

# TRANSCRIPT

## Recovery Potential Screening: A Tool for Comparing Impaired Waters Restorability

February 22, 2012

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### **Speakers**

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Tatyana DiMascio – Instructor, US EPA, Watershed Branch, AWPD/OWOW

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Anne Weinberg – Moderator; US EPA; Office of Wetlands, Oceans, and Watersheds

### **Anne Weinberg**

Good afternoon and welcome to today's webinar titled Recovery Potential Screening: A Tool for Comparing Impaired Waters Restorability. This webinar is sponsored by EPA's Watershed Academy and the Office of Wetlands, Oceans, and Watersheds, also known as OWOW. I am Anne Weinberg of EPA's Office of Wetlands, Oceans and Watersheds, and I will be moderating the webinar along with Menchu Martinez who also works in EPA's Office of Wetlands, Oceans and Watersheds. Thank you all for joining us today.

We are going to first start by going over a few housekeeping items. The materials in this webinar have been reviewed by EPA staff for technical accuracy; however, the views of the speakers and the speakers' organizations are their own, and do not necessarily reflect those of the EPA. The mention of any commercial enterprise, product or publication does not mean that EPA endorses them. We first want to go over a few housekeeping items about the features of today's webinar. We encourage you to submit questions to our speakers during the webinar. To ask a question, simply type in the questions box and click send. If your control panel is not showing this, simply click on the small orange box with the white arrow to expand it. If you have any technical issues, you can let us know by entering it in the questions box as well to the right of your screen, and then clicking on the send button. We will do our best to respond to your issue by posting an answer in the questions box. This webinar will be recorded and archived so you can access it in a few weeks after today's live presentation. The archived webinar will be posted on EPA's Watershed Academy webinar page at [www.epa.gov/watershedwebcast](http://www.epa.gov/watershedwebcast), and that's spelled as one word. This webinar on the Recovery Potential website will help states, watershed groups, and others become acquainted with the new website and a methodology for analyzing and comparing restorability differences among watersheds. The website provides step by step screening directions, time saving tools for calculating indices, and displaying results, summaries of over 120 ecological stressor and social indicators, a recovery literature database, and several case studies. Recovery Potential Screening was developed to assist complex planning and prioritizing, provide user customizable, but systematic and transparent comparison approach, and to help improve restoration program results. You can see the details of this tool on the website at [www.epa.gov/recoverypotential](http://www.epa.gov/recoverypotential). Again, recovery potential spelled as one word.

It is now my pleasure to welcome and introduce our two expert speakers. Our first speaker will be Doug Norton, an Environmental Scientist with the Watershed Branch of EPA's Office of Wetlands, Oceans and Watersheds. For 20 years in the Office of Water, Doug has specialized in the development and transfer of technical studies and tools for state and watershed practitioners, including the Watershed Academy's online training and certificate program, the TMDL Results Analysis Project, and the multi-agency stream co-administration handbook. His focus on watershed restoration and efforts to improve program success with limited resources led to the multi-year study of factors influencing differences in impaired waters restorability. The products of that effort are the Recovery Potential Screening approach, indicators, the tool, and the website that you will hear about today.

Our second speaker will be Tatyana DiMascio, an ORISE fellow also with the Watershed Branch of EPA's Office of Wetlands, Oceans and Watersheds. Tatyana works closely with Doug on Recovery Potential Screening, as well as on policy and technical issues pertaining to impaired waters, and TMDLs under Section 303(d) of the Clean Water Act. She specializes in watershed analysis using geographic information systems, the development of new enhancements, and uses of EPA's surface water quality data system, attains an impaired waters policy analysis. One final note before we get started with our first speaker. We will try to answer as many questions as possible throughout this webinar; however, due to the high number of participants, not all questions will be answered. However, we have posted the speakers' contact information in case you'd like to contact them after the webinar. You can find the speakers' contact information at the end of the slide presentation posted on the Watershed Academy's website at [www.epa.gov/watershedwebcast](http://www.epa.gov/watershedwebcast).

So now, without further ado, Doug, please take it away.

### **Doug Norton**

Thank you, Anne. I'd like to welcome everyone here and echo Anne's comments. It's great to have the opportunity to speak with you all. Also, I'd like to congratulate the Watershed Academy on their 62<sup>nd</sup> webcast. Having worked on the Academy in the mid-90s, and started its online web based training system; it's come a long way, so congratulations to Anne and others for everything you've done here. I'll skip this first slide here, and go right in to what we'll cover today. Although the billing really was about the website, the Recovery Potential Screening website, then what we've really scheduled this webinar to put together is how Recovery Potential Screening methods and tools work. You can always pop onto the website and see that, but what we thought would be the best time of use would be to go ahead and go through the recovery potential basics, some examples of ongoing projects that have been going on in several states around country, using recovery potential tools in a live demo of how those tools work, and a Recovery Potential website online tour.

First the basics. I would like to start with just a kind of a philosophical statement, we've had efforts to restore and maintain and protect America's waters for a long time, and restoration has been estimated to be a couple billion dollar a year enterprise actually, with all the efforts that go on to take care of our precious American waters. One of the interesting things though is that for many

years, there hasn't been a lot of progress in exactly how you could consider the relative ability to recover as one of the things that goes on when you do a restoration. And this has been a challenge mainly because the data weren't there for a long time, and decision systems that might help compare one water to another, and the differences it might have, and the types of factors responsible for one place being easy to restore and another being difficult, so part of that explains why there hasn't been this kind of ability to do this in restoration programs. But this was something that when, in the late '90s when I was working with a cross government team that involved 17 agencies doing a restoration handbook, then one of the things we thought as we wrapped up that handbook was where else could we go with restoration to really help restoration succeed. I took a special interest in this topic, and the idea of restorability and helping people get more insight into how things differ in terms of how they restore it, and then use that information in the best way possible. This is where Recovery Potential Screening as a concept originally came from. What is it? It's basically a method to help states and watershed restoration practitioners compare differences in restorability.

I work in the Impaired Waters Program at the EPA, where the home of TMDLs and listings of impaired waters under the Clean Water Act, which are national requirements, and so, this is where the idea started. It was mostly in relation to impaired waters. We now see that we have far broader audiences expressing interest just in being motivated by wanting to do better with restoration. The nonpoint source programs, fisheries programs, various restoration programs on a local or state level, individual watershed studies, statewide programs, even regional and national programs have all had some interest in this, so we are having to keep up with and need to be flexible in the approach. Fortunately, it was one of the ways that we wanted to design this method from the beginning. We also thought it would be very important that this would be a scientific method and as such, one of the easiest ways to design that would be to have indicators and use them mainly with geographic information systems, which allows you to put these values of different indicators onto the watershed basis, and also field monitoring data, so you had a reality check in what was going on the ground rather than making assumptions merely from the geographic data you had. But what you see at the bottom of this slide is our working definition of recovery potential, and the most important thing to take note of, if you take note of nothing else for this next two hour period, then note these three bullets here: the ecological capacity to re-attain its functionality, the exposure to stressors as another factor, and the social context, which also affects efforts to improve the condition of a watershed.

Those are kind of three dimensions of the major factors that influence the likelihood of a water body that has some problems to be able to be restored. So where did we start with this working concept? Well, we hit literature in a big way, and over the course of a few years, we looked into several hundred different published papers, really just looking for factors that influence or are associated with impaired water's recovery. What we were able to do was develop a cumulative literature database, and we also saw a lot of the factors we found in the literature converging into these three basic dimensions that I mentioned on the previous slides – the ecological, the stressors, and the social contexts.

I'd also at this point really like to thank EPA's Office of Research and Development, and in particular Jim Wickham and Tim Wade of the National Exposure Research Lab, who played a really key role in the first several years of working on this concept and doing our first demonstrations with me, and so starting from that idea of getting the literature, working up all those factors that had a relationship to restorability, and what we are now is, as advertised, the Recovery Potential website which became active in January of this year. There will be a lot more about that website coming up as the closing information of this webinar, so I just wanted to put up the cover page, the home page of the website at this point, and give you all an opportunity to get down that brief alias URL down at the bottom of the page, it's a lot shorter than the long one.

