2013 State Nutrient Reduction Strategies Web Series

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Wisconsin Nitrate Demonstration Project
Transcript

Speakers:

- **Jill Jonas**, Wisconsin Department of Natural Resources
- **Brian Austin**, Wisconsin Department of Natural Resources

Slide: Introduction

Cynthia Curtis
Hello there. This is Cyd Curtis, and welcome to the 16th webcast. Today we have Brian Austin and Jill Jonas from Wisconsin DNR to talk about the Wisconsin Nitrate Demonstration. As you might notice, usually we have some intro music. And apparently, somebody objected to the choice of a Big Ten song and stopped it on me. A lot of that, just so you know, is I work with whoever the speakers are. So clearly, one alma mater was in conflict with another. So I apologize for that. So real quick, thank you for filling out the polls so we get a sense of who's on the call, or on the webcast today, rather. And as we get going, I'm going to hand it over. If you are interested to see this, you'll note a button at the top of your screen that will expand the PowerPoint to full screen. And right now, I'm going to hand it over to Brian and Jill.

Slide: Wisconsin's Nitrate Demonstration Project

Jill Jonas
Good morning, everyone, and thank you, Cyd. This is Jill Jonas at the Department of Natural Resources, and we certainly appreciate the opportunity to provide an update on our Nitrate Demonstration Project. Many of you, I think, perhaps have heard me or others talk about the project, so I'm just going to move quickly through the initial slides and then focus on what's new and what we're doing now.

Slide: Wisconsin Uses Ground Water

And speaking of Bucky Badger and Big Ten, as he's indicating, Wisconsin is number one as far as the number of public water systems that we have in the state. We have more than 11,400 systems. Obviously, many of them are very small public water supply systems. But it proposes some unique challenges to us as we look at groundwater quality across the state. The blue spots on this map are several of our large population centers, and they have municipal systems, and they use surface water. But the vast majority of the public water systems and private well -- residential wells that exist in the state depend on groundwater as do -- which, just so you know, from a private water supply standpoint, is around 800,000 to a million residences.

Slide: Nitrate in Wisconsin Groundwater

We use the nitrate monitoring data from our public water supply systems, and specifically what we call the non-municipal public water supply systems, to find areas of need. And we believed that this was a good reflection to use, these smaller public water supply systems, in looking at nitrate because they have similar depths and construction as many of our private residential homes have. And also, they tap into the various aquifers across the state. We felt that by looking at these non-community systems with monitoring at least once a year, it would provide us a good reflection of what the nitrate condition was -- the nitrate condition that exists in the state. We also use this in work with our Clean Water Act colleagues here and programs in our Wisconsin Nutrient Reduction Strategy. When you look at this map, the darker blue indicates where we have, within a watershed, four or more public water systems with nitrate that is at five milligrams per liter during the last five years. So it's either at five or higher. The yellow dots that you see on the map are our larger systems, our municipal systems, that have five or greater. The reason we chose five as the number to look at as far as assessing nitrate across the state and trying to determine where we may have particular issues is because we know at five milligrams per liter it's no longer a naturally occurring phenomenon -- it can't be -- so that we know we have anthropogenic sources that are contributing. Nitrate is Wisconsin's most pervasive contaminant. Thirteen percent of our public water systems have exceeded five milligrams per liter in some local sampling programs. More than a third of all the wells have exceeded ten. The Department of Health Services here in Wisconsin considers nitrate a chronic as well as an acute contaminant. And again, this data provided us a first cut in deciding where we would locate a nitrate project in the state of Wisconsin. So you see, again, the darker shaded areas are where we have some of our more significant groundwater contamination from nitrates.

