TRANSCRIPT

Section 319 Agricultural Nonpoint Source Success Stories

Watershed Academy Webcast – June 14, 2012

Speakers
Lynda Hall – Instructor – Chief, Nonpoint Source Control Branch, US EPA
Shanon Phillips – Instructor – Water Quality Division, Oklahoma Conservation Commission
Nesha McRae – Instructor – Virginia Department of Conservation and Recreation
Greg Sevener – Instructor – Watershed Bureau, Wisconsin Department of Natural Resources
Anne Weinberg – Moderator – Office of Wetlands, Oceans and Watersheds, US EPA
Katie Flahive – Moderator – Nonpoint Source Control Branch, US EPA

Anne Weinberg
Good afternoon and welcome to today's webcast titled Section 319 Agricultural Nonpoint Source Success Stories. This webcast is sponsored by EPA's Watershed Academy and the Office of Wetlands, Oceans and Watersheds also known as OWOW. I am Anne Weinberg with EPA's Watershed Academy and I will be moderating today's webcast along with Katie Flahive who is an agricultural engineer in EPA's Nonpoint Source Control Branch. Thank you all for joining us today.

We will start by going over a few housekeeping items. The materials in this webcast have been reviewed by EPA staff for technical accuracy. However, the views of speakers and the speakers organizations are their own and do not necessarily reflect those of the EPA. Mention of any commercial enterprise, product, or publication does not mean that EPA endorses them.

Now I would like to briefly summarize some of the features of today's webcast. We encourage you to submit questions to our speakers during the webcast. To ask a question simply type the question – type it in the questions box and click "send." If your control panel is not showing, simply click on the small orange box with the white arrow to expand it. If you are having any technical issues with participating in the webcast you can similarly let us know by entering it in the questions box to the right of your screen and then clicking on the "send" button. We will do our best to respond to your issues by posting an answer in the questions box.

This webcast will be recorded and archived so you can access it in a few weeks after today's live presentation. The archived webcast will be posted on EPA's Watershed Academy webcast page at www.epa.gov/watershedwebcasts. Spelled with a plural.

So now we have completed the discussion of the housekeeping items. Let's kick off today's webcast. US EPA's Section 319 Clean Water Act Nonpoint Source Management Program was established in the 1987 amendment to the Clean Water Act. Under Section 319, states, territories, and tribes receive grant money that supports a wide variety of activities including

technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects.

This webcast will highlight agricultural nonpoint source success stories from Oklahoma, Virginia, and Wisconsin. For information on all of our current Section 319 nonpoint source success stories see www.epa.gov/nps/success. I just want to say we have many, many success stories. We only had time to highlight a few here but there are really quite a few more and we encourage you to take a look at that website. I also want to underline that this webcast is part of our series of Watershed Academy webcasts that is in honor on the 40th anniversary of the Clean Water Act. As I mentioned, this particular section of the Clean Water Act was established 25 years ago, back in 1987.

So without further delay, let me introduce our speakers. Our first speaker is Lynda Hall. Lynda is Chief of the Nonpoint Source Control Branch at US EPA's Office of Wetlands, Oceans and Watersheds. Lynda has been with US EPA working to improve environmental management and water quality for more than 20 years. She has served in a number of management positions at EPA has recently moved to lead EPA's Nonpoint Source Control branch which has responsibility for managing the Section 319 program.

Our second speaker, Shanon Phillips, is the Director of the Water Quality Division at the Oklahoma Conservation Commission. And has worked on water quality for the past 17 years in the state of Oklahoma. Much of that work has involved collaboration with conservation districts, USDA's Natural Resources Conservation Service and US EPA to help agriculture producers protect water quality from nonpoint source impacts of nutrient, sediment and bacteria through voluntary conservation programs.

Our third speaker is Nesha McRae. She is the TMDL and Watershed Field Coordinator at the Virginia Department of Conservation and Recreation. She works with communities throughout the Shenandoah Valley in Virginia to develop and implement TMDL implementation plans to address water quality impairments on Virginia’s streams. Over the past several years, Ms. McRae has worked to enhance the collaborative process used to develop TMDL implementation plans in Virginia including engaging farmers in discussion targeted to increasing participation rates in federal and state cost share progress for agricultural best management practices.

Our final speaker is Greg Sevener. Greg is a Watershed Specialist with the Watershed Bureau at the Wisconsin Department of Natural Resources, referred to as DNR. Greg has worked for Wisconsin DNR for 35 years. He initially worked in water quality planning and transitioned to the field office to work in wastewater and water resources issues. In 1985 and that is not a typo, Greg was involved in the initiation of the Bass Lake restoration project along with others in Wisconsin DNR and in the Marinette County Land and Water Office. So Greg has been working on this project that you will hear about, Bass Lake, since 1985.

So one final note before we get started with our first speaker, we will try and answer as many questions as possible throughout this webcast. However, due to the large number of attendees, we may not be able to answer all questions. In the event that your question is not answered, please feel free to contact the speakers after the webcast. We will share the speakers contact information in one of our final slides today.

And so, with that, we will begin our webcast. Our first speaker is Lynda Hall. Lynda, as I mentioned, is Chief of the Nonpoint Source Control Branch at US EPA and Lynda the floor is yours. Take it away.

Lynda Hall

Thank you, Anne. Hi, everyone. I am going to provide some context for the case studies that you will hear later in the webcast by providing a little bit of an overview about the challenges of nonpoint source pollution that we face as a nation - in particular nutrient pollution and talk about the role of agricultural sources in those pollution challenges and then introduce the Section 319 program and some of the important features it brings to help states and local communities control nonpoint source pollution including from agriculture.

So I will start with this first slide which kind of gets at the scope of nutrient pollution problems in the country. Now it's important to note that the 319 program deals with all types of nonpoint source pollution, sediments, pathogens, metals, it's not limited to nutrient but the scope and the pervasiveness of nutrient problems across the country really make it one of our most important challenges and this slide has a number of figures that illustrate the scope of that challenge. So we have -- states have identified more than 15,000 nutrient related impaired waters and for many reasons I don't have time to go into that. It is likely a vast underestimate, but even with that number it constitutes over 100,000 miles of rivers and streams and 3.5 million acres of lakes and reservoirs that are impaired by high levels of phosphorus or nitrogen. Accompanying that is more than 8,000 nutrient related TMDLs, total maximum daily loads, which are sort of cleanup roadmaps, if you will, for pollutants and we have a large number of those have been completed and many of those yet to be implemented.

The next three bullets give you figures from a source of information that is a set of national aquatic surveys that EPA and the states conduct for water resources nationwide and these are probabilistic surveys that allow us to draw conclusions nationally about the scope of various water quality problems. And from those surveys we have learned that about half of the streams assessed in those surveys had medium to high levels of nitrogen and phosphorus. More than 40% of lakes had medium to high levels of nitrogen and phosphorus. And 78% of our continental coastal waters are exhibiting nutrification which is excess nutrients to the point that algae blooms of concern are in existence there. And then from a different source of scientific information we know that there are about 168 hypoxic zones in US waters and that is where the excess nitrogen and phosphorus that are at such high levels that algae blooms of very large proportions have grown there and then as the algae dies they use the oxygen in the water. If the oxygen gets below 2 milligrams per liter it's classified as hypoxic and those are seriously impaired waters. So

as you can see we have a major challenge ahead of us and a long way to go to address these problems.

The next slide looks at the role of agricultural activities in nonpoint source impairment nationwide and the source of this data is information that states compile every two years under the Clean Water Act. They are asked to assess their waters and then report on those waters assessed and then to specifically identify those waters that do not meet the water quality standards, the desired uses and desired levels, compounds in the waters that states have identified as necessary. And so this data is based on those reports that states have submitted for rivers and streams. And --, And because of the large numbers of water bodies in many states and because monitoring resources are limited, only a subset of those waters can be assessed and what this pie chart shows is that of the number assessed, about half of those were considered to be impaired. And then states are also asked to identify the source of the impairment for the waters that they have identified as impaired. And for rivers and streams, the number one source is identified as agriculture. For lakes, ponds and reservoirs, agricultural sources are the third leading cause of impairment. And that includes number nine for estuaries. So obviously, it plays a significant role in our water quality impairments.