So you have the basic concept of where it started and where it is now with the user support website. The next two slides go over some of the several ways in which Recovery Potential Screening has been used by its various practitioners, and as we started talking about then working with impaired waters prioritization was a major part of that. Which watersheds in a given river basin or in a statewide program are more restorable and might recover quickly, and what maybe should be better done now versus later, maybe because of being under greater risk? Also, you could find out in looking at a screening, how are – if you measure the same indicators on all the watersheds you want to compare, then what kind of differences would you be able to detect? The level of difficulty, were you to take on any combination of the above? No restoration program I have ever heard of in my life has enough money to work on everywhere it wants. It's just a fact of life in our business, so we always have to look at levels of difficulty in where we make choices. If you're going to have to work on a very difficult place, what are the factors that make it so difficult? What are the chances of success? On the other hand, are there some things that you could work on that would build a track record that would give you some early successes and get people to buy in that you could be successful at restoration? There are all kinds of complex opportunities that may get a little easier, if you have a way to do these kinds of comparisons and uses of Recovery Potential Screening. TMDLs, which if you don't know what a TMDL is, then it's basically a pollution diet but you have to put a water on, if it's too polluted to maintain water quality standards. There are about 50,000 TMDLs that have been done nationwide, and one of the important questions is which ones would be the best ones to go ahead and try to implement and have restoration succeed there. This is another one of the methods where you can pose that question, and get some insights into choosing to invest in working up a restoration on one water body, rather than another.

Nonpoint source program strategies. Looking at differences throughout the landscape and how they affect restorability and this certainly affects any number of factors in that. Now looking down – I've said a few things already that seem to be orienting toward state programs quite a bit, and I apologize for that because that's actually where most of my work centers, and where Recovery Potential Screening originated, but I don't want those of you who are from watershed level programs to think that there is nothing in it for you. Recovery Potential Screening really allows you to compare subsets of any whole, whether they be 10 or 20 sub-watersheds in a watershed you're working on and you really don't work on the statewide picture at all, then that's fine but you can still use Recovery Potential Screening. It's also important to note that although general restorability differences is often a topic of screening, and one other option that people go through

sometimes is to focus a little more narrowly and look purely at for example, all their nutrient impaired waters, or look only at their urban watersheds, or look at the water bodies that contain fish populations, and you have not so much apples and oranges being lumped together as a group, you've got a more homogenous group of things you're trying to compare with them. You can focus your indicators better and learn more about the exact problem you want to address. Now there are also some other interesting things about uses of Recovery Potential Screening that have been coming out over time that we have been working with its users, and one is that it proves to be a very interesting tool to aid communication and interactions between levels of government, and across agencies. The idea of having looked at a screening and what seems to be priorities for certain questions gives you a chance to compare – well if you're in a watershed, how do your findings and your priorities compare with what you're seeing on a state level. In particular also, the idea with the interest in healthy watersheds, as well as restoring impaired watersheds, then there are certainly ways in which recovery potential can help reveal synergies between protection and restoration, which cannot afford to compete for the same money. They must be well coordinated and integrated, and there are ways to do that when you learn what factors you share in protection and restoration interests.

So, moving on from there, the idea of very basically, how does Recovery Potential Screening work. Here again is one of the most important slides of the day. I've mentioned already the idea of the three main dimensions of how you look at Recovery Potential Screening. Those being the ecological, the stressor, and the social context factors that will make restoration easier, or harder. What you have here shows that you would just be choosing a set of indicators, first the ecological indicators. They don't necessarily have to be five. They can be anywhere between 3 and 8, or 10 or more, but this is just for simplicity on the slide. And then a set of indicators about the most important factors that relate to the stressors. And then the third set being your social indicators. Each one of those creates an index, an ecological, a stressor, and a social index score. You can think of them as evaluation factors, and you'd have three sub-scores out of that, and that is very revealing in itself, because you do see the ecological capacity, how healthy is the system to begin with. You see how much of a stressor problem there is, and you also see the social context that can affect your chances of success in one place or another. But also some people really like to have a bottom line score, and that's what that formula at the bottom of this slide is all about is you can combine the ecological and social, which are scored as positive influences, and the stressor which is scored as more of a negative influence into a formula, and you can get a bottom line score where the higher score of that integrated score implies better recovery potential or worse recovery potential where the score is lower.

You're also probably curious by now about what kinds of things are included in what we would call the particular indicators in each of these three categories, and the next three slides are to give you just an introduction to that. Now again, everything you're going to see today is on the website, so don't worry about getting too much out of this one slide or the next two, because you can read everything you want about any of these indicators on the website later, but what I'd like you to take note of is on the left hand side of this slide then the 6 key factors are the types of things you're thinking about when you are choosing indicators for use in the ecological category.

Looking at watershed properties. You are also looking at conditions within stream order of the watershed. It's also important to be looking at flow and channel dynamics. These are very, very important primary characteristics of watershed health, all of these. Biotic communities tell you a lot about condition and ability to improve condition. These also have got some landscape concepts like aquatic conductivity and ecological history.

And then on the right-hand side you see several of the indicators that relate to those basic key factors. Now we've moved on to the stressor category. Again, you see we are looking for factors that relate to watershed and corridor and flow and channel characteristics. Again, biological factors are in there. But in this case we also see the severity and the complexity of pollution and also the land use legacy's, past pollution that may still be haunting the condition of the watershed. And on the right you see several examples, again, of stressor indicators. There are several – many, many more than this on the website, by the way.

Now the third category here is the social context indicators. And you see this is quite a mix that has been lumped into here. Some of these are about incentives, about human behavior, and community support. Some of them are about cost, complexity, how much is known or unknown about level of information. Socio-economic factors come in here. Regulatory factors and opportunities to protect things because of ownership. All of those factors all come in. Now they are not about the condition of the watershed right now. They are about the surrounding factors that also influence what may happen in the future. And that's why the social dimension is. That third dimension is such an important complement to the other factors that are in there.

That brings us to our first break point where we have an opportunity for some of the questions to come in that may have been posed thus far. Menchu, do you have any particular questions coming in?

**Menchu Martinez**

Yes, the questions are pouring in and thank you, Doug. The first question that I would like to read is that what forces or data sets were used as the basis for ecological indicators?

**Doug Norton**

That's a pretty general question there. And one of the things that I would like to say is that we have probably 40 or 50 different ecological indicators that are written up on the website and the sources for each one of them differ quite a bit. In one manner of answering the question then the source – originally, the idea of what indicators came from – where the indicator came from was ecological literature about stream restoration and recovery. And the data sources which also the questioner may have been referring to, those really vary by the particular factor that is being asked about. Many of them come from GIS data sets like watershed, land cover factors, forestry and such. But also some of these come from field monitoring such as bio assessment results that have been compiled in several states on watershed basis.

**Menchu Martinez**

And the second set of questions also refers to the indicators. Have you done a statistical analysis on the indicators to see a few of them actually drive the results?

**Doug Norton**

That's a great question. And I think that the only way to really properly answer that is that that is the type of activity that one gets into on an individual project if you would like to pursue that. I often point to the fact that although we do talk about summary scores in the eco, and in the social, and in the stressor area, then it is also possible to look at the differences through all your watersheds on an individual basis. So it is possible to do things like sensitivity analysis and look at which of those indicators are in fact most important to the group of watersheds you are really looking at right at the time.

**Menchu Martinez**

We have a question from South Africa. And thank you for joining us. This refers to how the tool is applied. Doug, you mentioned applying this at the statewide watershed or subwatershed level which would be a proactive initiative restoration effort. What about from an enforcement driven restoration project in order to rectify environmental impacts from legal activities? And these activities would be done at the smaller scale, smaller than the subwatershed. Would this tool apply to that as well?

**Doug Norton**

Well, if you have any unit that you are interested in comparing differences on, that unit can be – I think I stopped at subwatershed just because, I do like most of us in OWOW here, we do advocate taking a watershed perspective on your work because oftentimes whether or not you are looking at the smaller area or unit than the watershed has a heavy influence above and beyond the immediate place you are looking. But you could actually be looking at stream segments in order to apply a tool like this in the manner that the questioner is asking. So yes, it may be applicable. What I would not advise is taking a small stream segment here and comparing it to a large whole watershed over somewhere else and then comparing it to a political jurisdiction in a third place. You would be mixing units so you do need to keep whatever unit you choose as the basis for your comparison.

**Menchu Martinez**

And we have a question about ecological capacity. Is ecological capacity the same as carrying capacity?

**Doug Norton**

Actually, I'm glad that the questioner has asked that in particular. I think a better synonym from the ecological terminology is resilience. The ecological capacity to regain functionality is just – we've stated it that way just imply the fact that we are mostly looking at impairments and the ability to regain the opportunity to be fully functional. And I would say resilience is the closest thing to the same term.

### **Menchu Martinez**

And I think we have room for one more question. How did the degree of impervious surfaces affect the watersheds restorability?

