total market value is $1.5 million annually. And the regulatory drivers of point source trading are the base TMDL and the NPDES individual permits. And the active permit market is really being facilitated by the Watershed General Permit. And there is an emerging market with point source trading within the MS4 sector, which can also use point source credits.

So in the nonpoint source trading program, really it kind of mimics the mitigation banking model for trading. The scale of annual trading is 1,200 pounds. And then the number of trades is approximately 1,000 per year. Credit type is perpetual. And the trades are limited by tributary and also by same and adjacent eight-digit hydrologic unit and also based on local water quality based limitations, which really depends on the locality.

This program is implemented statewide. And the annual market is about $15 million. And the regulatory drivers right now for it are the post-construction stormwater management or the VSMP program. And the active permit market is also VSMP. But there are emerging markets with MS4 and industrial stormwater permits, as well.

I foresee some interest in nonpoint source trading versus point source trading for the MS4s mainly because once you buy a perpetual credit, you don't have to worry about renewing and buying credits on an annual basis. You can just buy that perpetual credit. And you'll be in compliance for the life cycle of your permit-- next slide.

The nonpoint source trading challenges-- one thing that we've kind of failed to do is incentivize ag BMP implementation for term nutrient credit generation. Virginia has yet to find a market for term nonpoint point source credits. We've also had issues with a credit tracking growing pains. In Virginia, who's currently tracking credit generations from 140 nutrient banks with thousands of sales in an Excel

spreadsheet for a registry at this time. We'll be upgrading to the RIBITS platform, which is currently being used for mitigation banking nationwide.

Now I'd just like to give a special thanks to USDA for providing a grant that allows us to make this upgrade to the RIBITS platform. And I would also like to thank the Army Corps of Engineers for hosting us on the RIBITS platform. Another issue we've had is a continuing programmatic development within an existing trading market that may oppose change. And it's kind of the, well, we've got this system that works great. Why change it? And this has really been indicated in the Draft Nonpoint Source Credit Certification Regulations have had several areas of contention expressed by the banking community in the recent public comment period.

Some of these issues include a baseline requirement, local water quality provisions, and credit release schedules. And lastly, one issue we've been having is updating land conversion credit rates using the latest Chesapeake Bay model to establish sediment reduction rates to provide sediment credits to the MS4s. Some of the unintentional consequences of this is by using the latest available science, we're seeing credit rates generally go down from land conversion practices, which is a cause for concern amongst the nonpoint source banking community-- next slide.

So lastly, what does it take to establish a nonpoint source trading program within a state or a locality? The take home message here is it requires a regulatory driver. If you don't have a regulatory driver that facilitates trading, you're going to have a program that just kind of sits on the shelf. So by regulatory driver, I mean enacting policies that allow or encourage trading, permits that require a numeric nutrient reduction, and permit flexibility that allows trading to meet reduction requirements.

It also takes addressing water quality issue with the appropriate scale for nonpoint source trading. You know, will the credit generation match the credit demand cost effectively? It also takes the establishment of a baseline to generate reductions beyond what is tradable to see a net uplift within the whole watershed instead of just a credit for credit transaction.

And it also takes allowing credits to be generated in a sector less regulated, where cheaper reductions can be achieved, i.e., agriculture. And lastly, it takes private sector investment in cost effective nutrient reduction practices that can be profitable to bank sponsors and marketable to permit holders for satisfying the water quality criteria.

So these are the factors that have led nonpoint source trading to be an effective tool for achieving cost effective nutrient reductions from multiple pollution source sectors in Virginia. And that leads me to my next slide. And I'd just like to open it up for questions. And that's the end of my presentation.

Thank you. Thank you very much, Derick, for that informative presentation. We've had a bunch of questions come in. We only have a couple minutes left to get to a few of them. Derick's email address is up there on the screen. If you have a question that we don't have a chance to get to, you can email it to Derick after the call to continue to coordinate-- to continue the conversation.

OK. First question-- is there a party that's responsible for field verification of the permanent practices? And how frequently are the practices verified under the Stormwater Trading Program?

So in Virginia, it's actually-- that's another one of DEQ's roles and responsibility. We also handle verification of these credit generating practices. In most cases, in Virginia, we're talking land conversion is the most common practice that's being implemented. So we usually try to get out there annually, particularly in the first three years of a reforestation project, because that's the that's the most critical time for our tree plantings. But yeah, so it's DEQ that's responsible. We don't use a third party for verification at this time.

Is there any way the public can view the free market dollar value of N and P credits?

At this time, no. That's kind of we-- you know, we've set up a registry, which allows, you know, anybody interested in purchasing credits to contact and ask for pricing and availability from any of the nutrient banks that can service their construction activity. So there really isn't a listing of prices, although of-- in some cases, I can give people, you know, an average value I've been seeing just based off of the 6% fee that we implement. But yeah, generally no, that's not something that we publish.

What is the least expensive and/or most effective BMP you have seen for nutrient reductions in Virginia?

So on the nonpoint source side, it's land use conversion. It's really been the most cost effective and kind of the low hanging fruit at this time. And you know, really the way I see it is land conversion-- it's kind of like it's always trending toward a new piece of land alone in the state of Virginia that's going to return to forest.

So it's always trending towards that state that generates credit versus something like a, say, a stream restoration or urban stormwater BMP, which has, you know, maintenance requirements that would have to be implemented periodically. So that's been the most common method for generating a nutrient credit. You know, I think long term that the program is going to have to evolve beyond just land use conversion, because you can't convert all our ag land in perpetuity.

How do NPS training results compare to the reductions required by TMDL?

Training results for-- well, see, most of it's been for the Virginia Stormwater Management Program, which has not really been TMDL related. We will be seeing more trades with the MS4 sector purchasing credits specifically for TMDL compliance. So we haven't seen a whole lot of that yet besides from the Virginia Department of Transportation, which has made a couple large scale trades fairly recently for permanent compliance into the Chesapeake Bay TMDL. So really--

[INAUDIBLE]

Oh, I was just going to say the VMSP program is really just for local water quality. It's not really TMDL driven necessarily, although the reduction, you know, the reductions achieved by baseline can show improvement in Bay watershed.

Great. And unfortunately, last question we're going to have time for today-- so far, Virginia has required lands to be retired to allow credits for trading. Is there any progress being made on term credits or extended contract credits? So it is not just retiring land from production.

So there is the capability of land conversion practices generating a term credit. Essentially, you know, these practices are allowed to sell term credits. And essentially that would just be them selling a term credit. And then once that term has expired, that credit would essentially return to their ledger. Yeah, I haven't seen a whole lot of that.

Great. Well, thanks, everyone, for the questions. And thanks, Derick, for the replies. Again, if you still have questions that you'd like to converse with Derick on, email address is there. And again, the recording and PDF of slides will be posted online within a couple of weeks.

Awesome. Thank you.

Yes, thanks so much. And again, thanks to both of our speakers. On behalf of USDA and EPA, we appreciate everyone's participation in this webinar. And this will conclude the four part webinar series. So thank you so much, everyone. And enjoy the rest of your day.