So this next slide drills down a little further in that information. So of the rivers and streams assessed -- of the rivers and streams assess these are the sources of impairments that were identified and agriculture is certainly not alone. That is the dominant source of impairment there. And the second source which is atmospheric deposition of pollutants is one that we can't deal with very well through water quality projects. It needs to be dealt with under the Clean Air Act programs in our sister agency in EPA. So this final slide for setting some context on just the scope of the problem gets both at -- looks at nutrients, pollution into iconic waters in the United States, the two top pie charts address the Gulf of Mexico and the two bottom ones look at the Chesapeake Bay and it shows the sources of loadings of phosphorus on the left side and nitrogen on the right side. And then looks further at the sources of those loadings and the blue and the green portions of the pie chart indicate the agricultural sources and then those are further broken down into crop and livestock sources. So from crops we would be looking at primarily runoff from fertilizer and some livestock operations, manure as a primary source of the nutrients.

So even in the Gulf of Mexico, about -- obviously very, very large watershed, it is dominated by agricultural activities. The Chesapeake Bay, also a large watershed, although not really the size of the Mississippi River Basin which has a more mixed land use. It has agricultural activities, but also a lot of urban and suburban activities. But in both of these different -- very different types of watersheds we can see the significant role played by agricultural activities and the pollutants loads for nutrients in particular.

So what tools do we have to deal with these challenges? Obviously, we have our work cut out for us in this area. And so the first place we can look is to the Clean Water Act and as many of you probably know, the Clean Water Act divides pollutant sources into point sources and nonpoint

sources. And point sources are defined as those that are discrete conveyances that have a discharge. So pipes, ditches, channels, etc. And those sources are regulated under the Clean Water Act through an NPDES permit. So for agricultural operations, the only activities that are permitted are concentrated animal feeding operations also known as CAFOs. They have been regulated under the Clean Water Act since 2003. And there are two categories, large CAFOs, operations that are at least 1,000 head of cattle or medium CAFOs which have 300-999 head of cattle or the equivalent but also meet other criteria close to a waterway or otherwise warranting a discharge permit. But when you look at the big picture, 0.4% of all farms have an NPDES permit. So it is not a significant approach under the Clean Water Act and in fact, the act specifically exempts runoff from agriculture and from irrigation return flows as point sources under the Clean Water Act. So that means they are nonpoint sources. And that means that they are covered under the Section 319 program. And the next few slides give you a little bit of background about the 319 program.

As Anne said, it was added to the Clean Water Act in the 1987 amendment and she covered the activities here in the first bullet that the program is intended to support. And many, many projects under 319 do focus on agriculture for the reasons just laid out and you will be hearing about a few of those, of course, just a little bit later.

But more generally, the 319 program is intended to both improve and maintain water quality by addressing nonpoint sources of pollution and as Anne mentioned, one of the success measures -- we use we call them success stories -- are waters that have either demonstrated improved water quality or that now meet water quality standards for one or more pollutants. And we are very proud that we have 368 of those so far and counting. They continue to come in.

And how states and others use 319 funds to make good thing happen on the ground and create success stories, varies a lot. 319 has a lot of flexibility and it can provide staffing support for staff at both state and local levels, support important planning activities, technical assistance. It can fund on the ground BMPs as well as monitoring. And also building partnerships which is a really essential part of the program and I think you'll see through the case studies how that works.

So basically 319 can be used in many ways -- 319 funding can be used in many ways depending on what is needed in a particular state or in a particular watershed to get to success.

And this slide gives you a little bit of information about the amount of funding available through the Section 319 program. In the early 2000’s we had an appropriation that hovered around $200 million and got even above that. At some point the funding has declined along with funding for many other federal programs in recent years. We are currently at federal appropriation of a $165 million. Since these funds go directly to states and territories via an allocation formula and then states add a 40% nonfederal match to that. So that helps to significantly grow the funds that are available for nonpoint source efforts. And I should note that many states provide significant additional funds beyond that 40% match too.

The 319 funds are divided into what are called base funds which can go to those many activities I already outlined and then what we have called incremental funds. And these funds are really to directly support watershed projects. And because of -- because the 319 funds are moderate compared to the scope of the nonpoint source problems that we need to address, it is very, very important to leverage other funds and very important to bring other partners into those watershed projects. And we find that most of the success stories are success stories because they have done that and pulled other partners in. And one of the most important partners is the USDA and specifically the Natural Resource Conservation Service programs not only because they tend to have considerable monetary resources which is very, very important but also because our programs are complementary and they work well together. We do share goals between the programs. We rely on voluntary actions by land owners and we rely on partnerships with other stakeholders to make things happen at the local level.

Currently under the 319 program, in about half the states there are what I think we would characterize as active and ongoing collaborations between the state 319 agency and USDA. We would love to see that expanded to 100%. And we think what comes with that is a great opportunity to enhance the coordination of these federal programs that can be used together to get better results on the ground and get to better water quality outcomes. And the success story numbers show us that we do get powerful results when these collaborations with the USDA happen. Of the 368 success stories I mentioned, nearly 30% of those involve collaboration with USDA and you will be hearing lots more about that from Shanon in just a few minutes and how they made that work in Oklahoma.

One strength that 319 brings to watershed based projects is the use of watershed based plans. And in fact, it is a requirement of the watershed implementation portion of the 319 funding that there is a plan to guide the use of the funds. And watershed based plans do this by outlining where are --, what are the pollutant loads in the watershed and these are usually done on the scale of a fairly small watershed. What are the sources of pollutants? What are the practices needed to reduce the pollutant loads? And what are the so-called critical areas where those practices would be most effective. Experience has taught us that not --, you won't get an equal result from putting BMPs in any given place in the watershed, there are usually areas where the soil is more erodible or closer to the water or the practice is going on there will just make a huge impact to water quality if they are corrected. So having a plan -- a watershed based plan or another plan that guides where these projects go is very, very important. And then, of course, having a plan to monitor the results is necessary to demonstrate that it has happened.

So I am going to segue way now to our success story components of the 319 program. There --, In any given year there are hundreds of good projects going on around the country that are supported by Section 319 funds. They are on their way to producing good results. And the success stories are those that have met a high bar. Those are the projects that have gotten to a point where the water body is either fully or partially restored. Based on the watershed and the water segment where the work is going on. And this slide gives you a website which will also

show you briefly later where if you are interested you can peruse many interesting success stories that we have in the 319 program.

But what qualifies as a success story? Well first of all, as I mentioned before, states identify waters that are impaired. That is that don't meet their water quality standards. And they do that every two years. And the success stories have to come off of or be identified from those lists, the state lists, and specifically we use the 1998/2000 listing cycle as our baseline. So currently to be counted as a success story it needs to be in that particular listing. And then the water quality has to have been -- documented water quality improvements have to have be achieved as a result of nonpoint source control actions and those projects are often although not always funded by 319. In some small number of cases they are funded purely by state nonpoint source pollution control funds. But mostly the large majority of cases, 319 funds have played a role in the success story.

When we look at the stories as a whole there are certain attributes that do emerge. And they are that, of course, specific practices have been changed or BMPs have been put in place to target those identified problems in the watershed. Those problems again, are often identified through a watershed based plan or in some cases, a total maximum daily load that has been developed for the water. As mentioned, 319 funds generally play a large or less prominent supporting role in the implementation. And the next two bullets work together and are really important which is that nearly all of the success stories feature multiple project partners, the local, state, and federal level and these efforts just tend to take a lot of resources, a lot of different skills, and work best when there is a group of committed folks working together. And it takes time. So, many of the success stories have been achieved after hard work over several years.

There are three different types of success stories. I won't go into this in detail but you will be hearing mostly today, I think, about success stories in the first category which are those waters that have either been fully restored, all of the state water quality standards are now being met, and all of the beneficial uses of that water are available or they have been partially restored which means that some of the pollutants that are impairing a water have been addressed and we often see that in any particular waterway it may be polluted by bacteria, high sediment levels, high phosphorus levels and nitrogen levels yet even with one or more of those addressed we call that a partially restored water. And the water is on its way to being restored and is considered a success story. So I am going to close here by just showing you the nonpoint source success story website. If you're interested in learning more after the webinar, I encourage you to take a look. Here you can search by state, you can search by type of success story and you will find it very interesting reading. And each of the success stories is represented by a brief fact sheet that provides all of the basic information about the problem and who is involved in solving it. So that ends my presentation. And I think Anne will have a few minutes for questions.

Anne Weinberg

Okay, thank you, Lynda, for that excellent presentation. And now we are going to have a time for some questions from our audience and Katie Flahive will pose a few questions to Lynda.

Katie Flahive
Thanks, Anne. Lynda, we do have a number of questions that have come in, but I think we have got time for a couple here. There has been a lot of attention recently on the value of protecting unimpaired waters before nonpoint source pollution becomes a problem. How can the 319 funds help protect unimpaired healthy waters that are at risk of being impaired by ag related nonpoint sources of pollution?