### **Doug Norton**

Ahh, that's a terrific question. Impervious cover has been a very, very powerful influence on a lot of watersheds especially in developed areas. And the intriguing thing about the research there is that we used to hear several years ago about when impervious cover got up about 10% or so of a watershed area that it was very difficult to reverse what had been done. Now we are learning so much more about impervious cover. I don't want to go into it too much because the limited time here. But we do have several different versions of impervious cover indicators that you can read on the website. And I've even heard some research pointing out biological effects down to just a couple percent. Rather than while we used to think was something that was maybe was around 10%. So we keep learning about these indicators and what they mean and they may mean different things in different places too.

### **Menchu Martinez**

Well thank you Doug. I would like to give the floor back to you to continue the presentation. And just to remind the participants that we will have another Q&A session a few flights down the road.

### **Doug Norton**

Okay, thanks Menchu. Moving onto the next section here. You pretty much had the basic constructs, the skeleton of what Recovery Potential Screening is built around being those three different dimensions of indicators and the scoring process and the ability to come out of it with summary scores. Now considering that, what do you then do with what you are coming out with? And I would like to turn the discussion now to the fact that there are three real types of Recovery Potential Screening products. One being a simple rank ordering. Just as who scored the best, who scored the worst, what's the order in between. And the second product is something that might be new to some of you but also familiar to many of you as well. And that is something called a bubble plotting. It's a way of looking at three different dimensions. Again, the three dimensions seem to be a very good connection using this tool. Three dimensions of a concept and you can actually view the way things compare to one another along those three dimensions and see those three dimensions simultaneously.

The third tool is mapping which we are all familiar with and it's always been a popular way to express information and communicate about it. So how do you use these types of products? In one sense than just the act of comparing differences is really where this all started out was just, you know, provide a basis to systematically compare differences and allow people to see those differences. But also we have found that some of the tools, and sometimes some of them are better than others for this usage, is that they can inform plans and decisions before they've been made. Sort of aid the discussion and aid people's



insights and bring up points they hadn't really thought of because of different ways of portraying the data. And the third is to communicate finds. We all have a boss somewhere above us and we have to communicate what we think we have decided or what we recommend. So all three of those are particular uses of Recovery Potential Screening products that we have seen come out of the time we've been doing mapping.

A little bit more detail about each one. This is a rank ordered sheet of results from a Recovery Potential Screening we did. And what you are seeing here is not just rank ordering from best to worst overall score. You are seeing the rank ordering done in four different ways here. You are seeing the number – it's in the order of the overall score but you also see that the rank ordering can be done purely on the ecological score, purely on the stressor score, or purely on the social. So we actually, as a standard product, have a tool that we will go into a live demo of later and this is one of the things that comes out of the scoring of that tool is portraying the rank ordering in these four different ways. So you are getting the idea by now that there is not one rigid result that comes out of doing Recovery Potential Screening. And that's a very important realization.

This is not a tool that's meant to tell you one way to do things. This is a tool to provide alternatives. To provide you insights from those alternatives, give you chances to look at the alternatives, discuss them, and maybe make some choices on what your final decision or order or selections or whatever you are doing would be. But this is not something for us as a national agency to be sitting there spelling out here is the one way for everyone in the country to do with the same way. It's a very flexible tool. And we recognize there are many differences from place to place. That's what we are trying to accommodate by creating a tool that catches options rather than one way to do things.

Here is the second tool. And I would like to say a few things about bubble plotting because it's been a surprisingly popular feature of doing Recovery Potential Screening with the users that we've worked with. And one of the things they really seem to like about it is that when you look at this as a graph, the bubbles you are seeing there are each an actual watershed and the way they end up on the plot and the reason why the bubbles are different sizes is because the eco score is the Y axis, the stressor scores is the X axis so they fall out on their score, each watershed falls out somewhere on this plot. It's the basis of those scores and then the dot size reflects the social score. So one way you could conceivably use this type of a plot is looking at that upper left quadrant. Then you see there are a number of waters that have fallen into that area there. One other thing I should mention, too, is you see that there is a solid blue for healthy and there is a hollow circle for impaired. The healthy are based not on the recovery potential scoring. Those are based on field data and determinations of healthy watersheds for bio assessment in this case. And that was information that was available. It was not done in the Recovery Potential Screening process.

But it's very valuable because there are your reference sites. And they should, you would expect, probably be up in that upper left corner where you see them with high eco scores,

low stressor scores. And often times you will see a fairly good-sized social score too because the social's context has been good for them to remain healthy. But you also see up there are a few watersheds that are impaired. And some of them have fairly good sized circles in there to. So they look like they might be good prospects for restoration.

Now if you look at the upper right there are higher stressor scores there but also the eco score is still good. So maybe that's another basis for using this kind of thing. So as you can see this is very thought provoking. People like the idea that they can see the eco, the stressor, and the social scores all at once in comparison.

So just for example, you might be able to use the bubble plot posing a question like this if you were to say, "If you had to build consensus for restoring 4 of the circles that are in red, the impaired ones, then which for would you choose?" There are some that look very promising and very strong in terms of their ecological indicators and others look like they are in pretty bad shape. So if you are simply looking for the ones that had as much value left you would want to choose those. If you were looking to tackle some of the most difficult things that affected the water downstream you might choose one's down below. But, in fact, it gives you some insights into what you are dealing with.

Now mapping is the third type of product that you can come out with the indicators. And again, in this case, the mapping that you will see here, this was from a statewide study in Maryland. The watersheds that were considered healthy are in yellow. And then the other – all of the other watersheds are in different shades of blue. And just in the general sense think of bluer is better. The darker blue is better. So if your question was which impaired waster restorations would most help meet the healthy watershed goals and increase the amount of healthy watersheds statewide then you could take a couple of different strategies. Like, for example, using a classic approach of landscape ecology that expands the size of the healthy patches. Try and build bigger out of smaller ones. So one opportunity would be where are the top quartile of the impaired waters falling in relation to the ones that are already helping. You see those three choices would be pretty ones to expand the size of a patch of multiple healthy watersheds.

And another technique out of landscape ecology is just looking at the idea of trying to reestablish healthy corridors. And in this case, you see, if you've already done or if your done looking for the high-scoring waters to be merged with the healthy watersheds and then you see one that even though it is in the second lowest category of the score, it lies in such a crucial position down there in the middle where the left-hand arrow is that it might be worth a lot of work if you could actually connect these two very large areas of pretty good condition. So this does give you an idea that not only can the mapping help explain what the differences were and how things ranked but can give you new insights into thinking of where you might want to consider investing some work for particular reasons like that.

So again, that is just a quick part about the three main types of products that come out of Recovery Potential Screening. And we have an opportunity for more questions?

**Menchu Martinez**

All right, Doug, the first question for this break is – is there a seam or closed crosswalk between the ecological indicators for this screening tool and the ecological indicators or factors used in EPA's Healthy Watershed Initiative? And a closely related question to that is how could this tool be used to maintain a good watershed that is to make sure that it does not get on the impaired waters list?

**Doug Norton**

Boy, these are great questions. I do want to say first of all regarding the connection to healthy watersheds, the Healthy Watersheds Initiative and Recovery Potential Screening have come out of the same division here at EPA. And the principle for healthy watersheds and I speak all the time about this. I have taken our master list of recovery potential indicators and crosswalked it with the six main categories of healthy watersheds assessment. And I have that available if the questioner would like to send me an email afterwards I'd be happy to share that because that really covers how healthy watersheds concepts and recovery potential concepts are so well linked. I was also able to participate in the workshop on developing healthy watersheds assessment techniques and indicators. And we also are going to do some work. We have done a little bit of work already in Vermont. And we are going to do some more work on healthy watersheds and recovery potential synergy starting in Kentucky very soon. And hopefully some more places.

**Menchu Martinez**

I have a question here regarding the stressor indicators selection. The question is what is the U-index?

**Doug Norton**

U-index is actually, you might call it the anthropogenic cover. The human made cover. It's basically, if you have a land cover map then it's the sum total of all the land cover mapping categories that are essentially not a natural indication or soil situation. They have been transformed by human activity. And those basically amounts to the urban and the agricultural change are in that. And I think also there is a mining category that's in that as well.

**Menchu Martinez**

There are a couple of questions related to social indicators which are clearly important. The first one, some of the social indicators seem likely that they might be difficult to quantify. How do you quantify them? And a related question to that is: wouldn't that depend on the agency or government if there is a government agency involved in the social indicator?

