

2013 State Nutrient Reduction Strategies Web Series

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The Nose Knows: Canine Scent Tracking Transcript

Speakers:

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Scott Reynolds, Environmental Canine Services

Sarah U'Ren, The Watershed Center Grand Traverse Bay

Moderator:

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Cynthia Curtis

... to give them a little bit more of a sense of what actually happened in the webcast. So without further ado I'm going to hand it over to our speakers to present. And at the end we will have questions and answers after their presentations.

>>Slide: The Nose Knows: Canine Scent Tracking

If you are thinking of any questions, please go ahead and put them in the chat box and I will help moderate through questions with the speakers later. Also just so you know, from this view up at the top of the screen you can click "Full Screen" to expand the presentation so you can see better. All right, Joe, do you to take it away?

Joe Rathbun

Thank you, Cyd. Let's see here. Like Cyd said, I am with the Michigan Department of Environmental Quality. I'm the Monitoring Coordinator for the Nonpoint Source Unit. And my intro is going to be very, very short. I want to get it to the people that actually know what they're talking about, Scott and Sarah.

>>Slide: Use of Canine Scent Tracking by Michigan's 319 Program

We in the 319 Program have used sniffer dogs in just a couple of projects specific to identifying bacteria sources in a couple of watersheds on the west side of the state, both intended to identify or eliminate human bacteria sources for public health purposes. It goes without saying though that any effort to reduce bacteria loadings will also reduce nutrient loadings and in some watersheds, particularly in Michigan, suburban and urban watersheds that can be a very significant source of nutrients to the watershed. Bacteria source tracking with a sniffer dog is a rare exception to the bromide of good, faster, or cheap. Pick any two. Compared to laboratory analysis for DNA testing and so on the use of the sniffer dog is all three. It is quite accurate. It is very fast and it is comparably cheap. Scott will be discussing that in the tail end and so will Sarah.

>>Slide: Tiered Bacterial Source Tracking (BST) Sampling for Human Sources

We like the use of the sniffer dog so much that we've incorporated it into our recommended tiered approach to bacteria source tracking. If you think you have human sources, you start off with the sniffer dog. You proceed into E. coli sampling after using the sniffer dog and if you come back with a hot E. coli sample then you proceed on to the bacteria source tracking DNA analysis. And that is now a standard procedure for us.

>>Slide: Speakers

And I will turn it over now first to Scott Reynolds, the project manager for Environmental Canine Services. He will be presenting information on both the training of the dogs, the use of the dogs, quality assurance, some case studies, and he will be followed by Sarah U'Ren, Program Director for our Grand Traverse Bay Watershed

Center up in the northern portion of the Lower Peninsula on Lake Michigan. And she will likewise be going through the use of the dog in discussing several case studies that were not funded by the 319 Program that illustrate the broader use of sniffer dogs around the state.

>>Slide: The Nose Knows: Canine Scent Tracking

Scott Reynolds

Okay, thank you, Joe. So the first thing we are going to do is sort of talk a little bit about how this got started to begin with. Sniffer dogs as a use of tracking human sewage might be a little foreign to some of you. We have been doing this since 2007. So we will go through the history. We will talk a little bit about how this idea was developed. Talk about some case studies and where we are heading into the coming years.

>>Slide: The History

In 2006 I was working with a company called Tetra Tech out of the Lansing, Michigan location. And my job was to conduct illicit discharge investigations both in the rural and also the urbanized areas looking for sewer cross connections, failing septic tanks, or failing leach field or drain fields. And Dan Christian, who was my supervisor at the time, was one of those people that, you know, the old thing of thinking outside the box. With Dan I don't think there ever was a box. He is one of those people that is always looking for a way to do something faster, more efficient, and reduce the cost, and benefit the client. And knowing that I had a background in canine scent training from previous law enforcement and search and rescue he came to me one day and asked if I would be able to train a dog to smell poop. And of course, my initial reaction was to laugh until I realized that he was serious. And we began this discussion about was this something that we could actually do. And I said yeah, I think I can do that. And then he said well make it happen and turned around and walked away. So it's kind of put into my hands.

So the first thing I did was to start doing some research to see if this had ever been attempted before. And did not take long to discover that it had not. So we were sort of starting from the ground up. After just going home and talking to my wife, Karen, about the potential of getting into this project. We decided that we needed to select a dog that would be sort of our pilot program, if you will. So after some searching through some of the shelters and rescue organizations, we found a dog that we thought was going to be perfect for it and his name was Sable and that is the dog that is on the pictures there. And began training him in early 2007. And we started out by doing actually just what is called imprinting where you introduce the scent to the dog and then put in a positive reinforcement. So we started with that. Then we went to free searching. And then we did blind trials that were actually set up by a third party and that is the picture on the left there. Where we don't even know -- the handler themselves does not know if the target scent in which this case was human sewage was even in the process or in the field to search for. And what that does is it takes out the human element. Of course, we want our dog to be successful and we want to find the nasty stuff. So as humans tend to be, we want to encourage the dog to do that. So if we are not sure it's even in there, that removes the human element and that way we rely completely on the dog's ability.

And then what we did from there is we went into what is called field trials and we would take the dog to locations where we already knew the status of a particular structure or a particular pipe through dye testing or bacterial sampling and that picture that is on the right there with Sable at the bottom of the pipe was actually his very first alert to the presence of human sewage from a septic tank straight pipe that was not encouraged. So it was a non-cued alert so that was his very first one.

>>Slide: In the Field

And then after passing the field trials then we actually take the dog into the field to places that we did not know the status. So he was actually working alongside the human counterparts if you will, and based on his reactions whether he would give an alert which in this case for Sable is a bark which you will get a chance to

see on Sarah's presentation later. Then based on his reactions we would follow it upstream through the enclosed system or in some cases, the open drain systems. And as you can see, this is all done from the surface. We do not do any confined space. The dog has the ability to actually detect and process, if you will, through scent training or through the scent process very deep manholes in the storm system. And we have in the past done in excess of 20 feet below the surface. So inaccessible areas sometimes this really works well for the dog. And the speed of it as well. We always say when people ask us how long does it take, the humans are the slowest part of this process. From the time you open the manhole it's 10 seconds roughly before the dog gives you their alert or it ignores its. And you move on from there. So it's a really quick process. And we are able to go through a lot of structures in a short period of time.

>>Slide: The Nose Knows!

Well it is no secret that dogs have a superior nose to humans. This list that I have up here is in no way all exclusive. This is just a few of the things that dogs are actually currently being trained for or have been working in for a long time. The ones that are in the bold are ones that I have actually myself and Karen as well have certified or trained dogs in previously. So I think taking the dog into this arena of tracking human sources in stormwater is really kind of a no-brainer. I just wish I had thought of it. The thing that is really great about the dogs though is not so much that they just have a superior nose to ours but it's also their ability to do what is called scent discrimination. And scent discrimination is the ability for the dog to actually filter out any background scent and concentrate only on the target scent, the human sewage. These dogs are trained specifically to alert to, to track, source track human sewage only and to ignore animal sources. And we do that in our training process which I will talk a little bit about a little bit later.