Lynda Hall
Yes, thank you. That's an excellent question. The --, a lot of emphasis in the Section 319 program over recent years has been on the restoration of impaired waters and certainly that has been the focus of my presentation this morning. There is the opportunity under Section 319 to use funds for protection efforts and actually through a number of changes and enhancements we will be making to the 319 program this year. And in the coming years we do hope to be able to put more emphasis in the program on protection of waters. We have thousands of waters that are impaired now and we know about those and, of course, we want to fix those but there are also many, many waters that are healthy now and might not be healthy in a few years unless actions are taken to protect them or that are maybe just beginning to be impaired and their degradation could be prevented with some interception now. So I think it's an excellent question. There's a lot of interest by the 319 program managers across the country I think in going in this direction and so you will likely see more activity in this area in the coming years.

Katie Flahive
Great. I think we have time for one more question. And can you just reiterate the proportion of 319 funds that are used for on the ground projects?

Lynda Hall
Sure. So in general there --, it is about a 50/50 split. It gets a little complicated because the discussion in the current 319 grant guidelines it talks about how these funds are split is tied to a $200 million appropriation which unfortunately, we don't have anymore. So that language is a little bit outdated. So I'll just say as a practical matter without getting into some of the details, it is about a 50/50 split between what we have called base funds which can support that wide variety of things like supporting state and local salaries and outreach, technical assistance. And then what have been called incremental funds. We are starting now to call them watershed implementation funds, about 50% goes to on the ground projects.

Katie Flahive
Okay, thanks and I will turn it back you, Anne.

Anne Weinberg
Okay, thank you, Lynda, for that information and Katie for leading us through that Q&A break. Our next speaker is going to be Shanon Phillips. She is the Director of the Water Quality Division at the Oklahoma Conservation Commission. Take it away.

Shanon Phillips
Hello? Hello?

Anne Weinberg
Yes, hello.

Shanon Phillips
Okay, good. Sorry, I had a little glitch there. Hello, I am Shanon Phillips from Oklahoma Conservation Commission and just a little bit of a background about our agency. It's our mission to conserve, protect, and restore Oklahoma's natural resources primarily by working in collaboration with conservation districts and other partners. The OCC is the state's technical lead for the 319 program and it's our water quality division's roll to protect water of the state from the impact of nonpoint source pollution.

All right, now I can't get it to switch. There we go. Oklahoma has a very successful nonpoint source pollution program and we believe that there are three keys to that success. First of all, we utilize an extensive nonpoint source focused water quality monitoring program. We utilize roughly $1 million a year towards this program and that's considerable amount when you consider that our current allocation from the 319 program is about $2.6 million. We also have very strong, effective partnerships including of course, our conservation districts, USDA, our state agency, EPA, and landowners of the state. And finally, we utilize locally led, voluntary cost share programs to install conservation practices across the state.

It probably sounds simpler than it really is but if you want to evaluate your efforts to address nonpoint source water quality problems, then you should be monitoring nonpoint source water quality. And in the late 1990s we realized that was not necessarily happening in our state with our traditional ambient monitoring programs. So we developed a program that would make that happen. You know, it's really part of our agreement in EPA in accepting the 319 funds that will access the state's waters relative to nonpoint source impairment. And so to do that we monitor about 250 smaller third to fifth order streams across the state. We rotate and monitor each of the streams for two out of every five years and rotate through the state that way. We also monitor an additional 250 probabilistic sites and we use that information to verify that the information we are collecting at our fixed station sites is representative of the eco-regions and the land uses in that area. We focus on streams upstream of major discharges or other influences so that we can be certain that the water quality measure is really a reflection of the land use upstream of that site and a measure of the nonpoint source impact. We focus on pollutants that we have numeric criteria for and the major nonpoint source pollutants like nutrients, sediment, and bacteria. What this means is that there may be significant data that we don't collect. For example, we don't have water quality standards for benthic algal production in streams even though that would be helpful for us in our program. So we are not currently collecting chlorophyll a data in streams, although if we do get standards, hopefully, we will make the modification to collect that later.

This investment in manpower and --, financially is a very significant investment and we have a staff of about eight full-time employees devoted almost exclusively to monitoring. In addition, we hire eight to ten summer interns to assist with the extensive summer sampling. And it was not really an easy sell to justify this investment in monitoring when we have so many other identified needs related to nonpoint source pollution. In fact, until July of 2012 this monitoring has been almost exclusively funded with EPA 319 dollars. The state would allocate money for some other portions of the program but not for water quality monitoring. But as a result of the success that we've been able to demonstrate though our nonpoint source program. This year the legislature voted to provide us with $500,000 which we can put towards water quality monitoring. That money is tremendously beneficial and it frees up 319 dollars for other parts of the program.

In addition, to the ambient monitoring program, we also use a paired watershed framework which we learned about from our participation in the National Nonpoint Source Monitoring program. That type of monitoring uses a combination of grab samples and auto samplers to intensively monitor and evaluate water quality success stories in watersheds where we have had more specifically targeted nonpoint source implementation programs. So everywhere we've developed a watershed based plan and are implementing 319 implementation programs, we are utilizing this impaired watershed mechanism. This monitoring is even more costly than the standard ambient monitoring but because of the equipment necessary and the sheer volume of data collected, however it has proven so valuable that we implement it now again in every 319 watershed effort where we are devoting 319 funds towards implementation. We've used this monitoring to document load reductions of 60-70% and in stream nutrient loading within 4-7 years of beginning implementation. We have done this in two of the three watersheds where we've completed this type of monitoring so far. We have reduction of about 14% and in another watershed and that's after only a year and half of post-implementation data. That is well in line with what we saw in the first two watersheds as far as progression and we hope to have additional data from another two significant watersheds to show how effective this monitoring can be within the next couple of years. So the bottom line is that we've used both these types of monitorings to delist streams and develop nonpoint source success stories.

The second key to Oklahoma success is our strong effective partnerships. We're pairing really the same partnership model that successfully addressed the dustbowl with EPA. Conservation districts, USDA, the State Conservation Agency, and local landowners are partnering with EPA through the 319 program. So conservation districts provide the local tie into landowners. USDA, as we know, has significant resources to incentivize best management practice installation but they also provide a great deal of technical support and training for our state-funded conservation plan writers. And then the OCC is the state agency that kind of ties into state funding and also uses 319 funds for the monitoring, education, and BMP installation. We utilize cost share programs and so landowners are participating. They provide between 10 and maybe even 100% of the cost of practices both for installation and maintenance of the practices and then, of course, EPA funds 319 which we use again for water quality monitoring, education, and some BMP installation.

We have other important partners which include our state cabinet level secretaries, environment and agriculture who are very supportive of the program. For instance, our Secretary of the Environment Office is the entity which accepts the Clean Water Act grant and so they provide a tremendous support in our partnership with EPA. We have great universities who focus research on collecting data related to nonpoint source issues and also on optimizing best management practices for us to address the problems. We have great other agencies who help focus our program as well.

The final thing that I will say about the partnership between the ag sector and EPA is that it wouldn't be possible without the trusted relationship that landowners already have with conservation districts, USDA, and the state agency. That relationship is really jeopardized by threats of additional regulation whether they are perceived or real and by cuts in funding to our voluntary conservation programs.

The third key to our success is that we are promoting locally led, voluntary conservation programs to install these practices. And in our state it is very important that we are promoting this as a voluntary program. Through the local USDA and conservation district offices we have implemented a variety of state and federal funded conservation programs which put practices on the ground ranging from conversion to no- till, repair and protection, rate stabilization structures, alternative water supplies, and really in any given year we are looking at between $28 million to more than $100 million worth of conservation practices going on the ground across the states through these programs. One thing that we've learned is that we almost always run out of available funding before we run out of people who are willing to participate in the programs as well.

So one example of where this success and this type of partnership has achieved success is in the Bull Creek watershed in northeastern Oklahoma. Bull Creek is a 30,000-acre watershed that covers parts of three counties. The land use in the watershed is primarily pastureland although there is some wheat and cattle production -- or corn production as well. And it was listed on the 2002 303(d) list for turbidity, fecal bacteria, and dissolved oxygen.

Using a combination of USDA, state, and landowner funding approximately $300,000 worth of conservation practices were installed in the watershed. And these practices really focused on improved pasture management, reducing nutrients, and on improving or reducing crop land erosion.