Slide: Wisconsin Nitrate Project

Wisconsin's nitrate project is a voluntary demonstration project, and it is on a sub-watershed and wellhead protection scale. This gives you a reflection of some of the sub-watersheds within a county. From the sub-watersheds that we identified with the largest number of public water systems, over five milligrams per liter of nitrate, we identified also overlap with where there were schools and day cares. So we wanted to make sure that we had a special emphasis on those facilities where there were also impaired waters, with our Clean Water Act colleagues, and also dischargers, wastewater dischargers, that were subject to Wisconsin's new phosphorus numerical standard. We took this broad list to a technical advisory group, and they helped identify counties that would be likely interested in collaborating with us on the availability of advanced groundwater models, was another thing we considered, and then suitable hydrogeologic conditions. And when I say suitable hydrogeologic conditions, we were talking about where we knew the water was moving fairly quickly through the aquifer, it was shallow groundwater, and they we had relatively uniform soils. From among the many choices that we had across the state, we have selected water systems in sub-watersheds within Rock County, which is shown here in this slide, and Sauk County. So these are -- if you look in the bottom right-hand side of this map of Wisconsin, you can see where those counties are located.

I am now going to -- with that introduction, I'm going to turn this over to Brian Austin, who is going to provide more of the update of where we're at right now. So, Brian?

Slide: Cost of Compliance Data Chart

Brian Austin

Thank you, Jill. So one of the basic questions that prompted the development of this project in the first place was the idea of would it be more economical to go into a wellhead protection area and try to address some of the sources of nitrate, nitrate being the most prevalent contaminant that causes MCL violations in Wisconsin? We had some data on the expenditures by municipal systems statewide. What you're seeing on the screen now is a survey that was last updated in 2012. The municipal systems in Wisconsin in total have spent about $35 million. There's about 48 systems that have needed to address nitrate MCL violations, and they do so by a variety of means: installing treatment, installing new wells, or by blending regimes. In 2004, the number was about 24 million, so the costs are continuing to rise. One other piece of information to note is that it appears to affect smaller systems disproportionately in terms of the per capita cost. So on this chart, Janesville has spent the most money in total. But because of their large customer base, the per capita cost is much lower than it would be for a smaller system that is forced to comply with our regulations to meet the MCL of ten -- in this case, over $2,400 per customer.

Slide: Cost of Compliance

Here's an example of the costs incurred by smaller systems. This is a transient non-community system example. This data is more piecemeal. We don't have statistics on all the systems in the state yet. They had a couple of options to comply based on their own MCL violation. They could install an ion exchange unit or replace their well. The ion exchange unit would take about ten years to equal the cost of a replacement well.

Slide: Sources of Nitrate

Previous studies done in Wisconsin assessed the sources of nitrate, and, generally speaking, agriculture accounts for about 90 percent of the nitrate that makes its way to groundwater.

Slide: Correlation with N Fertilizer Use

Here's another interesting chart that correlates nitrate sales -- or nitrogen fertilizer sales in Wisconsin with a groundwater study that was done by USGS as part of their NAWQA study. What's interesting about this chart is the use of groundwater age dating. So what you're seeing here are nitrate levels and, on the bottom, the -- the bottom scale is actually the recharge date as opposed to the sampling date, which is more significant and gives us a way to look at nitrogen inputs and the timing of recharge to groundwater.

Slide: Most N Fertilizer Goes to Corn

So one of the issues, we have current recommendations for nitrogen fertilization rates for various crops and soil crop systems throughout the state. We don't have quite enough data to say how well this will work in terms of protecting environmental quality. This is -- these recommendations are primarily based on economic optimization. The effect on water quality will be dependent on the geologic -- the soil and geologic conditions from where these cropping systems take place. The recommendations will probably be a little bit more protective of groundwater in loamy -- or soils that contain more organic matter. For sandier soils, the rates that are recommended are high enough that we think that there will likely be in exceedance of the MCL at the field edge.

Most of the nitrogen fertilizer used in the state goes for the production of corn, about 66 percent, and corn is not particularly efficient at nitrogen utilization. And we get -- there are various statistics on this, but in some cases, it may only use 50 percent of the applied nitrogen in a sandy soil environment. So in this example, for a nitrogen application rate of 195 pounds per acre, at a 50 percent utilization rate, you may see groundwater quality of about 40 milligrams per liter of nitrate underneath that field. On a brighter note, one of the things that we -- one of the statistics that we do see reported, there have been some studies showing that, in general, if producers were to follow the rates that are recommended by the university, that these would result in environmental -- a time weighted groundwater quality of about ten milligrams per liter. So to start, we would want to see that producers are following these recommendations.