When we talk about their ability and their superiority over the humans, let's just say bloodhounds which are known as being great tracking dogs and we see those on the movies chasing the prisoner that has escaped from confinement. Bloodhounds have roughly 300 million scent receptors in their nose where humans have on average 5 million. So you can see there is a huge difference there right from the start. And also the presence of what's called the Jacobson's organ which allows them to process scent and to actually hold it in their nose. So sometimes if you see a dog sniffing and they will close their mouths and puff their cheek out there actually able to hold that scent against that organ and then bring in clean air at the same time while still processing it which is obviously something that we are not able to do.

>>Slide: Best Breed?

The other question we get a lot is what is the best breed? We have no hard and fast rule for it. In general we try to stick with the sporting and working breeds. So your shepherds, your labs, animals like that that have a high drive. They want to have the willingness to work and something that you can work with to get them to actually do the things that you are asking them to do and the desire to seek out things. They also need to have a high level of stamina. They will be in mud and water. We sometimes walk long distances through heavy brush or on the surface streets so it is a dog that has to have a lot of stamina. What is not ideal is the sight-hounds. Those would be like a greyhound, Irish wolfhound. They tend to use their eyes more than they do their nose. And the smushed faced dogs like your boxers and pugs. They have a difficult time in higher temperatures bringing in enough air. So we tend to stay away from them. But again, we are keeping our mind open. We have been surprised before. We actually have some new dogs coming up which I will talk about at the end of the presentation that have been really a great surprise to us.

>>Slide: There Are A Few Exceptions ...

However, there is one exception. This kind of a dog I don't think will work out for us.

>>Slide: Environmental Canine Services LLC 2009

So in 2009 we decided to start our own business and we developed canine -- Environmental Canine Services.

We also added in -- we of course, brought Sable with us. My wife, Karen, on the left there with her dog, Logan, who is the rough coat collie mix who had proven himself to have an amazing nose at the house when he could find things that had slid under the refrigerator or the stove or the couch when no other dog would be interested in it. So we thought we would use that talent of his and in fact he has proven himself to be really amazing. Incredible detection level. And then on the far right is Dan with his dog, Sky, and we brought Dan on board in 2009. And they are working on their field trials. Sky has gone through some medical procedures that sort of put him back a little bit. But he has two brand-new knees and he is ready to go.

>>Slide: Karen, Logan, & Bella

We also since 2009 have brought in an additional dog, Bella, on the right-hand side. She is a German shepherd that was a rescue and I will just say also at this point all of the dogs on our Michigan team have been rescued or adopted from different situations. Bella is actually a purebred shepherd. Incredible drive. And she is really progressing well through her training.

>>Slide: Dan & Sky

And there is Dan and Sky again.

>>Slide: Scott, Sable, & Jack

And one other dog that we have added is Jack on the right-hand side. He is a coonhound-rottweiler mix and Jack is a very great nose. And we affectionately say that most of his brain is taken up with the sniffing.

>>Slide: ECS Training Grounds

We do have a little training ground at our residence where we have sort of a lifelike step that we put into our training process. East Jordan Ironworks actually donated some of their old casting so we have manholes, curb gutters and surface drains. We also have all kinds of pipes and culverts and all kinds of different conduit of different materials that we can change around constantly. And then in the back field we have what we call a gauntlet which is an area of pipes in a 4-acre area that we can change around and have different scents, distractor scents, which I had spoke about earlier with the animal sources. We actually go around which is really a fun part of our job to collect animal scat, both wild and domestic. Thankfully we live in an agricultural area so if I go up and knock on somebody's door and ask for a bucket of goose poop or whatever it's not really that big of a deal. But we have incorporated that into our training process and that is actually part of the certification that the dogs have to prove that they can accurately ignore those and only alert to the human sources. We also put in field blanks which are -- can also be visual as well as sensory for scent. So we have things that they might target on such as a pipe that would be empty so we work on that as part of the training process as well.

>>Slide: Multiple Structures and Setups

And again, we have multiple structures and different setups that we can arrange. We train pretty much year-round to keep the dogs fresh and also that allows us to work in pretty much any type of environment. Last year we did work into February although the winter was a little more mild. But some of the areas we worked with for the city of Lansing and Tetra Tech we still had some ice and snow on the ground. So the dogs need to be able to handle those situations. And the scent patterns and the way it behaves under different environmental conditions really does make a difference. So as a handler we also need to have that information and recognize how the dogs are behaving under those conditions to help them get through a specific type of condition where we can get them to that scent and make sure they that they are running at optimal speed.

>>Slide: The Science Behind It: Research

So what I'm going to talk about now is a little bit of research that we have that supports the canine abilities.

>>Slide: Santa Barbara, CA 2010

This was done in 2010 in Santa Barbara. And this was a research study that was funded by the Water Environment Research Foundation. And we are collaborated with University of California-Santa Barbara and the city of Santa Barbara's Creek Division.

>>Slide: RV Illicit Discharges

And we had kind of a specialized thing that they asked us to do as part of this and one of the pictures that I showed earlier with Sky and the little black pipe there, they had asked us to check the possibility that some of the transient and derelict RVs that were in the area along the beachfront were potentially dumping their blackwater, and graywater tanks into curbside drainage. They had been experiencing a lot of beach closings. The community was very upset about this and in an effort to sort of find some possible cause for the community was really pointing fingers at these RVs so they asked us if we would be able to check all of these catch basins where they were parked as you can see in this picture. They tend to line up and sometimes they will stay there for several days. They asked us if we could have the dogs do this. So what we did in the initial training was to actually have them come in and the dogs to be able to alert to some of the common chemicals that are used in the holding tanks. They were the EPA approved ones that did not have the formaldehyde in them for the safety of the dogs. We did not want to expose them. What we found out after working through this is we actually found a couple of the tanks that were leaking. However, we did not find any evidence that they were actually dumping this stuff into the roadside drainage areas. And in fact, the city had done quite an aggressive program with the local waste haulers who had a dump station on the property to allow some of these people who were living in these things to come in and dump their tanks for free. They actually went out and hung things on the windshields announcing where they could go, explaining what the program was. And it was actually very effective and several of the inhabitants that we spoke to were aware of that program and were actively using it so this was not something that was contributing to the bacteria levels and the beach closings.

>>Slide: Canine Scent and Microbial Source Tracking in Santa Barbara, CA.

What the program was is essentially Santa Barbara Creeks Division had already done quite a bit of testing in some areas and they knew that there were some potential sources but at the time they were not sure if they were necessarily human sources or animal sources. So what they wanted us to do is they wanted us to come out and check specific locations and then they would collect samples alongside the dogs and submit them to the laboratory at UCSB for source tracking. And I have listed here some of the things that they have actually did and I'm not going to try to pronounce them because I will embarrass myself. I have no idea how to say have that stuff but two of the other ones that they did use besides the human waste markers were caffeine and cotinine which would be the nicotine after it's been processed through the body. A total of 26 samples which is not a huge number. But a good sample for the area that we were working in and then they also did some of the chemical ones as well: potassium, fluoride, ammonium, and surfactants. And those would be the MBAS surfactants.