Then we used our 319 funded water quality monitoring data to evaluate changes over time and what we saw is that both turbidity and E. coli bacteria decrease significantly to a level where they were in line with Oklahoma water quality standards. And for turbidity, that means that less than 10% of the samples exceeded 50 NTU and for E. coli bacteria that mean that it had a geometric mean of less than 126 colonies per 100 milliliters. And so we recommended Bull Creek be delisted from the 2010 303(d) list and it has remained in compliance through the 2012 listing cycle. This is one of the success stories that is highlighted on EPA's nonpoint source success

story website. I think one thing that's important to note about this story is that we did not have a TMDL or really even a nine-element plan for this watershed. But what we had were three separate conservation districts and three NRCS district conservationists who were working in their countries to address natural resource concerns. They did not even necessarily focus their efforts on the Bull Creek watershed but rather on the resource concerns that they recognize in the counties. The end result was still significant water quality improvement in Bull Creek.

However, the Bull Creek success story is really just one of 16 current Oklahoma examples listed on EPA's nonpoint source success story website. And we are happy to announce that we have also submitted an additional 11 new stories to EPA this month for consideration for listing on the website. And these are noted by the double asterisk on the map. These are really all watersheds that we used a very similar approach to address ag related water quality problems.

One example of these proposed success story is the Pennington Creek watershed in southern Oklahoma. This is about a 60,000-acre watershed. Again, in three counties. And the land use in this watershed is primarily range land and forest land. It was listed on the 303(d) list for Enterococcus bacteria which is one of our toughest standards to meet. Also, the Town of Tishomingo is the gray blob at the tip --, southern tip of the watershed and Pennington Creek is a drinking water source for Tishomingo. Again, using a combination of USDA state and landowner funding we installed about $75,000 worth of conservation practices in the watershed that really focused on improved pasture management and reducing nutrient loading to streams. Again, we did not have a TMDLs or watershed based plan this was just the traditional USDA conservation district mechanism to deliver best management practices to landowners.

But also in this watershed, we had a significant citizen involvement. In Oklahoma we have a program called the Blue Thumb Program which is our statewide nonpoint source focus volunteer monitoring program. Blue Thumb trains volunteers about water quality, nonpoint source pollution, what they can do to protect our water resources from it. The volunteers then monitor streams and collect data, conduct school education programs, creek cleanups, and really other citizen education events. The mayor of Tishomingo is a Blue Thumb volunteer who monitors Pennington Creek. But also the program included the Chickasaw Nation which is one of the largest tribes in Oklahoma and Pennington Creek is an important part of their tribal area. And it also included the Tishomingo National Wildlife Refuge which sits in Pennington Creek.

So again, as a result we used our 319 funded water quality monitoring data to evaluate changes over time in water quality and we saw that the Enterococcus concentrations have decreased by more than half to a level that was now in compliance with Oklahoma water quality standards. Between 2006 and really 2012 or 2010, excuse me. So we recommended that the stream be delisted on the 2102 303(d) list although it probably should've been recommended for delisting on the 2010 list. And the stream is now fully supporting its beneficial uses.

So these are two examples of Oklahoma success stories where we have applied this model. And of our 16 current stories and 11 proposed stories, some are full delistings resulting in category

one streams while others are partial delistings where additional work is necessary. Obviously, intensive watershed planning is necessary in many watersheds in Oklahoma and across the country to figure out how to focus available resources on the most critical sources of the problem. We've also found evidence in Oklahoma that in some places the solution is fairly simple. And that our traditional conservation district USDA program model is very effective at addressing the existing water quality problems.

Another thing that our statewide monitoring program allows us to do is it allows us to constantly be on the lookout for potential nonpoint source success stories. For 2013 we have identified another 22 watersheds where we have had 2010 or 2012 303(d) delistings and where we have also had significant USDA or 319 project implementations that could have led to those delistings. So we will be monitoring the data from those watersheds in the future to determine whether or not those would be potential nonpoint source success stories. We are very careful in the selection of success stories and we want to make sure that we have data from at least two 303(d) cycles to make sure that stream is likely to stay off the list. The last thing we want to do is talk about the success in a watershed that later goes back on the list. So we probably won't have 22 success stories in 2013 but we should be able to have an additional 10 stories.

The other thing that we have learned is that the success support for our program has increased substantially as we have determined that -- and we have determined that we need to do a better job of focusing on positives instead of just negatives. Too often we use water quality monitoring to point out problems but we also know that we have streams across the state where we see good things. Most of these streams in our state are in rural areas, draining ag lands which means that in many places ag is doing a pretty good job of protecting water quality. So, of course, our nonpoint source monitoring program points out places where we totally solve problems. However, it also tells us that we have streams all over the state that are reasonably healthy. In 2010, we found that 109 streams or about 44% of those sampled fully supported their fish and wildlife beneficial use. Another 60 streams had healthy fish communities but chemical data suggested that they could be susceptible to future problems. So in total, this meant that almost 68% of the streams we monitored had healthy fish communities which is half of supporting Clean Water Act fishable and swimmable goals.

So it is true that success stories really lead to program results and directly due to our ability to document success and primarily due to our ability to document success in voluntary programs we have seen significant changes in the perception of our program which has improved our existing partnerships and lead to new partnerships as well. We have a great working relationship with USDA and because of the success we have been able to improve that relationship. We have more opportunities to participate with them in their programs and they provide additional funding for portions of our programs such as having staff. They are even looking at ways to provide some funding to help us with wetland monitoring. Farm groups are more supportive of our program even going so far as to go to the legislature and support us seeking water quality monitoring funding. Our Association of Conservation Districts has become one of our biggest supporters and promotes us at the national as well as at the state level.

And finally, because of this success, we have been successful at achieving new funding. We--, The $500,000 is a tremendous example of this. We've been looking for this type of support for state funding for water quality monitoring for over 15 years. But because of the success stories that we were able to document, we finally got it. In what really is a level state funding budget year otherwise.

Finally, the success has allowed us to begin new programs. We have developed a carbon sequestration program where we have more than 55,000 acres enrolled across the state of Oklahoma. Private partner such as electric cooperatives or citizens with big carbon footprints pay producers incentives to adopt BMPs that protect water quality and sequester carbon as well.

So with that, that is kind of an example of some of the success we've been able to achieve in Oklahoma but that we feel that is really a success that is going on in states all across the nation and we are happy to be able to share that success and I'd be happy to answer any questions.

Anne Weinberg
Okay, thank you, Shanon, for your excellent case study from Oklahoma. It is great to see so much good work going on out there. We are now going to have time for some questions from the audience and again, Katie Flahive will pose a few questions to Shanon.

Katie Flahive
Okay, hi, Shanon. Again, we have got a number of questions that have come in so I will get started. Can you reiterate how you use in-stream monitoring to show nutrient reduction from agriculture?

Shanon Phillips
Well, all of our monitoring stations are upstream of point source discharges. And so what we are really monitoring is the impacts of land use upstream of that monitoring station. And then either through our impaired watershed program where we are comparing nutrient loading between a control and a treatment watershed or through our regular ambient monitoring program we are collecting almost monthly data that includes all of the main nutrient parameters we are evaluating changes in that--, those nutrient values over time. And we make comparisons essentially before and after significant implementation.

Katie Flahive
Okay, thanks. Second question. How is it that you all in Oklahoma go about engaging the farmers to participate in these 319 programs in these focused areas?

Shanon Phillips
That's where the conservation districts are a fantastic partner because they have been working with farmers since the dustbowl since their inception. And they have the tools of the trade as far as how to get farmers to come into the door and participate in programs. We are also delivering

the types of programs that are very similar to the ones that they are familiar with and have participated with through USDA. Although they --, we may offer some additional modifications to that program to really focus it on water quality parameters. So we are delivering the programs to them in a manner they are comfortable with and we are also working through people that they already know. So that really helps get them involved and willing to participate in our programs.

Katie Flahive
Okay, great. Thanks. How much would you say increasing instances of drought has contributed to the reduction in nonpoint source pollution in your rivers and streams there in Oklahoma?

Shanon Phillips
Well one thing about Oklahoma is that you can never count on what the weather is going to be like. So although we did have one of the most severe droughts last year, this year we are actually having above average rainfall. And so one of the things we are very careful to do in assessing whether or not we are actually seeing real water quality improvement or just climate related water quality improvement is by using long-term data that represents both drought conditions and heavier rainfall conditions. And then we also back that up with our impaired watershed program where that evaluation is designed to eliminate the impacts of climatic events.

Katie Flahive
Okay, great. I think we have time for one more question. So in a word, what is the most important aspect of your program model?