Slide: Reliability of Reduction Practices

This is a chart that I borrowed from the Iowa Nutrient Reduction Strategy. This is a compilation, a science assessment where they assessed the efficacy of various management practices and tried to compile the statistics on how effective they are. One of the things they found is that the two primary factors are the rate of application and then, as far as management practices beyond that, cover crops appear to show some of the most promise. One of the drawbacks to the available data is that there is a lot of variability in the results that were obtained. You can see in the example that I pointed out, for cover crops, while there is a potential to reduce nitrate by up to 31 percent or more, the standard deviation is very high. So even -- in some examples they actually saw an increased nitrate loading.

So that's one of the challenges with trying to address the sources of nitrate in a wellhead protection area. This basic reliability question makes it difficult to choose that option in comparison to something that is more definite like replacing your well or installing treatment.

Slide: Achieving Safe Drinking Water Nitrate Levels Map

But nonetheless, we thought it would be important to go out into a watershed and actually attempt to achieve this process. We're going to show in the next few slides an example where we think that making a concerted effort to control the sources of nitrate may have a real important impact on a community. This is similar to the slide that Jill showed earlier, where we count -- where we looked at the number of impacted non-municipal wells, smaller system wells, in watersheds. These are HUC 12s that we ranked. And what I wanted to point out with this slide was that these systems were showing up in places where we would kind of expect. They were located in geologies that were dominated by unconsolidated and highly permeable materials and also where the surficial deposits were shallow, so the depth of bedrock was low. And in particular, limestone bedrock materials were a susceptibility factor.

Slide: City of Beloit-Lower Rock River Map

We looked at the idea of going into a HUC 12-size watershed and addressing the nonpoint sources of nitrate pollution, in particular, agricultural sources, and this is an example in Rock County where we have a very high number of small systems impacted as well as several municipal systems. You know, it would really be excellent to go into a HUC 12-size watershed like this and apply good practices and have a benefit to all these systems simultaneously. However, what we wanted to do primarily was get back to this reliability issue. We don't know, if these practices were applied on a wide scale, what effect they would really have. And it would be difficult to actually track if the practices we are applying were actually doing any good. So we scaled down our expectations of the size of a pilot project. We started targeting, very specifically, areas where the hydrogeology would be such that it would be easier to track changes in groundwater quality in response to activities on the land.

Slide: Groundwater Model

One of the things we looked at was the existing groundwater modeling that was done in several counties in Wisconsin, Sauk and Rock counties in particular. What's shown here is two contrasting wellhead protection areas or zone of capture modeling delineations. The one on the top is a far simpler scenario. This might be a well that is completed in unconsolidated materials, whereas the bottom scenario, a deeper well completed in bedrock and subject to far more complex geologic conditions and heterogeneity as well as the influence of other high capacity wells in the vicinity, and it creates a far more complex shape of the zone of capture. So if you wanted to affect the groundwater quality for this particular well, it might be difficult to pinpoint the areas contributing recharge. So therefore, for the purpose of our project, we would look for a scenario like the top example. In the future, when practices that are applied have been shown to be effective, they can be applied at a more distributed fashion. And that would also benefit in a scenario like the bottom, where you may have uncertainty about the specific areas contributing recharge to a particular well, but if practices were applied broadly in the area, they would also have a similar effect.

Slide: Map (1)

Here's an example in Sauk County where we have this simpler hydrogeology and very fast-moving throughput of recharge through the unsaturated and saturated zone. This is an example -- if you run a G-flow model, you get these very long and narrow capture zones. This is showing both a series of small system wells as well as a municipal well towards the bottom of the screen.

Slide: Phase 1

This is an example of one of the main steps in phase one of the project, where we are looking for particular areas where a pilot project would have favorable conditions to succeed. And these include local interests, trending -- public wells that are trending high for nitrate, a well understood groundwater flow system.