### **Doug Norton**

Very good questions. The idea that some factors are difficult to quantify is absolutely true. We have not shied away from identifying those among the list of eligible indicators because what we have found is that some places and some states tend to have information that is terrific information on factors that not everyone else has. And so even though it may not be something that is very common, you may find for example, that one state may have done a terrific amount of work on having their – let's say the patch size of the ownership, of the land owners in an area that gets at a factor like land ownership complexity. And another place just may not have done that with the property maps so you can use as a surrogate, in that case, something like the average patch size of the land cover map. It's not as good but it does give you an idea of how fragmented and dissected the landscape is. And how many different interests of how many different stakeholders would have to be brought together to get agreement in a certain watershed. And we know that getting stakeholders at the table is crucial. We also know that the more different interests that are there, the more challenging it can be to get everyone to agree. So those are some of the ways that you can get at some of the indicators that may not be obvious as to whether there is a data set right out there waiting to be used.

### **Menchu Martinez**

Thank you, Doug. I'd like to turn it back to you again. And for those participants who had questions we have got in a lot of questions and we will try to cover them as much as possible during the next break session.

### **Doug Norton**

Sure, thanks, Menchu. And there is also our contact information is there and anyone that would like to send their question in an email later please feel free to do so. I would be happy to have Tatyana and I take care to get it back to you on those too.

The third section here is really taking a look at – well we've seen already what the basics are and how this generally works. I'd like to really go through some things that different states and regions and watershed projects have done with Recovery Potential Screening. This – I'm not going to talk about each of these individually but I just put up this national map to give you a sense of where some of our activities have been occurring thus far.

The blue are the heaviest area of activity but also the yellow has been generally either training or inquiries of interest. I think we all are aware that it has been a rough couple of years economically for many states to have much money to do things they really want to do. So we have had contact from a number of states who have been interested in working with this process, but have not really been able to have the budgets to proceed on this.

And that is unfortunate because in a way, it's a tool that can help prioritize and focus work with less money. So in a way it's ironic that it turns out that way. But you will see many of the areas that are in yellow are ones that there has been some interest but not the ability yet to quite follow through.

And if you are from one of the green areas and in the green states then by all means give us a call. We have been helping everyone out in any way we can whether it is just emails or phone calls and now with the website we can probably help you out if you'd like to try out Recovery Potential Screening.

I've gotten together a little bit of notes from several of the different studies that we've done over the last several years. The first pilot that we did really was an Illinois study where we were looking at the impaired waters list. This 303(d) refers to Clean Water Act section 303(d) where the state puts out a statewide list of impaired waters every two years. So we used the 2002 impaired waters list and what we were doing because this was so early in the process. We did have any of the tools that we have now but were mainly looking at could we map indicators of relative differences and restorability on a statewide basis. We actually succeeded in mapping 104 different indicators, kind of en route started to realize that they fell into these three categories, the ecological, stressor, and social categories. We did try out some forms of analytical management and some of ranks and other techniques, but basically we also learned that too many indicators was bad thing.

So the next study we did was a much, much more narrowly focused study which was looking at the opportunities – using Recovery Potential Screening to compare where mining restoration interests from abandoned mined lands, fisheries restoration interests who were targeting brook trout restoration. And the Eastern Brook Trout Joint Venture. A wonderful program that has been going on throughout the East. And the Impaired Waters Program under the Clean Water Act. Three different programs all had kind of a Venn diagram and a common area of interest where were their potentially recoverable native trout populations that also had abandoned mined land impairments and were on the 303(d) list. So this analysis being so focused as this, added in a few other Recovery Potential Factors and completed the analysis in a week or two in Pennsylvania. It's quite remarkable that it was so quick. But it was just because it was narrowly focused and it did give us the realization that if you weren't trying to work up 100 factors. You could really have your results quite quickly. And some of these waters actually won new restoration funds in Pennsylvania as a result of pointing out that they had scored well in this analysis.

Now Massachusetts on the other hand has been our most recently active statewide project. And this has been a very rewarding project to work with. Massachusetts wanted to work at two different watershed scales. Those of you who are familiar with the HUC watershed units that is a standard unit of watershed size. HUC12's are about 38 square miles in size. But the state also had smaller subwatersheds that were worked up by USGS for a flow analysis study. What was really rewarding about working with Massachusetts is that they had the 319 Nonpoint Source Program at the table. They had the TMDL program at the table. They had other agencies from the state that were also interested and a lot of input into what the factors were that were of interest in looking at differences in restorability.

Another thing that was terrific about Massachusetts was they had a statewide data on changes from natural flow done by USGS that provided all kinds of flow indicators just referring back to the questioner about some of the data might be hard to get. And Massachusetts was very lucky to have the flow information from that study.

Now we wrapped up the production phase of the Massachusetts support that we were doing in a workshop in November where we ran through with the people who were from the programs the tools and techniques with their statewide data. And this is a list of 11 different statewide screenings that they themselves completed in the course of a two-day workshop.

You see there is a lot of different things being looked at here. There is a generic kind of statewide overhaul restorability. There was a healthy watersheds first draft assessment. There was a look at flow impairments and how they compared to the different watersheds on both of the scales. Sediment related, nutrient related, some things that related to the nonpoint source program, priority setting. And two different ways of looking at nutrients issues in an agricultural sense and then in the nutrient impaired waters in the urban sense. So all of these things were able to be done very quickly.

Here's a couple of the map products that came from that study too. And those were also generated by the state folks that we were up there working with. You see for example, on the left the two of them on the left side; one is the agricultural watersheds set up for nutrients, TMDL development. Again, you had the four categories, the bluer the better. And then you had the urban watersheds for nutrient TMDL development in lower one there. That's a first draft healthy watersheds portrayal over there on the right. And the priority setting 319 target watersheds.

We also were able to work with the state and create bubble plots which also as has happened before. They were very thought-provoking. The one on the left-hand side shows about – there are about 250 watersheds in the Massachusetts study at the larger scale of watersheds, about 12's. But what you are seeing in this plot here, you are seeing the scores of all the watersheds across the state but the two different colors being used, the orange at the top 10% of a completely separate field based study done by the University of Massachusetts and some really great work they've been doing. And that uses an ecological index. And that was the top 10% scoring watersheds on the basis of that ecological index. The blue was the next 10% of scores. So not surprisingly there was a lot of agreement with those scores being high and the other types of scores we were seeing throughout the rest of the watersheds from the state. Knowing that those were high-scoring watersheds we would expect those to be up in the upper left quad which, as I said, is where the ecological scores were high and the stressor scores were low.

Now on the right-hand side of the slide you are seeing another product of another one of the screenings which was about flow impaired waters. And what you see there is the orange ones or the ones that actually had been reported as having flow impairments. And

you see not surprisingly since these were all flow related indicators that were chosen to do this screening then they scored pretty badly. But what is kind of thought-provoking about it is you might look at the fact that some of the ones that scored pretty badly also were not among the ones reported as flow impaired. So maybe that would be a chance to go take a look, check on what the flow situation is there. And on the other hand you had some of them scoring pretty well that were up in the upper left. And one would wonder, okay, maybe the flow impairments are not too bad or there may be something else that may explain that. So you do get insights from doing a plot like this directed at one particular theme, one particular type of impairment.

We also worked for a good long while in Maryland early on in the project. And again, a load of thanks to the folks in Maryland's TMDLs program and their nonpoint source program for working with us on this. And they were very interested in looking at two different scales as well just like they did in Massachusetts. On the larger scale and they were thinking which of these watersheds just generally are more restorable. But then at smaller scale the question changed. It was more like which catchments within these larger watersheds would most likely be able to improve the condition of the larger watersheds they were within? We realized then it was very important to be asking different questions and probably looking at different indicators when you were in a larger or a small watershed.

Here's just a little bit of the Maryland results. Now this is all of the impaired watersheds on the larger scale. Maryland working with them it was interesting because they had done a real lot of work on deciding before we even started to work with them what they thought their priority watersheds were. And the ones in orange are the ones that they had chosen totally independent of our analysis. But again, you see that seeing that these are all impaired watersheds here, then the ones in the upper left are probably the ones that have some better chance of recovery because of their scores. And you see that is in fact where a lot of the ones that the state had chosen as being of interest, where they attempted to fall there.

Now looking on the smaller scale. I know I'm talking mostly about state and statewide examples, but here's one about the tiny small subwatersheds within one of the Maryland watersheds. And in this case the interest was where are the watersheds that scored high for recovery potential that also were located where there was a stream and some public land so they might work with the DNR on buffer stream protection for buffers. And three watersheds popped up as a possibility.