Shanon Phillips
Really the most important aspect of our program model is monitoring. Nonpoint source focused water quality monitoring.

Katie Flahive
Okay, great. Thank you so much. I'm going to turn it back over to Anne.

Anne Weinberg
Okay. Also, thank you, Shanon and Katie. Our next speaker is Nesha McRae. She is the TMDL and Watershed Field Coordinator at the Virginia Department of Conservation/Recreation. Take it away, Nesha.

Nesha McRae
Okay, thank you so much. So I have been asked to tell you all the story of how landowner stewardship in these two watersheds, Muddy Creek and Lower Dry River in the Shenandoah Valley here in Virginia led to significant water quality improvement in these streams. And I am going to try and focus on what makes this particular story most interesting which is really how a very closely connected community and an intensively agricultural area came together to support the restoration of these streams using much of their own limited resources.

So what happened in Muddy Creek and Lower Dry River? Well, we started out with two highly degraded streams in one of our most agriculturally productive regions in the state. And these watersheds are also home to a large Mennonite community. And the significance of this in the case of this project was really twofold. The Mennonite community historically does not accept money from the government. So they will accept tax credits but not incentive payments. So this meant that when it came to promoting the implementation of agricultural best management practices that we knew that we were going to be needed in order to address the issues that were seen in these streams, we knew we were not going to be able to rely too heavily on these financial incentive program or BMP cost share programs that convince a large portion of the farmers in these watersheds to implement these practices. However, on the flipside, this also meant that we were working with a community that had lived and farmed in this area for many years and therefore, has a very strong connection to this land and to these streams and this was really to our benefit in the end. So in a nutshell, we used the TMDL or total maximum daily load process to identify the water quality issues in these streams and to address them in a very targeted and effective way. And in the end, we demonstrated measurable water quality improvements in these streams. So we are not quite to the finish line just yet. We still have got a little more work to do in the case of some of these impairments.

So easy enough, right? Well we certainly had our share of challenges in this process. And definitely learned quite a bit as we went through this project. This effort took quite a bit of time and patience, particularly when it came to building trust within these communities. It took quite a bit of funding from diverse sources, considerable community engagement and also a lot of encouragement along the way. We learned pretty quickly that people need to feel like their actions are going to make a difference before they are willing to really step up and invest their own time and their own resources into a project like this.

So this is a map showing our two project watersheds. They are both located in Rockingham County in northwestern Virginia in the Shenandoah Valley. Muddy Creek and Lower Dry River both flow to the North River which then flows east into the Shenandoah River and eventually on to the Chesapeake Bay. Agriculture is by far the predominant land use, 56% of the watershed, and forest comes in next at 33%. So there has been very little development and urbanization in these areas.

And so I mentioned that these are intensively agricultural watersheds and that's really the case with much of Rockingham County where they are located. These are some statistics for the county that I pulled from the 2007 Ag Census. And you can see that poultry production really plays a huge role in the local economy. Rockingham County actually is ranked number one in the state and fifth in the nation in terms of the value of sales for poultry and eggs. And as a result of the extent of poultry production in the area, we really are importing a huge amount of nutrients and feed from the Midwest meaning that in many cases we are left with a considerable nutrient imbalance in the region in terms of all the poultry litter. We also have got a large proportion of Virginia’s dairies in Rockingham County. Many which are located within just these two watersheds, Lower Dry River and Muddy Creek. However, when you look at the average farm

size we are talking about farms just over 100 acres. So you can imagine that this leads to some challenges in terms of management of manure. In 2004, the Chesapeake Bay Foundation, a nonprofit in the Bay watershed, produced a report on manure in the Chesapeake Bay watershed and its impacts on our rivers and streams. And in that report they cited a study by USDA that identified Rockingham County animal operations as having more excess manure than any county in the nation. So I am sharing all of this just to give you an idea of where we were starting and certainly that we had our work cut out for us.

So Muddy Creek and Lower Dry River were both facing several water quality impairments when we started this project. Both streams were not meeting our water quality standard for bacteria. And in addition, they had exceeded our drinking water standard for nitrate which is set at 10 milligrams per liter. And these streams were subject to this standard because they are less than 5 miles upstream of the intakes of the town of Bridgewater and the City of Harrisonburg's water treatment plant. And in addition, Muddy Creek also has a biological impairment which has been attributed to excessive inputs of sediment and phosphorus in the stream.

So a series of water quality or TMDL studies were completed for these streams between 2000-2001. And the studies looked at the sources of pollution in these watersheds and the reductions that we needed to make in order to meet water quality standards. And the study showed that in most cases, livestock in the streams was a considerable source of pollution particularly when we talking about bacteria. The bacteria TMDLs for Muddy Creek estimated that 86% of the nonpoint source bacteria load was coming from livestock directly defecating in the streams. In addition, the TMDLs indicated that we were going to need to make some significant reductions in pollution from agricultural land both pasture and crop land. And that we also had some issues with failing septic systems and straight pipes which was more about concern from a human health perspective.

And so in 2001, several of these TMDL studies were pulled together and used to develop a TMDL implementation plan or a watershed plan that identified the actions that we would need to take on the ground in order to meet all of these different pollutant reduction goals. And this is something that we are required to do in Virginia due to the Water Quality Monitoring Information and Restoration Act or WQMIRA which was passed in Virginia in 1997. And so this TMDL implementation plan was one of the first three that were actually ever developed in Virginia in 2001. So this was definitely a learning process. And considerable efforts were made to encourage public participation in the development of this plan.

One of the directors from the local soil and water conservation district actually drove around the watershed in a school bus picking up farmers. I think he provided them with a spaghetti supper and got them to come to these planning meetings because he wanted to make abundantly sure that they had the opportunity to share what they thought should be included in the plan. So it's estimated that over 1,100 hours of time were invested by our project partners in the public engagement that took place over the nine months during which this plan was developed. And within the plan we quantified the best management practices that would be needed on the

ground to meet water quality goals along with what we thought that would cost. And we also identified a time line for implementation of 10 years with regular implementation and water quality milestones. And a copy of the plan is available on the website you see here.

And so you can see here, these are some of the highlights of the BMP implementation goals included in the plan. Livestock exclusion goals were pretty extensive. We were looking at nearly 100% of exclusion needed in Muddy Creek which added up to around 44 miles of fencing or 22 miles of stream that needed to be fenced. The similar case in Lower Dry River with the 84% exclusion goal. There were also a number of loafing lot management systems for dairies that were called for along with additional storage facilities for poultry litter and manure and these are practices that can get costly pretty quickly.

So between 2001-2011 a partnership formed that included the Shenandoah Valley Soil and Water Conservation District and the Natural Resource Conservation Service along with state agencies in order to implement this plan. And VCR Department of Conservation and Recreation used Section 319 funds provided by EPA to fund two full-time staff who worked out of the Soil and Water Conservation District office to promote both agricultural and residential septic best management practices. And at the end of 2008 when we tallied things up we spent nearly $600,000 in BMP cost share which was provided by EPA for practices and in addition, we leveraged just under $350,000 in state cost share funds. And one thing that I want to point out here that I think it's pretty notable is this total BMP cost figure of nearly $3 million. And when you do the math what this means is that a huge investment was made by local landowners and these watersheds to get these practices on the ground. And a lot of that is due to the Mennonite community there who did a lot on their own.

So what did we learn in this process from Muddy Creek and Lower Dry River? I think first we learned that it took quite a bit of time and it took the right personality to build the sort of trust that we needed in the agricultural community. We were extraordinarily lucky to have a local farmer from Rockingham County who is very passionate about conservation, Mike Phillips, in the agricultural coordinator position for this project. He is the fellow in the hat in this photo. I don’t know how well you can see it but his hat says soil is meant to be covered. But Mike really made it his mission to earn these farmers trust. I know he lost sleep over one farmer who looked him in the eye and told him he didn't trust him and Mike spent several years winning that man over. He really started gaining traction with the ag community after he met with one very well-respected producer and was able to really explain where he was coming from and dispel some myths. And so in the end, this producer ended up taking Mike around and introducing him to people starting with his own family and his church community and he really helped get him out on some of these farms. In addition, Mike sat down with the bishops who represented the different Mennonite church communities in the watershed and they were really instrumental and worked with Mike to encourage things like livestock exclusion within their congregations.
We also learned that flexibility is really key with these agricultural BMP cost share programs particularly when it comes to fencing. We had these enormous livestock exclusion goals for this project, but we had all of these small farms where farmers were either unable or unwilling to give

up the 35 foot setback for fencing that was required in order to receive cost share. So we learned pretty quickly that if we wanted to meet these goals we were going to have to get creative. We also learned that feedback is critical. Farmers were constantly asking to see water quality monitoring data and I think what it came down to or what this indicated is that the farmers wanted to know that what they were doing was making a difference if they were going to keep dedicating time and resource to this effort.