This study was blind to ECS or Environmental Canine Services, otherwise known as ECS. We did not know the status of any of these locations prior to taking the dogs there. We try to do that with every single project that we do. Again, as I mentioned in the beginning with the training, that removes the human element and allows the dogs to do what they do and just have us trust their instinct and their abilities to alert to human sewage. So we don't want to know what the status is prior to going in.

>>Slide: Results

The results of this is that 11 out of the 26 samples were positive for at least one human-specific marker. And when they analyzed the data based on what they had for the human markers and what the canine response is,

they found it was significantly associated with several of those. And Logan was 100% on all alerts when there was at least one human marker present. There was a really strong correlation in that study with a small number of false negatives. The sample locations where both dogs responded negatively so there was Sable and Logan were both there. And we would run each one of those dogs in the same location. There were zero human-specific markers. So basically there was zero false negatives.

This is a really long report. It's pretty in-depth so I have put the link up here. If you go to that link, to the Santa Barbara city website, and just go to the report section you will see that down there. It is actually listed under September of 2011. That's when it was finally published.

>>Slide: Benefits of Canine Field Work

The other thing that this report found and this is not written from us. This is from the city of Santa Barbara is that one of the things they found is the benefits of the real-time responses. We get immediate feedback from the dogs and based on that feedback, we can make decisions in the field immediately rather than waiting for traditional laboratory samples to come back and then making decisions and redeploying personnel. One of the things that happened was that we actually found two unmarked discharges that were not currently on their mapping. So they knew that there were some specific discharges that were potential contributors to the bacteria levels at the beaches but we actually found two of them that they had not previously found. One of the other benefits that is really what the canine scent tracking and not just on this one but across the board is that we are able to narrow down your focus. So if you have let's say a large neighborhood and you know there's a potential discharge within that neighborhood but you don't know exactly where it is, by utilizing the canines, we can take that large focus area and run the dogs through it and able to focus it down to a more manageable area. So say it may be one block or two blocks or four houses instead of, you know, 200. And then you can follow up from there with additional lab testing or dye testing, smoke testing, camera work, whatever it maybe. And the other thing too that we have also found continuing way after this study is that when people see the dogs out on the street, it really peaks a lot of curiosity and we get some very interesting questions like is there a gas leak. For some reason I know that they do use dogs to detect natural gas leaks. We've had people wondering if we were looking for bodies. One of my favorite things to tell people is that we are looking for alligators in the sewer. [Laughing]

But the beneficial part of it is really that there seems to be more willingness for land owners, business owners, and other individuals to cooperate with the investigations. And this is what the city found when they were working with us is that people tended to be more open to allowing them to go in and do dye testing or allowing them onto private property where storm drains may drain off of and this has really been something that we have seen across the board continuously.

>>Slide: Highlight

One of the big highlights through this was not just the research itself but actually a huge find that we had. There was an area that ran through a very high-end shopping district that was part of what is called the Hope Drain and they have had high bacteria levels going out to Hendry's Beach which is a tourist destination and a surfing beach and they had been unable to locate the actual source of it for quite some time. And it was so bad in fact that they actually ended up putting in a diversion to the wastewater treatment plant. That local wastewater treatment plant was not equipped to handle high flow periods so anytime there was rain forecasted, especially over a weekend, they would actually turn off the diversion and then, of course, that bacteria was going directly back out to the beach. We were able to track from that diversion all the way to the end of the terminal end of that storm sewer and through cooperation with both the street crew and the dogs we actually found that there was a cracked sanitary sewer that was above the storm drain. And when it would reach pressure, it was leaking directly into the storm drain which of course went right out to the beach. So one of the things that Joe Murray, Dr. Joe Murray with the Santa Barbara Creeks Division said was that this

real-time results just with the canines led to an urgency that the situation was that people wanted to get it uncovered and wanted to follow it up and in fact, the street crew -- this was on a Thursday and on Monday morning they ripped up a very major street in Santa Barbara and repaired that and I think since then they've actually made capital improvements on that whole area. So that was really a great highlight for that project.

>>Slide: Outstanding Stormwater Research Project 2011 California Stormwater Quality Association

Another good thing is in 2011 that project won Outstanding Stormwater Research Project from the California Stormwater Quality Association.

>>Slide: A Big Step- Beach Monitoring: DEQ Quality Assurance Project Plan (QAPP)—Clean Michigan Initiative Great Lakes Restoration Initiative

Joe kind of talked briefly about the Quality Assurance Project Plan that we have been incorporating into that as part of sort of the hierarchy or steps of illicit discharge or bacteria tracking and this has really been a big step for us to be included in this.

>>Slide: QAPP Components

And one of the -- I'm just going to touch briefly on this but one of the things that we put in there for the components of the Quality Assurance Project Plan is that we do 10% field replicates. So at the end of the project we go back and randomly select 10% of the sites that were investigated. It is sort of following lab procedures for replicates. One of the other way we have done this is if we are using two dogs on the sites, that can also work for that 10% replicate because we are getting two dogs, their reactions on those same sites. So that has worked really well for us. We try to select so that we don't end up with all alerts or all no alerts and get a mix of those so that we are getting the same response on the second go around.

>>Slide: QAPP Sniffing Options

One of the other things that the QAPP does for us is it allows us a couple of other options for being able to sniff some areas and it's what we call or refer to as bucket samples. And what we can do is we can go to a specific area. Usually we will have the client or a third-party do this so keeps it blind to us but they will collect water from a road crossing or areas that might be inaccessible to the canines in a clean container. It does not have to be sterile, it has to be clean. They will code it so they know where the location is and then we will bring it back to neutral scent area like a parking lot or a park or something that is away from the water sources and then we also incorporate field blanks which are distilled water in the same type of container and then we will set them out and we will run the dogs on them and record their results from there and we will also do the same thing where we do the replicates on those as well randomly generated. And this is one of those things that really allows us to cover a large area and sort of do a bracketing. So let's say you have a storm drain, an open storm drain that's 5 miles long and you know that there's high bacteria in it, you just don't know what the source is. By using some random selected locations or road stream crossings, you can grab some samples from there, bring them back to neutral scent area and based on the dogs reactions you can then bracket your area of focus and we can either take the dogs in there and continue investigations in those areas or you can take it from there and decide how you want to move forward.

>>Slide: In the Field: Paws on the Ground

So moving to actual case studies, putting the paws on the ground, if you will.

>>Slide: The Conservation Fund

I will start with one that is in Berrien County which is in far southwest Michigan. And it so far down there if you walk backwards you actually fall into Indiana. It's right on Lake Michigan and this was with the conservation fund from their mid-west office. And Peg Kohring, the Director there, doing some fantastic work with the folks down there.

>>Slide: Galien River Watershed

She asked us to come out and give them a hand with looking at some septic tank discharges, potentially into the Galien River Watershed so here's just a quick map of the Galien River Watershed. One thing that I would point out is you will see that chunk there that is white right up against the border of Lake Michigan, Chikaming Township. Just keep that in back of your mind. We will come back to that here shortly.

The Galien River has several branches. It has an eastern branch, then the main branch and then there is another southern branch that comes in and all of this drains directly into Lake Michigan.