Slide: Trending Municipal Wells (1)

So some of the wells that we're looking at, or the wellhead protection areas that we're looking at in particular, what I'm showing here are a couple wells in Sauk County. This is one of their trending municipal wells. In Prairie du Sac, this well -- they have already made preparations for what they're expecting, that they will not be able to continue using this well. They've already installed a new deep bedrock well. However, they are -- they would very much like to continue to use this particular well shown here if they could manage to control the nitrate inputs from their wellhead protection area.

Slide: Trending Municipal Wells (2)

Another example is Spring Green. They've been trending higher for the last couple of decades. This well is still in operation, although it is clearly threatened.

Slide: Map (2)

This is the Spring Green area in more -- shown in a little bit more detail. Towards the middle of the screen, we have a series of smaller system wells, transient non-community wells. All the ones shown here are showing elevated nitrate levels. The ones towards the middle of the screen are located about five to ten years of average linear groundwater travel time away from the municipal wells shown at the bottom.

Slide: Wells near Rt. 60 – Spring Green

In this graph we're looking at a compilation of the nitrate compliance samples that have been submitted by those TN systems that I just showed on the last slide. In 2013, a couple of those systems showed a particularly high nitrate spike. We think this has a lot to do with the drought of 2012 in contrast with a wet spring in 2013. The drought of 2012 appears to have caused the crops in that area to -- they were unable to -- they were unable to use the available nitrogen that was applied that year, so it remained in the soil. And the hypothesis is that it was washed through in early 2013. Similarly, in 2009, there was flooding in the area which may also have washed available nitrogen through the soil column to the water table. Six out of nine systems exhibited a peak that year in their nitrate concentrations.

Slide: Map (3)

So the point of that is that these systems are located up-gradient of the municipal well. It appears that there is a decent chance that there's a high mass of nitrate moving towards the municipal well. It would be good to know -- to get more data on the actual profile of the nitrate mass that's entrained in the groundwater system that is feeding that well so that they could assess and plan for that potentiality.

Slide: Calculating the N Loss Goals

So this is an example of how a municipal system, in particular, might plan in response to the distribution of nitrate sources in their wellhead protection area. Obviously, they would want to increase the amount of clean water that they're drawing in in comparison to nitrate laden water. One of the things that we would try to do with our project is assess in detail the amount of nitrate mass that is emanating from the particular agricultural fields.

Slide: Monitoring Considerations

So generally, the way -- there's some challenges that are associated with actually doing that. Getting -- installing groundwater monitoring wells and getting groundwater concentration data is not sufficient to get at that mass discharge number that we really need. So there are some detailed considerations that need to be considered when attempting to get at this mass discharge number. The majority of the contaminant mass will be transported in the more highly conductive materials in the aquifer, so one of the considerations is that we have to make sure that we're tapping in to the conductive zones within where we're monitoring.

This is an example of how the mass discharge from an agricultural field might be monitored. This is a technique that is borrowed from the remediation industry. In particular, this is a diagram from the ITRC guidance on mass flux and the use of mass flux to assess risk from contaminant plumes. But we feel that the same techniques could be used for nonpoint distributed sources, and essentially we would use a transect of monitoring wells at field edges located at strategic points. And the placement of those points would be -- would correspond to the rate of groundwater movement through the system.

Slide: Conceptual Diagram (1)

This is a conceptual diagram showing how the monitoring system might be set up in a community like Spring Green, which is what -- the community that we showed in the previous example. Because the capture zones are long and narrow, we feel we may be able to set up a half-field type of demonstration, where you have fields where practices are applied and groundwater is monitored, and then we would have adjacent control fields where typical practices were applied. So this work could be done up-gradient of some of those small systems and also up-gradient of the municipal well. And the idea would be to show progress in reducing the total amount of mass emanating from those fields. We would start by applying -- we would start by ensuring that the soil crop system -- that they were using the university recommended rates to start with, and one of the main pieces of data that we would want to know is, applying those rates, what exactly would the groundwater quality -- what exactly would that result be, and would it be protective in this community? And if we need to go beyond that, we would be applying additional practices and subsidizing those and ensuring the producer against a possible loss of yield.