And lastly, I think we've learned that it's critical to acknowledge what people were doing on their own or what we call voluntary BMPs in these watersheds. When this project first got going in 2001, we started seeing improvements in water quality but we could not put our finger on exactly why. And so as Mike began to form these relationships and get out on some of these farms he learned that a number of farmers in the watersheds were doing things on their own as they had learned that there were these problems in the streams.

So one of the things that the Soil and Water Conservation District did to try and get a handle on the extent of some of these practices was to send out a survey to farmers in the watershed. And you can see they had a 20% response rate which I would say is pretty good these days. And based on the survey results we learned that considerable amounts of stream fencing was established outside of our programs, over 8 miles, along with stream crossings and a number of manure storage facilities.

So what else was accomplished? This table shows what was accomplished during the project period through state and federal cost share programs which are usually covering around 75% of the practiced costs. I don't want to understate how much was accomplished through these programs as well. I think it is striking what people did on their own, but I think it's also striking what was accomplished through these programs.

So I have mentioned the need for increased flexibility. That was really emphasized by the ag community throughout this project particularly when it came to livestock exclusion. And so one thing I wanted to touch on that happened at least partially in response to the feedback that we heard from farmers in these watersheds was the development of an adaptive fencing program by the Shenandoah Resource Conservation and Development Council which is a nonprofit counsel that was formed in partnership with USDA. And so the RC&D received a $250,000 grant for this adaptive fencing program from an organization called the Chesapeake Bay Funders Network which is a consortium of private grant makers. So the fact that these funds were from private sources meant that the RC&D was able to provide some financial assistance to the Mennonite community because they were not government funds to install exclusion fencing and also to provide off stream water for livestock. So the RC&D got three years of funding and they provided cost share for fencing that could go on the top of the stream bank if that's where the farmer wanted to put it. However, I think one thing that is worth noting is that at the end of the first three years of this program the average setback was actually 24 feet so I think people were really after the flexibility but if they could go further back they certainly would. And the program actually began in the Muddy Creek watershed and then was extended to other portions of

Rockingham County along with neighboring Augusta County. And I think one key thing I wanted to point out here was that after this program was launched, both state and federal ag BMP cost share programs in Virginia came out with reduced setback fencing practices that allowed farmers to place a fence just 10 feet back from the streams which was really huge in Virginia when it comes to just getting cows out of the streams and addressing that bacteria load. And the RC&D program was so successful it was extended for actually three more years.

And so in addition to providing farmers with more flexibility in terms of where they put their fence, we have also been working with them to increase their precision in managing nutrients in their cropping systems which is something that I think makes sense both from an environmental perspective and also from an economic perspective. One of the tools that we have been using to accomplish this is a pre-sidedress soil nitrogen test for corn and this test is conducted after the spring wet period but prior to the period of greatest nitrogen demand by a corn crop and it allows the farmer to really make a well-informed decision regarding application of additional nitrogen rather than just erring on the side of caution and maybe applying more than they really need to. And while we don't have exact figures on the amount of nitrogen that ends up not being applied as the result of this testing, we do estimate that testing that was conducted on over 25,000 acres in the northern Shenandoah Valley resulted in some way or in the neighborhood of a savings of about 245,000 pounds of nitrogen which is pretty considerable.

We also implemented a pilot program in the valley doing cornstalk nitrogen tests. And so not only are we working with farmers to help them determine whether or not their soil has sufficient nitrogen available for their corn crop while it is growing, we are also helping them to see how much of that available nitrogen was taken up by that crop which in the end will help them make better informed decisions with respect to long-term nutrient management. In addition, Virginia Tech University received a grant from the National Fish and Wildlife Foundation back in 2006 to explore some really innovative approaches to effective utilization of poultry litter and dairy manure that was focused in these two watersheds along with neighboring Cook Creek. So I just wanted to illustrate that these watersheds really have been a hub for innovative research in terms of agricultural conservation.

So what was the impact of all of this work? This graph shows fecal coliform monitoring data collected by the Virginia Department of Environmental Quality along with the goal that was established for the bacteria TMDL for Lower Dry River. And in Virginia our bacteria standard is now based on E. coli. And this graph shows you fecal coliform, but I wanted to show this in terms of what the standard was when the TMDLs was developed which was fecal coliform. This is also what we had the most data for. So you can see some real progress in Lower Dry River since the TMDLs was developed in 2000.

And this is a similar graph for Muddy Creek. Our results are not quite as great, but definitely showing some progress over time when we are talking about bacteria.

And this is a graph actually of the same data for the North River itself. And you can see here that we have experienced considerable improvement in the North River so we like to think that some of the benefits of this work are really transferring downstream and hopefully making their way down to the Chesapeake Bay.

And then this last graph shows you nitrogen in Muddy Creek which was delisted in 2010. And so this was one of our success stories for these watersheds. We did one for the nitrogen delisting in Muddy Creek and then one for bacteria showing progress in Muddy Creek and Lower Dry River. And so with that, I can take a few questions if there is time.

Anne Weinberg
Okay, thank you, Nesha, for your information on the great work being done in Virginia. We now have time for Katie Flahive to pose some questions from the audience.

Katie Flahive
Okay. Hi, Nesha. In terms of flexibility, how did you navigate the 35-foot required set back as well as the local landowner needs in implementing those parts?

Nesha McRae
Well, I think that a lot of the voluntary fencing that was installed by landowners was more of the top of bank fencing. And so for several years of implementation we were sticking with our 35-foot setback requirement. Now with these more flexible programs in Virginia with the 10-foot setback we are finding a lot of farmers are pairing practices where they will do a 35-foot setback or a 100 foot setback where they can. And then in those tighter areas where they are really constricted they will work with the Soil and Water Conservation District to do that reduced setback fencing. So there is just more flexibility to meet individual needs there but it was not always that way.

Katie Flahive
Okay, thanks. What method did you use to quantify which BMPs to use in the plan?

Nesha McRae
Well, for the TMDL implementation plans in Virginia we used modeling to look at the reductions that are needed and we have different efficiencies that we credit BMPs with. So we will run watershed models to see what extensive BMPs are needed and then work very closely with the community to select what BMPs we were going to incorporate in the plan and looking at different ratios of let's say how much interest is in buffers versus conservation tillage or continuous no-till. So it really is kind of a balancing act in that process.

Katie Flahive
Okay, I think we have time for one more question. What happened in these watersheds after the project wrapped up in 2008? Did implementation efforts continue?

Nesha McRae
They did. And that was something that we really struggled with, with this project because it was one of our first. And it was almost like we were ending things once the funding stopped and shifted to another watershed. So we struggled with kind of that exit strategy and I think in the end what we found is that the Soil and Water Conservation District stayed very active in the region and continued that dialogue and continued to work with those producers. So things certainly did not stop nor did monitoring. But we did end up shifting resources to other project areas.

Anne Weinberg
Okay. Well, thank you, Nesha. Our next speaker is going to be Greg Sevener. Greg is a Watershed Specialist at the Watershed Bureau of Wisconsin's Department of Natural Resources. So take it away, Greg.

Okay, we are working to get out the slides for Bass Lake. And is Greg on? Greg? Okay. We have our slides up and Greg, take it away, you are unmuted so please speak.

Greg, are you on the phone? Okay. We are having a little technical difficulty. I apologize for that. Greg, please dial in again if you are having some difficulty with your phone.

This meanwhile is a beautiful picture of Bass Lake. I hail from Wisconsin. Worked at Wisconsin DNR a number of years ago and I am really excited to hear about this case study because it illustrates how we need to do the land treatment, it is a relatively small watershed. It also illustrates that in some cases we need to sometimes do in lake controls to address the recycling of internal cycling of phosphorus. And so in this particular lake, alum was applied. This is a picture of Bass Lake after the alum was applied showing the beautiful blue lake. Greg has worked with this--, on this lake for a number of years, since 1985, and so he has a long history of working with the local Marinette County folks. This is a picture that he gives credit to them for this lake. And I am trying to do my best here but Greg is our expert on this matter.

Meanwhile we are going to pause here and let Katie pose a couple of more questions to our speakers while we are waiting to get Greg online.