>>Slide: TMDL

There is a TMDL, Total Maximum Daily Load; it's on the 303 impairment for E. coli. And just a few things, in 2001 the range of E. coli that ended up getting them this TMDL and then what potential sources are. This is really a mixed area. It's a tourist area in some places along the lake shore. There is some agricultural inputs. Some of the places are on sewer and other ones are totally on septic. So just a mix of everything in that area.

>>Slide: Three Oaks, MI

So we started out in Three Oaks which is within that watershed and the goal was to walk the roadside ditches looking for illicit discharges coming from pipes. Now this area is specifically on septic. There is no sewer there. And what we would do is all of these ditches drain or flow directly into tributaries that go to the Galien River so potential sources there. So one of the places, the picture that is here on this slide you are facing south and the flow is going south. You will see in the background there there are two pipes visible. There's actually three there. So I took Sable down into that area and had him sniff and I immediately got an alert. So I took him to each pipe and had him sniff each individual pipe, but I did not get an alert. So that tells me that the water that is there is contaminated but it's not coming from any of those three pipes. The pipe that is in the closest to you and the largest sticking out from the left there that is actually the flow goes into that and crosses under the road. So I knew that was not it for sure. So what I did was I brought Sable back up and ran him down the edges of the bank back towards the south. And where that red circle is I got an alert.

>>Slide: Hidden

So I lifted up the grass and under that was a pipe that was discharging into the ditch. And what we found out after the Health Department went and did they dye test on a nearby residence that they had their septic connected to an old farm field tile. And the reason this was not -- this is one of those ones where you think well what did you need the dog for. That should smell bad enough but they had some heavy rain prior to us coming out there and actually washed away any physical evidence that in the ditch itself and the odors were not present like you would expect them to be. They did dye test it and confirm that it was connected to a farmhouse close by. And what was really cool about this was the Health Department, the guys that were working with me, Nick and Chris, both had said that they would have never had found this if it had not been for the dog because it was essentially buried underneath that grass and there really was not any visible evidence there. And the picture here you can see the green dye that is down at the bottom of the ditch there and this is Dan and Sky. We use this as a field training opportunity for them.

>>Slide: Photo Slide (Pipe Discharge – ID: 1-02, 3-29-12, ECS)

And there is just a close-up after the grass was pulled away and you can see that common greasy, grey, smelly, nasty stuff coming out of that pipe.

>>Slide: Residential Septic to Wetland

The next one, this was actually just around the corner from that one I just showed you. And this is sort of an example of both the importance of the dog being trained but also the handler. We are not just dog handlers,

we are actually stormwater professionals. We have a lot of experience in septic tank and stormwater and sanitary inspections and investigations. And we were looking for an open drain that supposedly was actually on the map. So we started walking across this farm field to try to locate it whether it had been covered up or if it was not even present on the map and I noticed through the trees that there were these mounds of dirt along the edges of a trench. Knowing that this was a septic tank area and in my past experience I suspected that someone had dug a trench to empty their septic tank out and indeed that's what happened. As we went back on the property. We found this trench and you can see in the slide there that it's quite a distance from the residence in the background there. I would estimate this trench was probably at least 100 yards long from where it came out of the ground to where it emptied into a wetland.

>>Slide: "Always been that way since we bought it."

And then this is actually -- you can see it's a little closer to the residence. This is where this black corrugated -- or black drainpipe actually came out and it was indeed of course, Sable alerted there for, human sewage and the homeowner came out, saw us back there and was talking to the Health Department and his explanation was that's always been the way it has been since we bought it. So I know they are in the process of trying to get this fixed up. Of course, the cost of that sometimes can be really difficult for individual homeowners.

>>Slide: Village of Glendora, MI

Another place, this is kind of an interesting one. Village of Glendora in Michigan which is also within that watershed. We were sent up there. There was a rumor that there was a discharge occurring into a tributary for the Galien River and that there was some sort of pipe attached to it but there wasn't really any information so Peg asked me to go up there and check it out and so I got Sable out of the car at this intersection which is where supposedly this was and this is a very, very small town. It's essentially just the intersection. And had him sniff this grate that was almost entirely covered with grass and I got an alert.

>>Slide: ID: 3-02, Interior Facing East, Sanitary Staining

So I opened it up and I found that there was definitely an illicit discharge, human sewage occurring coming out of this pipe at the top of the slide. And then the flow goes down and out the right bottom. That very common sanitary fungus we call it or staining, that white stuff that comes from the bacteria is occurring there. And you can see it coming out of the pipe.

>>Slide: "It Smelled Bad ..."

So following it from the upstream to the downstream here is this mystery black pipe. And as I was walking down and this pipe is probably close to 100 feet long. As I was walking down it trying to find the end of it one of the residents came out and asked what I was doing. When I explained the reason I was there, she revealed to me that the neighborhood had gotten together quite some time ago and hired a contractor to come in and put in this black pipe because it smelled so bad. This ditch here that this pipe is laying in actually runs between a couple of houses and they wanted the smell to go away so their solution was to transport the human sewage farther into the woods so that they didn't have to smell it. And I guess they spent like \$1,200 on this construction project.

>>Slide: Photo Slide (3-29-12, 3-02, ECS and ID: 3-03 Sanitary Debris)

What is really ironic here -- let me go back. This is the end of the pipe going into the tributary. You can see on the right slide there just some of the sanitary debris, toilet paper, and again that sanitary fungus in the picture there.

>>Slide: "It Smelled Bad..."

What is ironic here, I will go back two slides -- you'll notice this is Sky again. These little orange flags you can

see that there is something going down the bank and into the side of that black pipe

>>Slide: Photo Slide (ID: 3-01, 3-29-12, ECS and ID: 3-01 Sanitary Debris)

is that one of the houses that was right next to it had put in a straight pipe off of their septic and it was actually training down the bank and hitting the side of that black pipe. So two discharges. And I would have missed this -- I have to be honest -- if it was not for Sable because when I was walking along the bank I was looking at the pipe and trying to find the end of it and if he did not bark at me I would not have looked down and I probably would've walked right by it. So I have to give him kudos for that one. That picture of the right you can see the sanitary debris. There is actually feces and food and toilet paper and all that right there on the side of the bank.

>>Slide: Collecting Water for Canine Sample in Neutral Scent Area

So we are going to skip through.

>>Slide: Final Count – 16 Hours

Final count on that one, we ended up with three residential septic tank illicit discharges. That one discharge in the village of Glendora. Seven other sites that need further investigation and we also found one bag of meth materials that we turned over to the Michigan State Police.

>>Slide: Peg Kohring, The Conservation Fund

So a nice comment from Peg that we were able to accomplish what no other program that they had tried so far was able to do.

>>Slide: Round 2

Real quick, we went back to do some searching on that Chikaming Township that I mentioned earlier. This was all open drains running down to do checking for illicit pipes

>>Slide: Google Earth Map

and what we found as I move through this kind of fast here

>>Slide: Findings

is those residential areas were not significant contributors and that we wanted to redirect the focus to the sanitary pump stations that are all along those drains and also any inland sources that had not been followed up on yet.