Moving on from that, as I said we have been active with a lot of different types of applications but this is one I really want to tell everyone about. EPA Region IV which contains at least eight states in the southeastern US has been working on recovery potential concepts for the last several years. We've worked together on and off for a long time now. And they have prepared a terrific data set that covers the entire lower 48 states. And they have calculated about 200 different indicators, most of them centered on nutrients, sediments, and pathogens in an urban setting and pathogens in a rural setting.

But they also have developed analytical tools which I hope we'll be able to rollout. They are still in the working mode right now in draft. But there may be an online tool that will allow people to apply the same kinds of three dimensions, the ecological, stressor, and social that we use in the recovery potential with all these wonderful data sets. And we are now just starting to work together on some of the southeastern states.

Two other studies I just like to mention briefly before moving on in the next section and some more questions. Every time we have worked with a new locale whether it's a new state, watershed, whatever there is something that just seems so innovative and so different. And Minnesota was no different as another thing that proved to reveal some things that no one else had come up with. A highlight of Minnesota's approach has been that they have been very, very interested in exploring the social factors bringing this out in front of community groups. They've also been very successful at collaborating with the agricultural agencies and working with NRCS watershed planning and having EPA and the state and the USDA all participating in looking at differences in where you might go to work on certain watersheds. Terrific example of cross agency work.

Vermont also is another one which had a really unique feature that I think it's very promising for other places who could do this kind of work. Vermont's river morphology and channel condition work is just – I think it's the best in the country. It's been wonderful work and the idea of being able to bring that in along with other factors that reflect differences in restorability was a really unique opportunity. We had to kind of put this project on hold after the catastrophic flooding in Vermont but we are really anxious to pick it up again and help them out a little bit more with some more work in the coming several months.

So those are several examples of what kinds of things have been going on in other places and we are back to another opportunity for questions.

### **Menchu Martinez**

Thank you again for all of the questions. Doug, there's a whole slew of questions that refers to the weighting of the data. For example, it's not likely that a screening analysis would have the luxury of having data for all attributes. And so how does one deal with the shortage of that data and there is a related question. Would a weighted approach work when you have better data in one category or you have more suspect data in another? And does this mean that not every indicator should have the same weight? So this all pertains to the shortage of data and how does one account for that and how does one account for weighting data for the different attributes?

### **Doug Norton**

Very good. Yes, weighting I had not mentioned yet and as a matter of fact there some – a little bit more insight you will get into opportunities to weight your indicators when you see the live tool demonstration that Tatyana is going to do immediately following this questions section. But by all means yes, weighting is very valuable. It must be possible to do to elect this because they aren't all of equal significance, all of the factors you would choose. As



far as the idea of robust data for one indicator and not so great data for the other, that pretty much gets into a data quality decision. One of the ways in which the process of coming down to your final selection of indicators, if you look on the website and read through then you see there is kind of an initial large group of assembly of indicators that then becomes smaller as you look and you find the correlation analysis and find out that two or three of them are very, very close to measuring the same kind of thing or very tightly correlated. So you pick one out of those. And maybe you pick the one that has the best data that you are most comfortable with and eliminate the other two. Does that get most of the points in that? That was quite a complex set of questions all revolving around weighting but by all means yeah; the weighting is certainly a very important thing. The other thing if I read into that question thought it sounded a little bit like maybe worrying about having data on all the indicators. Well this is another thing. You don't need to have data on every indicator you are seeing it on. But you are really looking to have something in the realm of maybe 3-6 or 8 indicators in each of the three categories.

### **Menchu Martinez**

Thank you. On a related issue is, is there a short list of the most relevant or important indicators for each category that you would suggest?

### **Doug Norton**

I think that that really does depend on the reason why you want to do your screening. We do truly find some of the same indicators popping up time and again. I would say that the closest to maybe a favorites list I might steer you towards – on the website you see that the ones that have a PDF file on a reference sheet written up on them, those would probably be the ones that have been more popular and more important to use and for that reason that's why the PDFs are there. And there are 70 of those in total. So check on that on the website.

### **Menchu Martinez**

There are two questions related to how much time it takes to use this. And there is a state that is interested in using this as a scoring tool for its nonpoint source program to score proposals coming into it for a grant application. However, it would appear that the research required to come up with the score for an individual watershed could be intense. Is there any way to make this process more time efficient, assigned efficient as possible? And also there is a related question raised by another participant about how long does it really take to do RPS analysis.

### **Doug Norton**

Well, one of the things about actually having this kind of information is I think that I've run into all the time people who really are unsure where you would ever get information on a certain subject like some of these indicators are about. It's always a surprise to find out that as much data are out there as there are. Now that said, and they aren't all perfect for exactly what you want to do. It's not your dream data. Lot of times it's less than perfect, but that's why this is a screening tool. It can help you. It should not be driving everything you

ever wanted to know. It has its limits as you can imagine any tool like this would have but one of the things that always is a pleasant surprise is that there is usually a lot more data about a lot more indicators than you might think. A very common comment I have heard is I would love to do this, but you know I don't think my state has anywhere near all those different kinds of data. But you start looking and you start realizing I mean just remember what I just told you about the Region IV data set. All those 200 metrics they've been calculating. Also, take a look at the individual indicator write-ups on the website where we've not only talked about the indicators, we've talked about data sets that are out there on a national basis usually. So there may be some real surprises that in fact there are some ways to measure things you didn't think you could measure.

### **Menchu Martinez**

Thank you. We have a question in terms of the use of this. It seems that the examples seem to lean toward aquatic life use and impairments related to biological impairments or DO or nutrients. Would this tool also apply for indicators to assess recovery potential for recreational use, indicator bacteria, and fecal pollution?

### **Doug Norton**

Well, I will take the last two of those three first. And in fact, I think they have a lot of bearing on the first in that you are really talking about pathogen impairments overall. I think it is good also, again, to point back to the fact that the Region IV work which I participated in the initial discussion of what indicators might be relevant to looking at pathogen impairments and comparing differences in restorability. The first discussion we had on that was back in about 2008. And I know they've got many metrics calculated out on that basis. So yes, I think it can be done. And their work is definitely a good example. It all depends on the indicator choices. And that's why it's very important to phrase exactly what you want to get out of a potential screening rather than just say I'm just interested in general restorability which is okay. But you will get more out of it if you focus your questions better just like this. If you really say I'm looking at recreation and pathogens.

### **Menchu Martinez**

I think we have time for one more question for this question and answer session. How does the system account for the difference between the presence of a stressor and the effect of that stressor?

### **Doug Norton**

The presence of the stressor and the effect of that stressor? I'm not sure exactly what the question is getting at. But I will take a shot at answering that and that is that as a screening level tool then if the measurement is measuring the presence of the stressor then we are making the assumption of an effect. And you know that is always not necessarily going to be perfectly accurate. If something has been done to ameliorate that stressor then in that place where it has been done then that could be wrong, but that is why, as I said, this is a screening tool. You can usually proceed on assumptions like that and – but you also are aware of those assumptions and knowing that that is part of the uncertainty of your results.

### **Menchu Martinez**

Thank you. Now I'd like to turn it over to you Doug and Tatyana for the next presentation section.

### **Doug Norton**

Okay, thank you, Menchu. My voice is going to get a little break here in just another slide or two but I'm going to hand this over to Tatyana for a live tool demonstration. I will just give the intro to what this is going to talk about. That is again going back to the Maryland Recovery Potential Screening study that was done. I did talk a little bit about this earlier. And we were speaking of the larger watershed scale, 138 watersheds of which 94 have been identified as impaired. The state was interested in screening by eco-region among their three eco-regions and also statewide. They also then screened the sub watersheds within ten of the priority watersheds. And both of the TMDLs and the 319 nonpoint source programs were involved.

I do want to show this slide before I hand it over to Tatyana for the demo because as I said earlier oftentimes you start out and you go through a winnowing and narrowing down and focusing process with the idea of choice of indicators. And you see the numbers of how they first of all the numbers that were actually considered as valuable and then how many of them a smaller number could actually be measured and then among those after eliminating some of the highly correlated ones we got down to smaller numbers of nine, eight, and eight. And in this particular run, on what you are seeing here with five in each was a special selection of one of three different runs screening runs that used a five – they used different combinations of those nine, eight and eight indicators that were there.

But now then you're thinking back again that here is what those data were. You had for the one eco-region we're using in the demo there were I believe 27 watersheds that are going to be compared. And what we are going to use for them is showing the auto scoring spreadsheet, which is one of our most timesaving and accuracy saving tools in the use of this product.