Katie Flahive
Okay. Thanks, Anne. Shanon, we have some more questions here that we can ask to you if you are available to unmute your phone.

What is it about the monitoring program there in Oklahoma that facilitates your program's success?

Shanon Phillips
Well, I think the important part about the monitoring program that facilitates success is that this was designed to focus on nonpoint source impacts. So we are -- this is the same data that is utilized to make listings determinations for the integrated report and it is the same data that is

then used to evaluate whether or not we have seen progress related to those listing recommendations. But again, it's really--, the fact that it is focused upstream of wastewater discharges, upstream of other major tributaries, closest to the sources of nonpoint source pollution allows us to see results in a meaningful time frame.

Katie Flahive
Okay, thanks, Shanon. We have got another question for you here. Do you have data on where the impaired water bodies are targeted through the 319 program are also working to improve drinking water sources?

Shanon Phillips
That's a very interesting question and that's something that we are working on with our source water protection folks. We realize that both the nonpoint source program and the source water folks are really after the same goal of protecting water resources. And they implement a lot of the same or very similar planning to what nonpoint source programs do where they're evaluating what the sources of likely impairment are in their source water area and then trying to come up with recommendations for how to remediate that. And so we are currently looking for some of those and we have determined that we are going to find three of those before the end of the year. The Pennington Creek example that I spoke about is one of those types of stories though where this is a-- Pennington Creek provides drinking water for the City of Tishomingo. That local community came together to address the water quality impairment and the mayor was very involved in the Blue Thumb program in helping educate people about the water quality issues in the area and so over the time period of the program they were successful in delisting that stream for Enterococcus so it's now fully supporting all of its beneficial uses which include public and private water supply. But we are looking for other places across the -- we don't have any examples right now, there are some where we have seen progress towards full restoration of watersheds and one of those is another success story that is on the EPA website which is the Beaty Creek watershed that provides water for the city of Tulsa and we have been working in subwatersheds to reduce nutrient loadings and to delist for E. coli bacteria.

Anne Weinberg
Okay, Shanon, thank you so much. And I think we have Greg online now. Greg, are you with us?

Greg Sevener
Can you hear me now?

Anne Weinberg
Yes, please proceed. Oh great. Sorry for this little technical glitch but we are good to go.

Greg Sevener
I appreciate you filling in for me I had an issue with the phone.

Anyway, this is a picture of beautiful Bass Lake like Anne said. And I want to give a little background of Bass Lake. First of all, it is located approximately 60 miles north and west of the city of Green Bay which I think you all are familiar with in relations to our infamous Packers. It is a drainage lake which has a small inlet and outlet which is intermittent and it drains through a wetland towards a trout stream eventually. The lake is only 36 acres or 37 acres in surface area and as you see quite deep. I understand in the past they actually mined marrow out of the lake for the ag land use quite a few years ago. And it averages 40 feet deep so it--, for that size lake it is a very deep lake. It has a public access and the reason we decided in 1984 after a lot of discussion, it was decided to fund one of our first small watershed projects in Wisconsin is the fact that it had a great fishery because as you see, it is surrounded by cedar, wetland areas, and not developed except for the ag land to the north and west. Actually, east also out of the picture.

So what caused the tarnishing of this little gem which I call it a gem in the photo actually appeared to be bluer than it actually is because that was the photo taken just after the alum treatment was done in the fall of 1999. There are two dairy farms which expanded in the watershed during this mid-70s along with a number of cropping changes which included growing more corn on the sloping cropland which resulted in an excess of nutrients to run off into Bass Lake through a small inlet to Bass Lake which also ran through a wetland. It was being washed through a channelized tributary in through this wetland and saturating the wetland and going directly into Bass Lake. Because this wetland had become saturated, wetlands usually are natural sponges to filter contaminants in our waters and we struggle to maintain our wetlands through the years in the United States and this is one reason it's important to have a wetland. However, this became saturated with phosphorus and nitrogen becoming a source in itself of nutrients surging. The reason they know this is because when it was dry and they were measuring and monitoring the inlet they had extreme phosphorus loadings coming in the inlet even though we weren’t experiencing runoff. So we had excessive phosphorus both from the watershed external loadings and also in this lake because it is so deep, it really stratifies which means it sets up three different layers in the lake and the top one called epilimnion, the bottom hypolimnion, and hypolimnion actually became – it becomes very anaerobic and it was just a pool for phosphorus that would recycle into the lake water column when it turned over each spring and fall if it did turn over. So that is internal loading also. We had that aspect or dimension to deal with. In this photo you see the red line shows the watershed. And it is a small watershed. It is 451 acres in size. And 83% you can see cropland. And this farm and this farm were the two farms that were causing the extreme barnyard runoff which you can see the little tributaries in blue here, here, this little pond next to the farm accumulated a lot of run off from his barnyard which drained directly into this inlet through the wetland.

This other photo shows Bass Lake during an algae bloom after this eutrophication or super enrichment from nutrients really started deteriorating the lake. And we have blue-green algae blooms and severe oxygen depressions. Sometimes we would go there and monitor and the oxygen would be depressed but because of the algae it would be super saturated with oxygen and then the algae dies and I was actually there, arrived one day and was witnessing a fish kill taking place. The other thing which caught on, two major papers in our state which is unusual for

a small little lake up north, Milwaukee paper and a Madison paper both wrote articles that little Bass Lake in Marinette County was dead.

As you see, the phosphorus levels in the red diamonds show the phosphorus levels in the bottom layer of the lake and those were reaching super high levels. They should be down in a normal situation, down in this range where the arrow shows. The blue dots show the surface phosphorus and that was way elevated beyond belief and thus causing the issues that we are seeing in the lake.

So what did we do? We organized a group which included the Soil Conservation Service which is now the NRCS, the local county land and water conservation department, the DNR, the town people, and developed a watershed plan. We had a public meeting which also included farmers in the area and all of the actors and discussed what do we do with Bass Lake? It's a beautiful lake with trout and warm water sport fish and it seems to be dying and dead. So we developed this plan and got some funding in ’84-85. That was before the 319 program -- Section 319 was started. So we obtained money through the state to contract the Land and Water Conservation Department, take the lead in working with the farmers to figure out what to do. And there was a lot of head scratching on what to do because there were a lot of different things going on that we had to think about.

One of the first things we did the Land and Water Conservation Office set up a monitoring station on the little inlet. And this is how small the inlet was which goes to the wetland from the farms -- farmland runoff. And has a level recorder that is shown in this left-hand picture. In the right-hand picture you see the V-notch so we could determine loadings of phosphorus and track the success of the practices being implemented in the watershed.

This is Chuck Druckrey from the Land and Water Conservation Department who actually did a lot of the limnological work and monitoring in the program and he is monitoring the inlet here in this photo. And continually trying to get a handle in tracking the external loadings coming into the --, Bass Lake from the inlet. The two farms were --, they instituted some classic BMPs on the cropland to reduce erosion. And also the barnyard to reduce clean water diversions, grass waterways.

And this is one of the farm barnyards prior to the redesign. A typical barnyard with cows standing around and the runoff went off into this field to the west and toward Bass Lake.

They tried to close in and develop some practices that with grass waterways, feed lot upgrades, and manure storage and cropland management at both operations. This small --, this one here which were about 300 dairy cattle each.

Here are some photos of grass waterways that was installed after --, and BMPs were installed which it turned out were not enough.

We went back and we continued to monitor the Bass Lake inlet and we were still up in the hundreds and a lot of pounds of phosphorus coming in to the inlet to Bass Lake.

So in 1991 we had to go back to the drawing board and really talk to the Land and Water Conservation Department, we are talking again, to the farmers and really trying to determine okay, what do we need beyond this point. The County Land and Water Office created great working relationships with the cooperative farmers and the farmers were being very cooperative. And finally, the farmers made decisions to make major life changes I call it in their farming operations.

This is the farm, if you remember, to the left in the aerial photo that you viewed earlier. This is the farm that actually is remaining. The other farm ended up kind of preliminary to the slides, but ended up -- the farmer decided to retire and I will tell you about that in the future here. But this farmer decided to completely enclose and get rid of the barnyard and close his animals in a free stall design barnyard and created more storage for the manure, redesigned everything. Here is an aerial photo -- a real nice aerial photo showing the barn, here is his feed bags over here and now those are all -- there is concrete under all of those. And this spring pond which before actually was a super source of phosphorus from runoff from the barnyard, the clean water diversion was created but was not needed after he completely concreted and enclosed his animals. This was an abandoned feedlot right here, as you can see, it would have easily drained down into here and into Bass Lake to the inlet. The Fish and Wildlife Service, at this farm, did some wetland scrapes and this one here is the sediment control basin with a dyke and that helped. That helped to catch run off at the present time from going into the inlet. In fact, after everything was completed, the farmer had a manure spill and came down, collected in this wetland scrapes, they called the county right away, the county came out and they cleaned up the entrapped manure without going into the -- avoiding running off into the inlet.