>>Slide: East Coast FB Environmental

One other place we've been is the East Coast, Maine and New Hampshire.

>>Slide: Coast Lines

This really presented some interesting dynamics because we were working in tidal influenced areas which was really an interesting aspect to this that we had not worked in before. Because some of the places that they wanted us to check were under the tide influence so we could not say whether or not the fecal contamination was coming from the ocean, from areas adjacent, or if it was actually coming from the area where the dogs were alerting. So I know they are in the process, Emily Difranco from FB Environmental and Casey in FB Environmental doing some great stuff out there.

>>Slide: Bucket Samples

Doing the bucket samples again.

>>Slide: Share the Knowledge

Did this in a public parking lot as part of a community event and so we killed two birds with one stone, if you will. We were able to actually talk to people, raise the awareness there, and also get the job done by doing a demo, if you will, of the actual samples.

>>Slide: Septic to Storm

And then one real high point. I have to give Logan -- that Sable in the picture but Logan actually found a septic tank that was actually into the storm. And it was in an area that looked like a sanitary sewer that the DPW did not even know existed. So that was a really great one also.

>>Slide: Environmental Canine Services LLC 2012 and Beyond

Moving on where are we heading here next?

>>Slide: Western Region Team, Sonoma County, CA

We are really proud to announce that we have a group of canine handlers and fantastic dogs in Sonoma County, California that will be working on their certifications and they will be handling our western region. A great group of very dedicated people and some rockstar dogs. We are really excited about bringing them on board and looking forward to moving on with them.

>>Slide: The Doggie Bag

So just real quick, sort of the doggie bag, if you will. Logan taking a shower.

>>Slide: Questions

And then any questions?

>>Slide: Contact Information: Scott Reynolds

And I just want to thank real quick Eukanuba for feeding all these critters because there's no way I could do it on my own. [Laughing] And here is Sarah.

Sarah U'Ren

We are switching seats real quick. Sorry. All right, thanks for inviting me to come talk. This is slightly weird for me. I've never done a webinar before so I feel like I'm talking to myself which is not at all an unusual thing if you ask my officemates. There we go.

>>Slide: Canine Scent Tracking: A Case Study – Grand Traverse Bay Watershed, Healthy Beaches Program

So I wanted to talk about some of the things that we have been doing at the Watershed Center. And I'm going to kind of get off topic for a little bit because I want to give you a history of our Healthy Beaches Program and then I will come back around to the canine scent tracking and talk about how we use some canine scent tracking on some remediation projects that we are working on right now and how that helped us tailor our plans for the remediation so we knew what we were dealing with human poop or animal poop. And yes I'm going to say the word poop quite often in my presentation. Sorry.

>>Slide: Our Mission

So first of all, for those of you who are not aware what the Watershed Center is, we are a nonprofit environmental watershed group and we are based out of Traverse City, Michigan which is in Northwest Michigan, Lower Peninsula. And we are basically an advocate for clean water in the Grand Traverse Bay and we want to protect and preserve the watershed.

>>Slide: Grand Traverse Bay Watershed

Here is just a picture or a map of our watershed so you can kind of get an idea where it is. It's almost 1,000 square miles. There's a lot of water, a lot of lakes, a lot of rivers and each of the sub-watersheds has its own separate characteristics. But I enjoy all of them. They are like all of my children.

>>Slide: Beaches and Tourism are Key Sources of Economy in Grand Traverse Region

So a while ago we realize that the Watershed Center in the Traverse City region, the Grand Traverse region in general we realized that beaches and tourism are a key source of our economy. But also there is a quality-of-life aspect and that is all tied to the health of our water resources. So we know that we have to keep our waters healthy. People want to go swimming, they want to go fishing, they want to enjoy the water resources. And that improves their quality of life and it also boosts the local economy. If you've ever been at Traverse City during Cherry Festival you know what I mean.

>>Slide: Starting Our "Healthy Beaches Program"

So we back in 2006, almost six years ago, we started our Healthy Beaches Program. And this really started after a number of E. coli bacteria advisories were being posted. And people were starting to freak out a little bit and this is because we changed the way we actually started posting them. We started notifying the public more of when there were advisories at their beaches. And just some background there. The presence of E. coli bacteria at a beach indicates a source of fecal contamination which is not good to be swimming in poop. So two beaches actually in the Traverse City region are on the state impaired waters list for bacteria for fecal contamination. So people were a little upset about that and we were too. We don't want poop on our beaches. I'm saying the word poop again. I'm sorry. I have to stop.

So in 2007 we partnered with the county and city officials and the counties in our area and we formed a stakeholder group to talk about these issues to see what we could do about it. And that group actually still meets today. We meet on a monthly basis. We take a few months off in the winter but other than that we still meet all the time. And what we did back in 2007 was we drafted a three phase action plan for Healthy Beaches. And this is something we are currently in phase three of the plan but we wanted to enact this because we really wanted to make sure that our beaches were going to stay clean.

>>Slide: Action Plan for Healthy Beaches: Phase 1 – Ordinances, Public Education, Behavior Change

So the first phase of our action plan for Healthy Beaches really deals with education.

>>Slide: Phase 1 – Ordinances, Public Education, Behavior Change (Duck Feeding and Pet Waste Photos)

We have to educate the public about what the problem is, how you can alleviate the problem, how you can reduce bacteria problems at the beach and one of the ways we did this was to try to get the local city of Traverse City to prohibit the feeding of waterfowl within I think it was 500 feet of any bodies of water and we actually did get them to pass that ordinance so now it is illegal for this girl right here to feed the ducks. Actually this is a staged picture. That's Maureen from our office, but I needed a picture so. So we also encourage people to pick up their pet waste so you see these doggie pot pet waste picker upper thingies. So we installed some of those around the area.

>>Slide: Phase 1 – Ordinances, Public Education, Behavior Change (Educational Signage)

And we also have educational signs that we've been putting up over the last six years. These are just some examples of some. The one on the left here is from the Traverse City State Park. That's a three panel kiosk. We also smaller ones like this one on the upper right where they are just small and they talk about don't feed the waterfowl, pick up your litter, put your trash away. Just some quick messages.

>>Slide: Phase 1 – Ordinances, Public Education, Behavior Change (Marketing Signs)

We also had a fairly large advertising campaign that we did and this was through a grant we got from the DEQ.

And this paid for some advertisements in our local newspapers and we also put these on Facebook and our Twitter feed if that's what you call it. So and there were a number of these. These I thought were two of the funnier ones that we had but we really wanted to use humor to catch people's eyes. So we have "Don't be a Potty Animal at the Beach - Make bathroom breaks your #1 and #2 priorities." And I'm just going to pretend you all are laughing at my jokes there. So there were more of these but we actually got a lot of feedback from people who really liked these advertisements and it was good because they saw the advertisements, they laughed at it and they actually read it and hopefully they went back and they did not feed the duck on the beach and they made their kids take bathroom breaks and not pee and poop in the water. Poop again.

>>Slide: Phase 1 – Ordinances, Public Education, Behavior Change (Radio Advertisements/PSAs)

Okay, we also had some radio advertisement we did. We have some fairly lengthy radio advertisements. So I'm just going to, I saw Cynthia pop one up here and I'm just going to play this one for you.