So this slide just kind of captures briefly what happens in that tool Tatyana is going to demonstrate. You can enter the indicator names. Here is also in this tool where you add the weighting for individual indicators. You paste in the raw data and just a quick cut and paste action and then you hit calculate. It calculates everything. Puts out the summary scores and also puts out a values only summary of everything you've calculated.

So let me go ahead and pass this on over to Tatyana. I guess what we should do is minimize this for the time being briefly. And which one would you like to go with?

## **Tatyana DiMascio**

Thank you, Doug. I will take you briefly through the auto scoring spreadsheet and show you how it works using the Maryland subset of data from the example project that Doug had mentioned, just mentioned to you.

So in what you see in front of you is a spreadsheet that contains values for all the indicators that we selected for this watershed. Each watershed has unique identifier identified in column A. And it's very important how you organize your spreadsheet with this raw data and you will see why in just a few minutes here.

So the way you would typically want to organize your spreadsheet is specify the watersheds unique identifiers, their name or anything that would describe the watershed first, then you list indicators that belong to the ecological group of indicators. Then you will list your stressor indicators, followed by their social indicators. And the top row here you see your indicator names and subsequently at the bottom you see the values for each watershed.

So now I'm going to go ahead and switch to the auto scoring spreadsheet and show you how we put this data into the auto scoring spreadsheet. So this is the auto scoring spreadsheet. It contains several tabs on the bottom. The first two tabs give you instructions on how to use the spreadsheet in Excel 2003 and 2007 since there are various things that are relevant to each version. The next two tabs are relevant to a use for inputting data. And mainly the set up parameters tab used for inputting field names as well as the weights. So typically when you open this spreadsheet you would not see the indicator names already inputted in there. I went ahead and put those in there right now for the sake of time. But typically the user would have to type those in. And the way you want to type those in is in the same exact order as they appear in the data spreadsheet that I just showed to you.

So in our data spreadsheet is when you look at the fields and they go from left to right, that's how you want to input them from top to the bottom for each corresponding group of indicators. So as you saw on the data spreadsheets we had water ID which was the unique identifier, water body name and whether this water body was flagged as pass/fail by the state of Maryland. And then – I apologize. Then we have an ecological indicator field listed. You specify how many of them are there and corresponding weights. If you think one of their indicators should have a stronger weight than the rest of them you can specify the weight.

Similar you fill out the indicator fields for the stressor indicators as well as the social indicators. At this point, you're – the tool will set up a spreadsheet for you to enter data. If you go ahead click set up indicators and the spreadsheet shoots over a one tab and takes you to the indicated data into spreadsheet. As you can see the field names are organized in exact same order as we had them in the Maryland data spreadsheet. That's why it was

important to input the fields in that order so that once we get it to this tab we actually have them in the same order.

So having the fields organized in the same order all we have to do is go to the data spreadsheet, copy all of the fields over. And paste them into the auto scoring spreadsheet. So I'm using case special command. And we try to do that just to avoid any formatting errors. Sometimes Excel could be tricky in that way. So we recommend you use the case special.

Now we have all the field names and corresponding indicator values imputed into auto scoring spreadsheet. The next step will be to calculate your summary scores. And to do that you scale calculate. The calculation was successful. The scale calculation is completed and the spreadsheet is again shifts over to the next tab. This tab shows normal indicator values. And these are essentially the values defer them, take the raw values and recalculate them in the range from 0-1 normalizes them and these are the values that will be used in calculating the summary scores. The more probably the tab that is more of an interest to most of the users is the summary scores tab. And here you see your descriptive fields of water ID, water name, any other information and you will get into the index scores – ecological index scores and how this specific watershed – how does each watershed rank based on the ecological index score. The same way you see the stressor index score and the rank for the stressor index score it's important to know that the higher the stressor score, the lower would be the ranking. Therefore, the watershed with the rank one from the stressor score perspective has the lowest stressor score. Similar you see the social index score in the corresponding ranking. And the overall recovery potential score as well as the ranking. So this column, the ranking column here gets back to one of the variables Doug had mentioned previously in his presentation on rank ordering your results. So the user can just take this rankings right out of this spreadsheet and use them for further analysis of and output in terms of looking at the ranking.

The last tab puts the information from the two previous tabs all together for each watershed as well as all the summary scores. It's useful to you have all this information together because users can just grab for example, the last 10 fields with summary scores, export them to a new spreadsheet and use statistical Arc software or I guess Excel has functionalities to develop bubble plots. We are not going to do that in this presentation because it is rather time consuming. But I will show you how the user can also take all this information and link it to a GIS output based on the water ID. So I will go ahead and close Excel. And shift over to Arc Reader session. For those that are not familiar with Arc Reader, Arc Reader is a free software that allows users that are not familiar with GIS to use GIS data to identify attributes of GIS data without having the ability to actually manipulate the data. So it's pretty useful on day-to-day basis.

So here you see – you see the watershed from the Maryland example. The watersheds labeled in yellow are the ones that are labeled as pass watersheds. And you turn them off and turn the next layer on. This layer represent geographical distribution of eco-index

score. The scores were divided into four quartiles where the dark blue which is quartile one represents the best scores. Similar you can view the stressor scores. Social scores. And the overall recovery potential scoring.

The next thing about Arc Reader also is that it offers tools that a user can use to validate information a little further. For example, if somebody is trying to identify a connectivity corridor they can use a measure tool that allows the user to measure the distance between two watersheds or get a sense of the area of the watershed. In addition, to that the user can identify attributes for each watershed by for example; I see that a certain watershed scores really highly or poorly. For example, this watershed right here. I can get a watershed ID number. I can also find out the name of the watershed. The name of the watershed right here. And as well as I can find out which – what were the scores for this watershed from that eco-stressors, the social groups. So with that we will switch over to the slides.

So now that you saw how easy it is to use the tool once you do have all the data assembled as assembling the data really is the most time-consuming part of the screening process. It becomes relatively easy to run several analyses rather quickly. So often we get a question on what to do with multiple screening runs. And the answer is that you can choose – you can do – you can choose different indicators for each run and then look at the results and choose the one that you think is the most appropriate for your objective. Or the one you think that scores in a way that makes the most sense to you as you are familiar with the local area and your project. And the other way to look at the multiple runs is to actually combine them the scores from each run and to the total some sort of quantifiable total value and evaluate watersheds based on that. And with that, we will take any questions.

### **Menchu Martinez**

Thank you Tatyana and Doug and I think you may have just ended your session with the first question I was planning to read which was the first one who determines the values for the stressors and also the value for the indicators? And are these values ever challenged?

### **Doug Norton**

The – for example, I guess the questioner is looking at the idea of weighting. And the fact is that this method is designed to be a user driven assignment. I would not be surprised at all if there are opportunities to question and debate eventual weight used. As a matter of fact, we recommend that assigning weights and assigning values to the different indicators is a group process where you can go through and build consensus.

### **Menchu Martinez**

There's a question that was asked in terms of screening applications of this tool. Has this screening been applied to any Mississippi River Basin Initiative or MRBI watersheds?

**Doug Norton**

We are actually working in background on doing that in the coming year. But we do not know – we are not talking about doing it on the whole Mississippi River Basin, which does include 32 states. But we are working with the MRBI Initiative folks and with a couple of the states in the initial discussions of their interest in using this tool for possibly various purposes like nutrients that might help the Gulf of Mexico.

**Menchu Martinez**

Thank you. And for the Region IV analysis example that you had shown, is the data set developed by Region IV available for download?

**Doug Norton**

I will have to get back to you on that if you would follow up with an e-mail to me. I know that right now they have the data. They are interested in users using the data, but to my knowledge, it is not kept on a public server right now that would be easy to just browse them and download the individual indicators. That would be something maybe that they hope they can get support for in the future or we may be able to work together on that to make it possible but right now it has just been a matter of not being totally done with that and not having the funding yet to make that available.

**Menchu Martinez**

Thank you. And are there plans to do training or workshops specifically for each or any states interested?

**Doug Norton**

What we have done with training has been we did offer one regional training course in the Northeast back when we had more of a travel budget then we do now. And that was very nicely received. All six states were able to attend that. An effort to put together a similar course for the south-central US was unable to be carried out last year because of funding and travel limitations. But what we did in that case was about a two-hour webinar much like today. So two hours is not quite what a day or two is, but it certainly gets you partway. The other thing though that we have done is we have actually done webinars directly to specific states. And anyone who is able to set up that technology, Tatyana and I can certainly call in and talk to you about a more focused part of the process or working with your own data or may be facilitating choices of indicators or anything that would help you out. So we will try to work around the limits in our budget and the limits in our travel as best we can. Fortunately, today's tools make some of that possible.