Slide: Conceptual Diagram (2)

One of the other challenges with this approach is trying to tie particular groundwater quality results to particular fields. This is a technical challenge right up front. It's been done in a few studies in Wisconsin, but only occasionally has that effort been successful. One possible way to assess the timing and location, basically assess the origination -- to determine which fields that the actual contaminant mass is coming from is to use some kind of a tracer. The diagram at the bottom shows a concept where the tracers would be applied in a line, perpendicular to the groundwater flow direction.

Slide: Chloride Example – Serving as a Fortuitous Groundwater Tracer

Here is an example of some data that was collected, also in the Spring Green area. This was chloride that was monitored in a private well, and we looked at the amount of time it took for it to travel from the roadway that was salted, compared the timing of that to the arrival of a peak of chloride in this particular well. The road is about 800 feet away, and it took about a total of one year for this peak to arrive at the well, which is encouraging to us. It is a piece of data that supports the idea that this is a very fast-moving system. So the way that the project is laid out conceptually in this half-field configuration that I showed earlier, because the fields are generally laid out in relation to the (inaudible) PLLS, Land Survey System, you have about 660 feet per half-acre -- I'm sorry, for half-field dimension. So therefore, this data would suggest that nutrients that are carried through from the surface might arrive at our monitoring wells within a year's time, and that would allow us to potentially get some feedback on how well we did in that particular growing season and potentially make adjustments for the next season if improvements need to be made.

Slide: Map (4)

What's shown here is an example of where you might want to collect groundwater data. One thing I should point out is that the zone of -- you're looking at two zones of capture that are contrasted with each other. On the left, the long, narrow shaped zone of capture, this cyan shape right here, is the Spring Green municipal well that's completed in the sand and gravel aquifer. It's about a 125-foot feed. The depth of water is only about 12 feet here. On the right you have their second municipal well that's completed in deep sandstone. It results in a different shaped zone of capture, much wider, more diffuse. This little point here suggests that it is also drawing water in from the sand and gravel wells -- sand and gravel aquifer simultaneously. These blue lines here would be a general plan for where you might want to collect data to assess the profile of nitrate mass that is entrained in the groundwater flow system heading towards this well. Right here is where we suspect there is a large nitrate mass at the moment, whereas there was also that peak back in 2009, and that could be somewhere around this location by now, or even farther south. So there is some degree of urgency to start collecting data like this in the community. It would be helpful, then, to be able to plan for -- to plan for that.

Slide: Phase 2

So that's where we're at at the moment. That's an example of how we chose our potential project location. We're in the midst of outreach communities, not only just Spring Green but other communities in Sauk County and elsewhere. We do have a challenge in getting cooperation from landowners and producers. They're understandably not necessarily thrilled about the idea of having monitoring wells installed at their field edge. They have various concerns. They're concerned about potentially being regulated by us or EPA, and they're also concerned about how they might be perceived in their own community, by their own neighbors. However, in that one example in Spring Green, there is some recognition by the community that some acceptance of some of these facts that we've shown here today -- some acceptance of where the nitrate is coming from. So that's a place where we're going to continue to work with outreach efforts. We have significant and important partnerships with the UW, with county conservation personnel. We have technical partnerships with folks like the USGS and the State Geologic and Natural History Survey. And we hope to get -- we hope to work with agricultural groups and crop advisers and other technical folks from the university that can help us design practices. Phase two of the project will be the deployment of those practices and the monitoring and determination of how well they're working.