Radio Advertisement

Those fuzzy little ducks are so cute and it is so tempting to feed them. What goes in must come out. Droppings contain E. coli and other harmful bacteria that leads to beach closing. These please don't feed the ducks. Besides it makes these wild birds dependent on handouts and more likely to spread disease. Visit GTBay.org for more information. This watershed moment brought to you by Watershed Center of Grand Traverse Bay, GTBay.org

Sarah U'Ren

So that was the "don't feed the ducks" one and then we also have this other one. I'm going to play this one Cynthia and then I'll skip the third one.

Radio Advertisement

Grand Traverse Bay's beautiful beaches offer miles and miles of fun. Keeping them safe and clean is up to all of us. Please place pet waste and litter in the trash and don't feed ducks or seagulls. When we all do our part our reward is healthy beaches. See GTBay.org for more easy healthy beach tips from the Watershed Center of Grand Traverse Bay. This watershed moment brought to you by the Watershed Center of Grand Traverse Bay. GTBay.org.

Sarah U'Ren

So you can see we were trying to educate people about don't feed the ducks. Put your trash away and I think that third one that I didn't play was about making sure that you put your waste from your RVs and your campers in the correct spot and not down a storm drain. So these radio advertisements were played on numerous radio stations during the summertime in the Traverse City region.

>>Slide: Action Plan for Healthy Beaches: Phase 2 – Detailed Sanitary Survey and Source Tracking

And so our second phase of our action plan had to do with sanitary surveying and source tracking. We wanted to find out where the sources are coming from and actually phase one and phase two kind of happen at the same time.

>>Slide: Phase 2 – Sanitary Surveys/Source Tracking (Sanitary Surveys)

And so what we had to do first was we conducted EPA sanitary surveys at local beaches. This was just so we could identify known or potential sources of bacterial contamination. We had to assess how big the problem was and we also wanted to identify areas where we might need to do further testing. And what we found for most of the beaches in our area that had elevated bacteria levels were being impacted by storm drains. Either storm drains that emptied right at the beach or a storm drain or creek that emptied right near the beach.

And what we found in our area is really if we got a heavy rain followed by strong onshore winds we were getting beaches that had bacteria advisories. So then we started doing some more sampling of our storm drains and some of that sampling revealed there was a lot of E. coli in the storm drains. And for those of you that are familiar with E. coli levels we were getting between 10,000-30,000 colonies per 100 milliliters. And that is quite a lot. The pictures down here are two of our -- these are the two beaches that were on the state impaired waters list for bacteria. The one on the left is Bryant Park; the one other right is East Bay Park. Those are the storm drains there. I'll talk more about those more in a bit.

>>Slide: Phase 2 – Sanitary Surveys/Source Tracking (Source Tracking)

So once we did the sanitary surveys we also had to go through a source tracking. We wanted to know where the fecal contamination was coming from. Basically was it animal or was it human? If it's human sources is it an illicit connection? Is it leaks in the sanitary sewer that are getting into the storm drain system or if its animals was it a large congregation of ducks on the beach, too much dog poop getting in the water or the animals in the storm drains like our furry friends up there on the right-hand side who are not really my friends.

Why we do the source tracking is because it's important to identify the source so you can work on your next steps. If you need to deal dogs you need to deal with dogs. If you need to deal with your sanitary sewer system well that is a lot of -- that's quite a different management technique to deal with leaks in the sanitary line. So each of those sources that you find are going to require a different management plan how you are going to deal with that.

>>Slide: Phase 2 – Sanitary Surveys/Source Tracking (Determining Human Sources – Partnerships)

So we went through some source tracking. This first slide is talking about some of the partnerships we had with research agencies. We did a study with Michigan State University and then another study with USGS. The bullets here are for the Michigan State study. And we took samples in 2009 and in 2010. But we did not get the results until 6 or 9 months later. And we were working in conjunction with a grad student there. And they were analyzing for human pathogens and gene markers. So basically, you know, lots of scientific microbiological testing that was determining whether there was human poop or not human poop. So they were taking samples at the beach. They were taking samples at drain outlets and along a nearby creek for one of the beaches and they did find positive results for human sources of fecal contamination but it cost over \$50,000 and we did not get the results for nine months which actually I should say we only spent \$10,000 on it but since it was a grad student and you could work the grad students to death we got a lot of free labor. This is the grad student right there. It's Marc Verhougstraete who is now Dr. Marc Verhougstraete and he actually wrote his Ph.D thesis on Mitchell Creek and some bacterial contamination we have in there.

>>Slide: Phase 2 – Sanitary Surveys/Source Tracking (Determining Human Sources – Canine Unit)

So the next one -- the next way we determine human sources getting back to the canine part of our webinar today is we decided to have Scott and his group come in. I had seen an article about Sable, the poop sniffing dog in a magazine and said to myself I'm going to get that dog to come to Traverse City one day. And I think three or four years later I finally found the money and finally got him to come up. So as you know, the dogs are trained to detect human sewage or detergents in the water and what we had them do is we had them sniff up a storm drain line so why this was nice is because you can pinpoint the sources. We had them start at Bryant Park because we knew there were problems there. They started right at the bottom drain and we sniffed all the way up. And you sniff and the dog keeps barking and when it stops barking you know in between where it barks and it did not bark you have a problem. And that is nice and I did not have to wait nine months for the grad students to finish up the test to tell me that. So it was really great. We had Scott's group come out in fall of 2010 to do half the drains and had them come back in spring of 2011. And like I said, we had the results immediately. The picture up here is, I think this is Sable's first day at Bryant Park in Traverse City and the picture on the left is me and my colleague, Maureen, and we call ourselves Sable's pup-arazzi. We

thought of so many lame canine jokes when Scott was in Traverse City it's ridiculous but I will see if I can remember some more of them.

>>Slide: Phase 2 – Sanitary Surveys/Source Tracking (Determining Human Sources – Canine Unit Cont'd)

The entire sampling program including both weeks they came up was less than 10 days. So less than 10 days we got the entire city of Traverse City storm drain system sniffed. The cost to us was less than \$8,000 because and that is because it did not take as long of a time and that was a few years ago so I think Scott's costs have gone up since then. But regardless, 50,000 or 8,000. I like spending 8,000 because I'm a small nonprofit and we don't really have a lot of money to spend on a lot of things.

These are pictures of the dogs that you saw before. Logan on the right there. He sits when he detects something. Sable in the middle, he barks. And there's me and Maureen again. This is with Sky. And Sky barks when he detects. And we had the fortune of having all three dogs come up, so we got to meet them all. So we are big fans of the pup-arazzi.

>>Slide: Phase 2 – Sanitary Surveys/Source Tracking (Determining Human Sources – Canine Unit Cont'd 2)

Something else I would will mention that was really great was that the city's DPW, those guys up here in the top picture on the right and the left, those two guys there were so much help and they helped us get the “as built” of the storm drain system and I strongly encourage you to get the “as built” because this actually shows you what was built and, you know, how it's put in the ground and that way you know what's storm drain what's the sanitary line so Scott can tell you there were a lot of mismarked things out in the field like sanitary lines being mismarked to storm drain lines and that sort of thing.