Now this photo shows this farm that I was just discussing which completely enclosed his animals and did other practices -- increased his manure storage and is continuing to work with the county very closely because he is expanding and his goal is to become a capital level operator.

This farm right here, in the discussions with the county said that he would like to just retire from farming. He was at that age. Our fisheries people were able to obtain some stewardship money which enabled --basically enabled us to create an easement, a conservation easement. Actually we call it one farmship easement and also a stabilization conservation easement which included the area outlined in black. You see all of this cropland area, the farm -- no more farming activities can take place on this site. Even if they sell it, it has to remain vacant from any farming activity. This easement includes this wetland area, south on the lake and this area and some of the lake bottom even and probably about close to 70 or more acres of land which forever cannot be farmed or developed on the lake.

So after all of this was done and a free stall constructed, the manure storage improved, the fire abandonments, the cropland practices instated on the watershed and some clean water

practices. This is Paul Close here who was seen in the previous photo sampling the inlet and you can't see it here but the inlet is not as brown colored. In other words there is far less phosphorus coming into the inlet now. And we need to monitor that to make sure. And we did a lot of monitoring on this. The phosphorus went from 600 milligrams per liter down to less than 100 not milligrams but micrograms per liter.

So this photo shows finally, we decided we have the external loadings controlled and it was down to a specific level that we like to see in order to be worthwhile doing an alum treatment. So the county got a grant to our lakes program and they took the lead on organizing an alum treatment. Our department included our technical knowledge. Initially we were going to treat with alum in a classical dosing amount which would help to precipitate the phosphorus in the water column and drop it to the bottom and activate it to the bottom. However, these things, especially with this lake with the huge internal loading problem of phosphorus recycling from the bottom up into the water column upon turnover, we decided to increase that alum dosage five times. And we looked at different factors, the acidity that it would cause and it would not cause a problem with low -- increased pH or low pH. And we looked at the aluminum -- how much aluminum could be withstood in the sediments without causing the problem because aluminum can be toxic. You will see this arrow at this point and this slide similar --, is the same one as you saw earlier. But at this arrow you see when the alum treatment when it was done in November of 1999, 61,000 solvent gallons of alum was dispersed by this boat. They trucked it in by tanker and filled this boat. The boat had GPS and they really accurately spread evenly the alum with booms in a two day period and they applied it in the areas of the lake greater than 3 feet. Which was most of the lake because the shallow waters zone actually drops off very rapidly in this lake.

In 2006, the DNR contracted the Land and Water Conservation District office through a special project funding to monitor the lake and to verify the project’s success. This is very important. I really encourage this to be done because they were discussing whether we should take it off the 303(d) list and whether it was really a success. And so they rebuilt the monitoring. Actually the V-notch weir was still there and did some monitoring on the inlet and monitoring within Bass Lake and wrote a report and we determined that in 2010 we took it off -- we were able to take it off the 303(d) list for the low DO impairment of DO, algae blooms, phosphorus and the fishery started coming back. And things were really looking good.

As you see again, this is just another slide of the water column phosphorus. It was totally out of control just before the alum treatments. Just recycling during turnover, the internal loading was tremendous even though the external loading been controlled. So it's a little more complex situation with lake --, dealing with lakes because of that extra factor of internal loading. As you see after the alum treatment and in November of 1999, it just plummeted. Both the phosphorus in the bottom area of the lake and the phosphorus in the surface area of the lake.

The post-alum treatment concentrations, as you see in the slide here, it took a while to stabilize with the turnovers and that, it took a while to stabilize the phosphorus. But as you see in January 2008, it was down in the bottom to -- it was down to 60 micrograms per liter. And the

surface was down to around 10 or just above micrograms per liter. We did not have algae blooms. The fish were coming back. The clarity was --, we got secchi disks --, up to 23 feet which is almost oligotrophic type clarity. So --, and things were really looking wonderful on the lake.

As far as the solution and agencies and farmers working together for a solution, you will see on the left what was done. And this is just a small summary of what went on in the background of this project because there were so many twists and turns in order to get to the final success of the project. And the success involved adaptive management, as you may have gathered, applying practices, determining they didn't work, you needed more, working with the farmers to finally make some big decisions. It involved a lot of money and I think it was mentioned back in Lynda's program and that that prevention is the best solution. Because after something happens like this it takes a lot of money to restore a resource. Success involved patience, as you know. The project started if you remember in 1985, the alum treatment took place in 1999, and we monitored after that to determine whether it is still a success. So it takes a lot of patience, it took a lot of patience on the farmers part and the county and the state all working together.

The cost of success is tremendous. This small little lake, 36, 37 acres. You will see the final total of $693,948. $700,000 backed from 1986 to 2000 was spent. That does not count after the fact, monitoring and some other things that went on, on the lake. You will see it itemized, the nonpoint source activities. This LAG stands for Local Assisting Grants that were obtained by the County Land and Water Conservation Department to administer and do what they did in the office to calculate and do the background work that needed to be done. County money, they threw in a lot of money and not nearly as much as the total but they threw in $23,000. The DNR's Lakes Program contributed $35,000-36,000. And that was basically for the alum treatment and some monitoring that went along with that. The Department of Ag, they were involved. Initially the SCF office was involved initially but the County Land and Water Conservation Department were the main lead actors in the field working with the farmers. And also, as you know--, remember me mentioning the limnological work also and the Department was involved and we were giving technical expertise. But they took the lead.

The landowner. We can't forget the great landowners. They contributed in their cost share $160,000-170,000. And the stewardship fund which really, really was important for the future of this lake deteriorating again, came along from our lakes people and nonpoint source funds.

So today we are looking at a beautiful lake. And first-hand experience, I went back after I told Anne I was going to tell the story of the success at Bass Lake. And as you see, it's a beautiful lake. Loons are on it. So much woody debris and cedar trees that have fallen in the lake over the years no development. Springs feeding it. And you go around the lake and see tremendous amounts of fish swimming around, bass, panfish. I also did some monitoring two weeks ago and it turned out that the phosphorus on the surface and the phosphorus in the bottom area was maybe on the increase a little bit because it is so anoxic in the bottom area of the lake, it stratifies very strongly. You smell rotten egg odor, H_2S odor when you bring the water up from the bottom of the lake. And it did that before it deteriorated also. So it's a really strongly stratified lake.

However, the phosphorus is maintaining down below even after over 10 years which is kind of a classic period which if you don't control external loading, alum treatments tend to start to deteriorate after 10 years. The inlet, we monitored, did a grab sample at the inlet for phosphorus and that too was holding its own. And it was dry. So you know it was a little increased which means they should probably take a look and see if anything is going on in the watershed that is not included in the easement that should be contained. But it continues to be a success and I think it will because we controlled external loadings and also went the extra --, loading --, did the extra loading with alum in order to tie up that phosphorus in the bottom of the lake.

So that is basically the story that is told. And if anybody is up in this area in Marinette County, it would be a treat to visit Bass Lake.

Anne Weinberg
Okay, thank you, Greg for your presentation on Bass Lake. At this time I would like to make a few announcements. We have run out of time for questions today. But we did have quite a number of questions that we were able to ask. If your question did not get asked today or you would like to contact our speakers you can find their contact information here.

Also, I want to announce our next webcast topic. The webcast will be on USDA's National Water Quality Initiative. I hope you'll join us for this webcast. Registration will be posted soon at www.epa.gov/watershedwebcasts.

And also, please do not forget to download the training certificate for today's webcast if you would like to get one. This certificate can be downloaded from our EPA server through a link that is on this slide. You can personalize the certificate with the names of everyone watching the webcast from your location.

And also, at the very end of this webinar you will be sent an evaluation survey. Please do consider completing the survey and letting us know your thoughts. We do appreciate your feedback as we work to improve our webcast.

Again, we do not have time for more questions today but if you have questions, please contact the speakers directly.

At this time I would like to conclude today's webcast. Thank you, Lynda, Shanon, Nesha, Greg for presenting today. And thanks to, Katie, for moderating and all the other folks that helped make this webcast happen. And of course, thanks to everyone who joined us. That ends our webcast for today. Thanks, again.