Slide: Barriers & Bright Spots

Jill Jonas

Okay. And Brian is turning it back to me, just to wrap up and do a little bit of a summary. But as you can see from Brian's presentation, there has been significant work as far as preparing for the scientific aspect of this and also significant work as far as the determination of the sites and now what is in full force as working with our various partners to recruit the agricultural folks. And as Brian laid out, there are some challenges associated with this, as I'm sure anyone that's on this webinar can understand. But we do feel positive that everything is set up and ready to go. And we have a sound -- certainly, a sound approach, from a scientific standpoint, and we are confident that we'll be able to move forward on trying to show this relationship that I think is something many people are looking forward to if we're able to be successful on it. It will be interesting to see what the results are. The monitoring design, as Brian mentioned, continues to be under expert review, and we are very thankful for many of the collaborators that we've had on the project. And I want to just call out especially the USGS, the United States Geological Survey, and the projects that they're planning on collaborating with us on here as far as collection of water samples and determining the geochemical condition and mixture of groundwater ages and so forth. Their expertise will be extremely valuable to us as we continue to move forward.

We do plan on the nutrient management plan and economic analysis going under the same kind of expert review in our phase two of the project, which Brian made mention to. And we are very active in reaching out to other state groups to reach their support. But there are barriers and there are bright spots. From a technical standpoint, as far as barriers, the monitoring and modeling techniques, it's difficult when you're looking at different zones that are saturated or unsaturated and how that might impact preferential flow paths. So from a scientific standpoint, we have to be very conscientious as far as how we move forward and interpret the data that we receive. And as I mentioned, we really appreciate that USGS will be there to help with this. The landowner participation, as people have found across the country, there is a significant concern that some landowners have as far as potential regulation or liability. Nobody wants to be singled out. So we're trying to make a very good effort to say we all have a responsibility here, and how can we get the various groups to all take responsibility and see how we can move forward and support people both from an economic public health and environmental standpoint.

It's interesting -- we had one landowner that actually said groundwater seems a little bit different than surface water. Surface water we can see. So when you make changes, you can see those changes benefiting surface waters fairly quickly. It's a little more difficult with groundwater, when you can't see it. So we're working very hard to get the right combination of trust relationships to move into this groundwater area that is so critical for a state like ours that relies so heavily, from a drinking water standpoint, on groundwater, but also for the quality of our lakes and streams and the economic value and environmental value that has for people as far as quality of life here in Wisconsin.

Some bright spots, certainly with wellhead protection areas, with fast-moving groundwater, it's allowed us to involve a smaller number of people to negotiate with and to try and cooperate or bring to the table and cooperate with. So having a more focused, smaller area has been helpful to us. And some of the new agriculture technology that we know is out there is certainly a bright spot. There are cost saving potentials for the individual producers, and there is certainly interest among the agency and university and local governments to see if we can work together to create some success.

Slide: Thanks to our Collaborators

So this gives you an example of the partners that are involved that are -- gives us the confidence that we will continue to make progress and to move forward. And as I mentioned, the contributions of the USGS have really been significant from an source water collaborative standpoint. So with that said, we're going to open it up for questions.

Slide: Questions

Cynthia Curtis
There's a little mic icon at the top. If you just click on it, it will mute for a sec. Thanks. So I'm going to encourage people, if you have any questions about the presentation, to enter your questions in the "Chat" box, and we'll start going through them. I see Les has already entered a question. So Jill and Brian, question from Les Everett: Wisconsin has some statutory nutrient management requirements. Are they not being followed, or do you want to talk to that a little?

Jill Jonas
Just to make sure -- to clarify with Les, are you talking about the phosphorus standard, or are you talking about nutrient management plans? Okay, okay. We see it's nutrient management plans. Thanks, Les. Yes, we do have some requirements on nutrient management plans, and our intent is to work with the county conservation folks and working with the individual producers. But we -- the following of the nutrient management plans really depends, from a regulatory standpoint, on the size of the facility and, in some cases, as far as whether or not the size of the facility we're working with has a nutrient management plan or is required to is not -- doesn't necessarily cross the realm of our project. But certainly, where nutrient management plans are utilized, we have worked with our Clean Water Act folks to look at incorporating the groundwater perspective more into that nutrient management planning process. Many of the plans are associated with the uptake of the plants, and the idea is that if it's targeted towards plant uptake, then is that really protective of groundwater quality? And so those are some of the things that we are hoping to try and get at with the data collection and monitoring at that we're doing here on this project. So whether or not everybody is following their nutrient management plans, that doesn't necessarily fall under our agency. But we do question whether or not targets that are associated with optimum plant uptake --

Cynthia Curtis
Great. Thank you. I also had a question. Early on in the presentation, you were referencing some data from the Iowa Nutrient Reduction Strategy. And one of the things Brian mentioned was a pretty wide band of variability. So getting to what you were just talking about, Jill, are there things that you all would be considering in terms of how you're designing what you're going to be looking at, what data you'd be collecting or what -- like cover crops versus other practices?