And also traffic was really important. We were doing some of this work in the summertime when we have a lot of traffic. So these guys with their blinker truck they would go out and stop traffic and put cones around. So it was really great to have them out there because we knew we could be safe and these guys would run ahead to the next storm drain and before Scott and I couldn't even walk up with Sable they had the drain open and waiting for us which was really great.

>>Slide: Sable in Action!

Oh this is a video I think I'm going to try to get to work here. But basically this project received a lot of press coverage. We had people that would come and stop by and ask us what are you doing here, you know, are you searching for dead bodies, searching for gas leaks. We had little kids come up and want to pet the dog and we got a lot of press coverage. The radio stations. I was on the radio stations, I was on all the local news stations, the local paper was interviewing us. It was great. Not only were we getting work done but we're also getting education done too. I will try this and see if this works.

[Video Playing]

There you go. You can see this lady up here with the red shirt with the vest. She was one looky-loo's that stopped by and said what are you doing? So we could educate her. So you see the guys working their butts off there. They got the drain off. They got it ready to go. Scott went up. It was pretty cool. So we also have another YouTube video that if you want to sometime you can go to our website, GTBay.org and there's a little icon there for our YouTube channel. And if you scroll down you can see another video we have and this time it's Sable and Logan. You can see Logan sit and then Sable come up and sniffs and then he barks as well. So this was really great to have them come up and do this work. How my doing on time?

>>Slide: K-9 Positive Hits on the City of Traverse City Stormwater System May 2011

Okay, this is a map of all the hits that we got in the Traverse City storm drain system which now that I look at it

it looks like a lot which I guess it kind of is. The thing with the city's sanitary system is that it's really old. And the storm drain system is fairly old too so I have a feeling there's a lot of leaking going on. So I'm going to talk about these sections. There is Bryant Park here and there is East Bay Park and then another section just south of there and then on the west side there is a Munson Hospital issue.

>>Slide: Positive Human Fecal/Surfactant Hits in the Traverse City Stormwater System October 2010

And let's see Bryant Park, this is the park that I said in the beginning of the talk here that was on the state impaired waters list. And what happened here is there are two storm drain lines and the dog started sniffing and they started going all the way up the lines and they got a hit up this line. I hope you can see my arrow. They got up this line and they stopped at this intersection and, of course, this intersection is one of the busiest intersections in Traverse City. So we did a camera inspection and we could not find any illicit connections along this line. Oh, Scott just told me because Joe was asking me how long all this took. And Scott said that the whole thing took 24 hours of field time. And then there is 186 storm drains that they sniffed. So we got a lot done in just 24 hours of work. All right, so at Bryant Park we had a number of hits along the line there. And what we found is that we could not really find any illicit connections. We did camera inspections. We are not really sure what's going on there so we still need to do some work. The city is hesitant to do any smoke testing because it will take a while because it's a busy intersection they are but also we are wondering if there is maybe a leaking septic system along this line because these are old and they got grandfathered in and did not have to hook up to the sanitary line.

>>Slide: East Bay Park

So East Bay Park. There were a number of hits along this line too up into the neighborhoods. And we thought up in this neighborhood another reason why the city guys were so important to have out with us is because they said that there is a guy up here that basically washes his car every single day. So we had a feeling that Sable was hitting on their surfactants right there. And let's see. There is also a lift station sitting in the vicinity right here so we thought there was some interference coming in from that area too. But again, here we have a feeling its leaking sanitary pipes that could be getting into the storm drain. We also did a camera test and we found a lot of that which is raccoon poop in the storm drains. So we know that raccoon poop is a big issue for this area and not necessarily human poop. So that is good to know.

>>Slide: Corner of Munson Ave (US31/M72) and 8th St

We also here -- I'll just go over this really quick, there is an auto detailing shop and they are illegally discharging this wash water into the storm drain. The city found it and the next day called them and told them to stop which they did.

>>Slide: Munson Hospital

This is another great one that we found. This is over by Munson Hospital and there is basically this big dumpster right there and it was leaking this oozy, gross, nasty stuff into the storm drain and Sable sniffed right up the line and stopped there and we took pictures and I contacted the Health Department and I called -- I know the facility manager over at Munson Hospital and they basically had the problem fixed within a week so I thought that was really great and one of the nice things about living in a small town is you can call somebody and say dude your dumpster is leaking and he's like alright I will fix it. And it is fixed it in a week. That's how we do that.

>>Slide: Action Plan for Healthy Beaches: Phase 3 – Additional Stormwater Controls and Implementation

So let's see. I have a few more minutes. I'm going to go over maybe just one of the stormwater controls if that's okay with you Cynthia. Because what we did is we did the education and then we did the source tracking and so now we had to actually take what we learned there and go through and do some actual implementation using this work.

>>Slide: Action Plan for Healthy Beaches: Phase 3 – Additional Stormwater Controls and Implementation (GLRI Beach Projects in Watershed)

So we had three beach projects going on that we did using Great Lakes Restoration Initiative funding from the EPA. Thank you very much EPA. I appreciate that. And we have Suttons Bay project up in north of here. I don't know if I will get a chance to talk about that one, but I will talk about the Bryant Park one here because that one is actually all finished. And then we also are working on East Bay Park. So Bryant and East Bay Park are the two beaches I said earlier that have bacteria problems and they are on the Impaired Waters List.

>>Slide: Bryant Park Beach Remediation - \$267,755

The Bryant Park Project, we bargained with the DEQ on this and this beach, this storm drain here would frequently overload and blow its top and spew the stormwater right into the beach but the actual opening for this storm drain is actually out here underneath the water. So that's just not fun to be swimming in storm drain water.

>>Slide: Bryant Park Beach Remediation Cont'd

So what we decided to do is after we had Scott's group come up and we knew that there were no illicit connections are obvious sources of human input although we do know that those human source -- human bacteria sources were found in the water, we knew that it was not any sort of illicit connections that we had to deal with. So what we decided to do since we had a large beach area with good infiltration we wanted to reduce the actual stormwater input to the bay and we chose an end of the pipe underground filtration system.

And these pictures here are the first phase of that where we actually put in the new connections to stop the overflowing pipe but also to have the divergent structure that would go to the treatment system.

>>Slide: Bryant Park Beach Remediation Cont'd 2

And in spring of 2012, so just this last year, we installed this big system that you see here. The first picture here and I have these little red arrows that you can follow to see where the water goes. So the water comes into this diversion structure and this is actually an oil grit separator and that will settle out some of the heavy solids and then it goes from there into these two concrete box structures you see at the bottom of the picture here. And the runoff goes through those structures, it further settles out with the solids and there is actually screens between the second and the third compartments and those screens are filters and actually filter out finer things like cigarette butts and pine needles which are considered neutrally buoyant so they don't sink and they don't float, they just kind of float along the middle of the water.

>>Slide: Bryant Park Beach Remediation Cont'd 3 (Completed!)