**Menchu Martinez**

In terms of the examples that Tatyana walked the participants through, there was a question about where one can find the URLs for the spreadsheet. I understand that these are available on the website.

**Doug Norton**

That's right. The tools section actually the next section that I'm about to go through which would be the last section of today's webinar does actually take you on a tour of the website. The auto scoring spreadsheet tool is a free download from that website, but in addition to it there are also a number of downloadable tools that you will find on the website. There is actually a tools and resources section. And the local plotting program is another one of those. With each of these there is not only the downloadable tool but complete instructions on exactly how to use them.

**Menchu Martinez**

Thank you. A couple more technical questions have come in related to flow. One says that this is a great tool in watersheds where flow monitoring data is available. What about watersheds without flow monitoring? Any rules of thumb for assessing restorability in non-flow watersheds?

**Doug Norton**

Yeah, flow – if I could wish wonderful data onto everywhere flow would probably be at the top of my list. It's terrific when you've got it. It's not crucial when you don't although it is sorely missed. The idea of being able to substitute anything in particular for flow is difficult because although you could make some assumptions about flow from some of the data that USGS have and from looking at landscape and watershed characteristics and precipitation maps, but what that does not really account for is the modifications of flow. The departure from expected flow regime that you have because of human activities. And that is what is so valuable to have when you have the flow data. So it's tough to do without it but I guess the other thing that I would say is you are still able to compare even when you are missing a factor like that that we know is important you still have several other key factors that can compare. And the weight of evidence of all of them altogether tends to be valuable to make that comparison anyway.

**Menchu Martinez**

Thank you. I think we have time for one more question before we turn it back to the website demonstration. And this question pertains to how does one account for barriers to aquatic conductivity and fish passage relative to culverts, dams and other stream crossings when selecting stressors?

**Doug Norton**

That's a great question. I think that is from one of the fisheries members of our target audience out there perhaps. There are some data sets that are out there about aquatic barriers that I can't remember the name offhand, but I believe I heard a briefing on this through the Fish and Wildlife Service. So that would be – part of it would be to try and find that kind of a data set. The dams national data set – the national inventory of dams is another data source but there also are different levels at which one can take that. There has even been some work in the Northeast that has looked at abandoned dams on a very, very small dams. Very, almost pre, early colonial day dams that are out there for several



states. So some of that information is also very useful when you have it. You will notice also that some of the ecological and the stressor indicators both deal with this idea of barriers, over conductivity. And recolonization potential even though it's in the ecological category you can see there's a bit of the inverse of it in the aquatic barriers indicator listed in the stressor category.

**Menchu Martinez**

Thank you. Thank you Doug. Before I turn it over to you, I would just like to thank one participant who did a follow-up answer to a question that was raised previously about the flow data or lack of flow data. The participant indicated that USGS typically publishes regression equation for flow and streams that are not monitored.

**Doug Norton**

Is that the stream stats data? I think that is stream stats. Yes, that is kind of what I was grasping for. Thank you for bringing that up.

**Menchu Martinez**

Thank you. Now I'd like to turn it over to you Doug.

**Doug Norton**

Great. Okay. Well, we are coming up on the final section of the webinar. You all are hanging in there. We are too. And this part is the fun part. Because it is just a little bit of a wrap up of everything that you have seen before but it's a chance to go on to the website live and go ahead and see what we have been putting together online just as a basic review of some of the things you've already heard here. So I'm going to pop off of the PowerPoint and over onto the website itself. And bring that up.

And this has been cycling through our automated banner so I will move it back to the real pretty first picture. And as I have alluded to this a few times, what we have really tried to do is recognizing that we don't have nearly the travel or the time to potentially reach out to everyone who might want to use a tool like this. The website that is set up as a tools and systems and a resources informational website was our next best thing we could think of. The structure here really involves three different basic parts. And one is step-by-step directions on exactly how one goes about Recovery Potential Screening. The second major part is tools and resources. And the third is all about the indicators. There is a wealth of information in there. And quite a bit about each one that could be very helpful to the folks that would like to try this out.

The quick links at the bottom of the page are a good way to go to each of those three main areas. Also want to just briefly mention that the overview page is a great place to look if you just want it all in a nutshell exactly what all of this is about. We all do agree that this is a – continues to be a work in progress, a learning area where we will never stop learning about more factors that teach us more about differences in restorability. So we always like to emphasize we make this appeal to send in any papers, any ideas, things that you

learned and experienced about different information that will help us learn more about different Recovery Potential Factors.

Now going to one of these first three areas, the screening methodology is set up as just a basic seven step thing that you can read through probably in less than an hour if you just read through and you don't take any of the little side trips of information. So it's another good way to get a great overview of the process and see what's involved. But what is more compelling about the individual steps is that each one of them is thoroughly hot linked through the website to different tools, to different resources and other parts of the site that are all placed in the context of steps one through seven.

So you can go to any one of these and take a little side trip off the basic direction to get something that was referenced there and come back to the directions. But just as part of this quick tour then let's go from there onto the second major area and take this little side trip off to step two over to the recovery potential indicators section. And here you have a very interesting structure that will help you be able to browse potential indicators at any of three levels of detail. You can look at a simple list, just a list of names, you can look at them with a summary paragraph or you can look at about 70 of them or so that have a reference sheet that has more like – anywhere from about 1 to 25 pages of information about one indicator. So the way you can use this site is entirely up to you. You can use it at any of those levels of information. But the way to structure – let me demonstrate this live here. These key components that you saw very early in the PowerPoint slides today, the ecological key components, the stressor and social context key components. Then all of those are listed here. And if you are actually for example, let's just say we are interested in possible indicators for disturbances in the stream corridor. Just click on that and it's actually hot linked to a list of candidate indicators you might want to consider of things that go on in the corridor that can influence restorability.

So these also, if you look over into them, let's just click on one of them here. Corridor percent urban. That then brings up – here you are at the second level of detail here the summary paragraph. And you will see right in through here, the brief description of corridor percent, urban, why it's relevant to recovery potential. And also as mentioned earlier, and we've done a lot of work trying to identify what types of data sets whether they be GIS or otherwise that are out there that you might find useful to actually measure this indicator. And in this case, it's even got a hotlink as to where you could go to pop off into getting to the National Land Recovery Database. And as mentioned the different years for which National Land covered data are available and where to find them.

Now if you want to even go beyond that level of detail, we also notice that this indicator, as a PDF, and its six pages long. So you can click on that, gives us a chance to open the PDF file and there we have again the basic summary information here, but we also have if you scroll down, when you go below the first set of standard information which runs about half or three quarters of a page, then you start to hit bulletized information that are essentially excerpts from different scientific papers. All of which have something or other to do with

the indicator that you are reading about. And in this case, there's about 5 1/2 pages of bulletized information about urbanization in stream corridors. So that varies as to which indicators are better developed than others and have more information in the literature. And some things just especially the social category are not as thoroughly documented as in the stressor or the eco categories. But that's partially because I don't think people have tended to write a lot of published papers about differences in effects of having a TMDL in existence or not having a TMDL in existence. Or of a thing in practice rather than something people tend to write papers about.

But you see you do have the opportunity to look at indicators and study them in great detail from the reference sheets or study them on a more general level. Or you can just look at a list.

Now the third category, just before we wrap up here, is the tools and resources part of the website. Now you will notice each one of these major subpages is set up with tabs along that top row. And in this case, then you can just read across the tabs and see what the makeup is up a lot of these tools and resources. I mentioned early on that we had done a literature review and there was a database of over 1700 references that have to do with the various factors that were then turned into the indicators. This literature database is available as a download. It's a Microsoft Access file. And you can download the whole thing. It's even open. You can add your additional references to it. You can also go to the scorings tools tab and there you can find the auto scoring tool which Tatyana demonstrated. You can also go to – you see the displaying results tab. You go to that and you find a whole description of displaying results as rank ordering, as mapping or as bubble plots. And there is a place where you could download the script which uses art – to display the bubble plot format out of the data that was calculated from the auto scoring spreadsheet. There is also a section on publications and training including a 2009 publication on recovery potential we did in environmental management. And there are example projects descriptions from three different projects and I hope we will have more in the near future. And there are related websites because there are plenty of other tools out there which do grapple with these difficult challenges of restorability and we want to help them do whatever they can do to make more successes in other areas as well.

But – and that is basically all I wanted to say about the website itself. So I will drop that down and go back to the PowerPoint. I'm just going to skip past several of the slides. In case the Internet connection was not available, I just put those together so they are in the slides if you have a copy of the slideshow.