Brian Austin
Well, I think the way we've put this together is we're assuming that because there's such an availability in the practice -- in the farming community and the types of crops, and also their way of managing their farming practices, that we wanted to leave that up to -- basically leave that up to them, with the exception that we would bring in whatever technical experts that we -- that would have the expertise to potentially make improvements on the demonstration fields versus the control. So the control would be the producers' current practices, probably refined a

bit. In particular, they're probably not going to apply above the university rates, especially because essentially what we're -- one of the key pieces of data is just collecting information on the practices that are being applied in the demonstration and control field, so a lot of detailed accounting of actually what's going on. So the main -- the primary piece of data that we want to collect is this bottom-line groundwater quality result, the mass flux of nitrate coming off the field, which is a combination of just the -- not only the concentration, but also you have to look at the rate of water flow emanating with the groundwater flow system under these fields. So the other piece to that would be to correlate this with measurements of nitrogen utilization efficiency. We are -- our partners at the UW especially UW Soils and their Nutrient Management and PES (ph) Division are doing studies of this type. So we want to incorporate that. That's probably more of a long-term -- in the long-term, it's more practical to do that kind of assessment. It's less data intensive. So we want to couple this groundwater quality and mass loading result to those efficiency studies so that in the future, if it's practical only to apply the efficiency calculations to begin with, we have a better understanding of the actual effect of that groundwater quality.

Jill Jonas
One of the things, Cyd, that we'd like to do is to make sure that the producers and the experts, the agricultural experts, have the opportunity to select what they think will work best. And so we want to make sure that that's the approach that we take, that we let the people that really understand the agricultural end of this make some selection as far as what could work as far as maintaining a nitrogen level that will -- in groundwater that will be protective of drinking water.

Cynthia Curtis
All right. Thank you. I had one other question because you've got quite a long list of partners that have been involved. And just, again, to what you were learning as you get more down into these narrow areas and the reluctance or concerns from different landowners, just curious, did the shift -- was there a shift in partners, like from the beginning design through the current state? And understanding that hindsight is 20-20, are there any choices that you would have made differently, looking back through, in terms of engagement?

Jill Jonas
I think it's a little too soon to tell on that one, Cyd. You know, I think -- I think it's just too soon to tell. We're kind of at an important point right now in the next couple of weeks to see how some things move forward, and it's too early to tell whether or not the way we started is the way we would do it next time or not. I think the only piece of it that I can think of that we might adjust -- I think we've had great collaboration, and we are so thankful for the expert panel that was involved in the selection and the design of the scientific and data collection portion of this. But I think perhaps bringing some of those -- it will be interesting whether bringing some of the utility people in earlier might be an approach to consider in the future. But even that, I think, is a little --

Cynthia Curtis
All right. Good to know. It will be really interesting to see how things shape in the coming months. I know we've been watching it with great interest. Well, I'm not seeing any other questions coming in from the "Chat" box, but I want to thank you both. And Jill, I understand

you stepped in at the last minute, and I really appreciate you doing that. And thank you, Brian, for putting this together.

Jill Jonas

Thank you, Cyd. We appreciate the opportunity.

Cynthia Curtis

All right. Well, to all of you, normally I tell you when the next webcast is coming, and right now we're in a -- I'm getting the 2014 calendar set. So please look for an e-mail with future schedule dates. We have several different topics that we're working on getting speakers confirmed on different dates. So once again, I want to thank you all very much for attending, and if you have any feedback or suggestions, please send them to me. You should have my e-mail. It's curtis.cynthia@epa.gov. Thank you very much, all, and thank you again, Jill and Brian.