And then from there the water goes out and it goes into this divergence structure at the top of the page there you see. And then from there water flows down this long chamber which diverts it into this header tube which is this black tube on the right and from there the water overflows into those infiltration tubes. And from there it actually infiltrates into the soil. So the gravel in there will help it filter into the soil. So our goal there is to actually reduce the amount of stormwater getting out into the bay by actually taking it out of the storm drain system and filtering it into the ground. We will be testing this, our beach monitoring program will continue throughout the next year or so as long as we can continue receiving funding from the state and the federal government. And hopefully we will see a reduction in the amount of bacterial contamination at this beach. Yes, this project is completed. That makes me happy. You want me to stop big talking now Cynthia or do you want me continue on?

Cynthia Curtis

What I would like to do is make sure I give people a chance to ask questions. And so what I will suggest is as you all are thinking if you have questions for any of the three speakers to start typing them in the chat box now.

>>Slide: East Bay Park Beach Remediation – \$767,648

And I know we have this reserved through 11:15, the time blocked out for people. We can go a little over, but I also want to be mindful of that. So if you have like -- take a couple more minutes and then we will shift over into Q&A. Okay.

Sarah U'Ren

All right, thanks. I actually only have a couple more slides. This is our East Bay Park remediation project. This was almost \$770,000. But this is on East Grand Traverse Bay and again, we were having problem with the storm drains. They come out right here and you see the swimming area right nearby.

>>Slide: East Bay Park Beach Remediation Cont'd

So what we wanted to do here, again, we knew that there was human sources of contamination but we knew that a larger source was the raccoon poop that I showed you earlier. So we knew that there was no illicit connections that we had to take care of. No obvious sources of human input. We also knew there was poor infiltration here. A lot of clay soils, the groundwater table was high. So what we did is we chose to actually have an end of the pipe underground manufacture filter system on these three separate lines that go into the bay. So basically the water will come through and go through diversion structure, oil grid trash separators just like at the Bryant Park Project but then in the end it goes into this proprietary thing called the Helix Cartridge Filtration System and it's a high flow cartridge but it's designed to treat and reduce pathogens, sediments, hydrocarbons and nutrients in stormwater before it gets to the bay. And then all these drains are actually -- we will have them come together at one new drain outlet on the south end of that beach there. This project will actually be done this coming spring so hopefully we will see some good results with that and continue our monitoring program to make sure.

>>Slide: Sutton Bay Stormwater Remediation – \$987,102

The last one I have is the Suttons Bay Stormwater Remediation Project. And basically all you need to know here is that Suttons Bay is a small village north of Traverse City. There are three main storm drains that come into the bay. We do have bacteria advisories down here at South Shore Park. Marina Park Beach is not tested though.

>>Slide: Sutton Bay Stormwater Remediation Cont'd

And that picture did not show up. So we actually also had Scott come out again with his K-9 unit here to determine if we had any human or animal sources of bacteria because again, we wanted to make sure if we had to deal with human poop or animal poop. So this actually only took a single day and we did not have any hits or human sources of E. coli that we found. So we quickly verified this was animal rather than human and then we could do our remediation project accordingly.

>>Slide: Sutton Bay Stormwater Remediation Cont'd 2

So what we are going to do here is install a series of BMPs that will actually increase infiltration up within the village which will actually reduce the amount of runoff making it to the actual outlets. So we are trying to actually eliminate any stormwater output at all. We are going to do this through rain gardens and infiltration trenches throughout the village. So we will have infiltration trenches running along the street and we'll also have rain gardens at the corners of a lot of the village roads. So we will take out some pavement and we will dig it out and plant some plants and make it a rain garden and put a riser on the existing storm drain structure or the storm drain inlet and then the water can fill in the rain garden and once it overflows it goes into the

storm drain system eventually making its way to this infiltration trench. And so what our engineers have told us is if we do this we will actually eliminate 95% of the stormwater outflow from all those drains. Additionally, we will also redirect these two outlets right here. We will redirect them into the wetland. We also will get DEQ permits since Joe Rathbun is sitting right behind me from the DEQ. We are going to get a DEQ permit to discharge into the wetlands for additional treatment.

>>Slide: Questions?

So with that actually now I am done. So 12:13. I've got two minutes. Should we start the web cam?

>>Webcam: Joe, Scott, and Sarah

Cynthia Curtis

Yes, please go ahead and start. And so far not seen any questions come in the chat box but of course, I have one. So first of all, thank you to all three of you. Those were great. Really enjoyed learning about them. So Joe the one that is most off the screen this is the guy I have a question for. Joe, how do you see this playing in to a bigger statewide -- a bigger statewide strategy?

Joe Rathbun

I'm sorry what was the last bit there, Cyd?

Cynthia Curtis

How does this fit into -- we are talking about state nutrient strategies. Do you see this fitting, how is Michigan using this or do they have intention to use this as a part of a bigger statewide project?

Joe Rathbun

It will certainly become a routine recommendation from the 319 Program, the nonpoint source program. We have not taken it to some of our other branches of DEQ -- excuse me, and I think the Michigan Department of Agriculture too to illustrate it to them. That is the next step for us for sure.

Cynthia Curtis

All right, cool. All right, go ahead.

Scott Reynolds

It looks like we do have a comment here from Dana Strauss. And I think we have been talking to her about Ottawa County. About the potential of bringing the canines out there for the deer and bass area. So we are hoping that that gets funded. And we might be able to do some work out there.

Cynthia Curtis

So the one she sent you. I think she sent it to you directly. So if there was a bigger question if you could read it out for the group.

Scott Reynolds

That is it. That's all there is.

Cynthia Curtis

And then I see Eric, you raised your hand. If you have a question if you would not mind typing it in the chat box just to make sure we are minimizing any audio difficulties.

And let's see, so with that I will allow that to kind of transition. In the interim I want to thank everyone and

remind you that one, at the end of this webcast I will launch you into a URL of the YouTube videos. And also our next webcast is March 6th and it is Richard Cook from the University of Illinois talking about bioreactor sizing. This is our first recording so we are still working on a little bit of the logistics. The hardcopy presentation will be available on the web and I'm working out exactly how the recording is going to show up in the interim. If you are not on our e-mail list, please send me an e-mail to follow up and I will get you on our mailing list.

All right, great. We have one other question it looks like for Scott. What type of training is involved for the dogs?

Scott Reynolds

Well we do the scent training. Essentially, what we do is we -- the East Lansing Wastewater Treatment Plant has been really good to us about supplying us with sewage for the training. The way that we do it is we start out with this what is called imprinting where we introduced the scent to the dogs first of all to make sure they do not have an aversion to it. Believe it or not some dogs don't care for that stinky stuff. And then they move on through different processes until we are sure that they have what it takes. It roughly takes between eight months to a year depending on the dog. And they do vary depending on their actual drive. But roughly eight months to a year before they actually are certified and we put them in the field on projects.

Cynthia Curtis

Great. Thanks, Scott. At this point we are only two minutes over our allotted time. I want to thank you, all three very much again for a great presentation and thank everyone else for attending. And I will be wrapping up this meeting. Thank you again, and I will see you all or hear you all in a month. Thank you.

Scott Reynolds

Thank you.

Joe Rathbun

Thank you.