So this is wrapping up here. Just as a final bunch of thoughts, we have a number of ongoing screenings that are still active. We have inquiries from a number of other areas and we do our best to help people out with them. We also will continue to be collaborating with Healthy Watersheds Initiative projects and we are very excited to be doing some work in the same areas seeing if we can work up that idea of protecting and restoration synergy really means. We are looking at expansion opportunities to go ahead and for example,

work more with people on the watershed level, in individual watersheds. As you can see most of our experience has been looking at across whole states, which is very difficult because it often involves hundreds or even thousands of watersheds being compared. Different kinds of questions, and different opportunities and techniques should emerge when we look at the watershed basis with only 10 or 20 or something like that, sub watersheds to compare.

But to the extent that we can do, we have some technical assistance available for in particular the state scaled projects are big enough that they really need the help. And we've been able to do that in a few different cases. We will continue to do that this year as far as our resources can sustain. But also, we are happy to take phone calls or e-mails from folks on a watershed level too. And we are very interested to see your techniques used on that basis as well. And overall then, thank you very much for your time and attention.

**Menchu Martinez**

Thank you, Doug. I think that answers the question that I was just about to pose to you that was sent by a participant in terms of the map of RP screening activity the person was curious as to who actually does the work. Is that the state, EPA headquarters or EPA region?

**Doug Norton**

That's an excellent question. And actually, I need to apologize for not fully answering a previous question. I realized I cut short. Someone was asking how much work it takes to actually go through a whole screening. I never did get to that. I got up in the first half of the answer. But that is entirely dependent on the amount of effort necessary to come to agreement on what you are screening for, and the type of condition that the – it's usually the GIS data are in. For example, a state with a pretty good GIS data set of factors and a lot of the data already there that would easily be measured for indicators can actually take on a Recovery Potential Screening quite quickly and efficiently and have some results within a matter of weeks. And I think the Pennsylvania example that I talked about was one example of that. On the other hand if you are really starting from scratch, a lot of going out and finding GIS data sets and measuring them has to happen too. Then that can be probably a few months to several months to actually go through all of that. But once you have actually compiled the data as the measured indicators, then all of the opportunity to actually do new and different screenings for just a countless number of different purposes becomes very, very quick at that point.

**Menchu Martinez**

Thank you, Doug. So I understand that that would also answer also the question in terms of how long it would take to try the tool for a small watershed if one had reasonable amounts of data and then perhaps use that as a way to sell one to management in applying it for other watersheds in their jurisdictions.

**Doug Norton**

Sure, sure. That – it all depends on how soon that initial data table can come together. So that is key if you can actually assemble the indicators in a data table and show how it's done then it works quite well from there.

I'd like to go back to the question about who actually does the work when we help out, when we do the technical assistance. Usually one of the most important things is that the receiver of the assistance really has to be the ones that decides what they want to screen for. They would want to set their objectives. They want to have enough people in the room or are going to be needed to buy in on what indicators are going to be looked at. Beyond that, we facilitate the process of how you'd select the indicators. We also can provide some of the GIS data compilation help. And we also train people in how to use the tools with their own data sets when they are finished up. And that can actually be a pretty good thing to work out. We have done this in a couple of cases with at least two states entirely on a separate location. And these are places where we have never actually been there. So that ends up being an example that it's pretty easy to do.

**Menchu Martinez**

Thank you. There is a question that relates to restorability versus success of restoration. Is it possible to use the index to find out if it's actually possible to recover a watershed? Would there be a number under or over which it would not be practical to try the restoration?

**Doug Norton**

I'm glad that was asked because again this is something I usually mean to mention. I do not think that it's an appropriate use to consider anything un-restorable on the basis of this tool. And that is just because it is such a complex decision to actually say something is totally un-restorable. It is more that this is actually relative differences in comparison. You have greater and lesser likelihood of being able to be restored or greater and lesser difficulty to do a restoration but to actually make a hard bright line that this is restorable and that is not restorable is not the purpose of this tool.

**Menchu Martinez**

Thank you. What about using this tool for other aquatic resources such as wetlands and identifying where there is greatest potential in need for restoration of wetlands to help address water quality issues?

**Doug Norton**

Sure. I think that the choice of indicators would probably have to be modified somewhat but wetlands, like any other water of the United States, response to watershed inputs and watershed dynamics. And a lot of the same kinds of principles that I know you have heard me talk about streams today but that was not intentionally to be exclusive to streams and certainly any type of water body can be compared and water bodies in their watershed can be compared. You have the data and you have the right indicators.

**Menchu Martinez**

Another question relates to statistical analysis done to determine which factors were most indicative of prediction. Was that done and if so, what?

**Doug Norton**

As I talked about that question before, then that is something that tends to be important to happen on a particular study. We see such differences from places to places throughout the country that we have not made an effort to call particular indicators out as more important than other indicators by their statistical power. It's just because the circumstances vary so much from place to place.

**Menchu Martinez**

A question was asked about the applicability of this approach for lower watersheds at the HUC 8 level, for example.

**Doug Norton**

Okay, is that the whole question as regarding those?

**Menchu Martinez**

Yes. Could this approach work for large river basins?

**Doug Norton**

You could compare a number of different watershed scales. You could use this on the HUC 12 – or sorry on the HUC 8 level but you know, the HUC 8's are a watershed unit that actually approaches 1,000 square miles in size. So you often have a lot of differences of very, very heterogeneous differences throughout those watersheds. So if you are looking past all of the watersheds you're a little more likely to be able to – to compare something that does not differ so much from one end of the watershed to another.

**Menchu Martinez**

Doug, a question was asked if this would be useful in the USGS SPARROW model or other models such as LSPC or SUBL.

**Doug Norton**

I have actually had conversations about that. We have used some of the SPARROW model outputs as indicators in some of the Massachusetts work. We expect to be able to use SPARROW outputs with regard to the nutrients analyses that we are working with in the coming year. So most definitely, those models are possible inputs. The main thing is uniformity of the data. You have the data to the things you want to compare on the proper scale of watershed then there should be opportunity to go ahead and use that.

**Menchu Martinez**

Thank you. A question was asked whether this would work for a 64-bit ArcView system?

**Doug Norton**

64-bit ArcView system. Tatyana, do you want to take that one? [laughing]

**Tatyana DiMascio**

I think that – I'm sorry. I'm not familiar with ArcView system. I work only with ArcGIS nine and 10. But I think as long as you can join the fields the same way you can do in the rest of ArcGIS – as long as you can join the fields to Excel data you should be able to import your recovery potential scores back into the mapping application. And as long as you can do all the GIS processing which I know you can in ArcView to generate summaries for watershed basis all you have to do is export those scales back into a database such as Excel or Access to transport those values into the auto scoring spreadsheet. So I think the answer is yes, it's just a matter of how you go about generating the values.

**Doug Norton**

The ArcView and ArcInfo tools are not really the ones this all depend on anyway so that would only affect the mapping. Now, I'm going to turn this over to Anne Weinberg again. It looks like we've reached the end of our time. So Anne, take it away.

**Anne Weinberg**

Okay. Thanks Doug. Thanks Tatyana and thanks, Menchu. Thanks to the audience for a great set of questions that you have provided. You saw in the previous slide the contact information. Please do contact Doug and Tatyana with any of your questions. It seems like they are working with a number of states and are quite willing to work with others.

We are also – we want to provide information about the certificate that you can download. This was available in the URL here. Please record this so you can put that in your browser. I will also offer that you can send me an e-mail and I will send you that URL because it's rather long. So if you send me an e-mail to Weinberg.Anne@EPA.gov and that's spelled Weinberg.Anne, Anne with an E. @EPA.gov. So if you send me an e-mail I will send you that URL and you can document your learning during this webcast and type out a certificate for yourself or groups – number of people.

I also want to at this point put in a plug for our next Watershed Academy webcast, which will be An Introduction to the Clean Water Act. This webcast will be on March 15<sup>th</sup>, 2012 from 1:00 to 3:00 p.m. Eastern Standard Time. This webcast will be held in honor of the 40th anniversary of the Clean Water Act that will be kicking off in March. And registration will be open in a few weeks at EPA.gov/watershedwebcast.

One final reminder to please fill out the webinar evaluation survey, which should appear on your screen at the end of the webinar. Please do consider completing this survey and letting us know your thoughts. We do appreciate your feedback as we work to improve our webinars.

And at this time, I would like to conclude today's webinar. Again, thank you, Doug and Tatyana for presenting today. Thank you Menchu, for your help in posing questions and of course, thanks to everyone who has joined us. That ends our webinar today. Thank you again for joining us all.